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## The Economics of Injunctive and Reverse Settlements

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February 2009

*Abstract:* This paper extends the economic literature on settlement, and draws some practical insights on reverse settlements. The key contributions to the economic literature on settlements follow from the distinction drawn between standard settlements, in which the status quo is preserved, and injunctive settlements, which prohibit the defendant's activity. The analysis identifies the conditions under which injunctive settlements (rather than standard settlements) are likely to be observed and the conditions under which reverse settlements will be observed among the injunctive settlements. We also examine the divergence between private and social incentives to settle and policies that would minimize socially undesirable injunctive settlements. The results are applied largely to competition-blocking litigation, such as patent infringement and antidumping. However, the analysis of settlement here has broader implications for efficient remedies and legal rules.

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## I. Introduction

This paper presents an economic analysis of injunctive settlements – settlements that implement the terms of an injunction sought by the plaintiff. The best known examples are observed in the context of competition blocking litigation, such as patent infringement and antidumping litigation.

In the patent-antitrust context, a great deal of controversy surrounds “reverse settlements” in patent infringement litigation. The reverse settlement involves a plaintiff in a patent infringement suit (for example, a pharmaceutical company with a patent on a drug) paying the defendant (for example, a manufacturer of a generic drug) to settle the case. The reverse settlement typically includes an agreement that the defendant will restrict sales of the allegedly infringing drug. At present, federal circuit courts are split on the legality, under the antitrust laws, of reverse settlements in patent litigation.<sup>1</sup>

In the antidumping context, a similar type of settlement is observed. These are administrative proceedings in which the plaintiff is technically the United States Department of Commerce. However, the Commerce Department’s lawsuit is brought on behalf of or at the instigation of domestic firms that claim that a foreign seller has “dumped” goods at unreasonably low prices in their domestic market. Some antidumping disputes are resolved when a complaint is withdrawn and the foreign seller increases its price in the domestic market. In other words, the foreign seller opts for some share of the domestic cartel’s profits rather than continuing to fight the dumping charge. As we will see below, this type of settlement is indistinguishable in economic terms from the reverse settlement.

This paper aims to extend the economic literature on settlement, and to draw some practical insights on reverse settlements. The key contributions to the economic literature on settlements follow from the distinction drawn below between standard settlements, in which the status quo is preserved, and injunctive settlements, which prohibit (or constrain) the defendant’s activity. In many instances, both types of settlement are available to the parties. Consideration of both types greatly expands the zone of mutually agreeable settlement arrangements beyond that in traditional economic analysis of settlements (Landes-Posner-Gould framework). The analysis identifies the conditions under which injunctive settlements (rather than standard settlements) are likely to be observed and the conditions under which reverse settlements will be observed among the injunctive settlements.

The basic model challenges some of the established stories about the economics of settlement. The majority of cases settle in this framework not because the parties have

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<sup>1</sup> Favoring legality: *In re Tamoxifen Citrate Antitrust Litig.*, 466 F.3d 187, 190 (2d Cir. 2006) (refusing to impose antitrust liability where generic accepted payment in exchange for agreement to delay entry); *Schering-Plough Corp. v. FTC*, 402 F.3d 1056, 1076 (11<sup>th</sup> Cir. 2005) (same); *In re Ciprofloxacin Hydrochloride Antitrust Litig.*, No. 08-1097 (Fed. Cir. Oct. 15, 2008) (same), *available at* <http://www.cafc.uscourts.gov/opinions/08-1097.pdf>. Opposing legality: *In re Cardizem CD Antitrust Litig.*, 332 F.3d 896, 908 (6<sup>th</sup> Cir. 2003) (finding per se antitrust violation in agreement to delay generic entry); *Andrx Pharm., Inc., v. Biovail Corp. Int’l*, 256 F.3d 799 (D.C. Cir. 2001) (same).

the same beliefs regarding trial outcome, in addition to similar stakes, but because when the full range of settlement agreements is taken into account litigation is not a rational outcome in most cases. And when the parties have the same beliefs regarding trial outcome, settlement will occur no matter how divergent the stakes.

The remainder of the paper examines the conditions under which injunctive and reverse settlements are likely to be harmful to social welfare in the context of competition-blocking litigation. We also examine the divergence between private and social incentives to settle and policies that would minimize socially undesirable injunctive settlements. If reverse settlements were barred, the potential litigants could switch to predispute waivers. We examine the divergence between the private and the social incentives to waive in the competition-blocking context, as well as policies to minimize socially undesirable waivers. One new policy examined here is an optimal penalty that would align private and social incentives to settle or to enter into a predispute waiver agreement.

We find that in the antidumping context, it may not be socially desirable to ban injunctive settlements. However, there is a strong case for banning reverse settlements (as an especially harmful type of injunctive settlement) in the antidumping context. In patent antitrust, the case for holding reverse settlements per se unlawful under the antitrust laws is weak.<sup>2</sup> A reverse settlement may signal a weak claim on the part of the plaintiff, but it may also occur because the stakes associated with the injunction are high. The stakes may be high because of the anticompetitive potential of the injunctive settlement, or because the injunction supports substantial market development and innovation incentives. The mere observation of a reverse settlement would not permit an observer to know whether the settlement is socially beneficial or detrimental. The model suggests the economic factors that should be considered in a rule-of-reason analysis of reverse settlements in patent infringement litigation.

The analysis here applies to all types of litigation. One result is that the reverse settlement is part of a family of remedial dispositions that includes the compensated injunction of Calabresi and Melamed (1972) as a special case. The injunctive settlements studied here could also describe settlements in which the parties agree to operate under alternative legal rules. Such settlements could minimize the scope of inefficient legal rules and lead to the adoption of private norms in place of the law (Ellickson, 1991). Widespread adoption of private norms could explain a tendency toward efficient common law (Rubin, 1977).

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<sup>2</sup> This conclusion is in opposition to that taken by the FTC in federal court litigation and of several commentators, see Crane (2002); Cotter (2004); Hovenkamp, Janis & Lemley (2003); and Hemphill (2006). In addition, the European Commission has issued a report on patent practices, including settlements, that suggests the possibility of legal action against major pharmaceutical companies that have entered into reverse settlement agreements with generic sellers, see <http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/08/746&format=HTML&aged=0&language=EN&guiLanguage=en>. On February 3d, 2009, U.S. senators Herb Kohl and Chuck Grassley introduced legislation to ban reverse patent settlements in pharmaceutical patent disputes, see <http://kohl.senate.gov/press/09/02/2009203B19.html>.

The analysis below builds on two simple models from the economics of litigation literature. One is the familiar workhorse Landes-Posner-Gould settlement model. The other is the waiver analysis in Hylton (2000). Both models are extended to take into account external effects in the context of competition-blocking litigation.

## II. Background

Injunctive and reverse settlements can be observed in any area of litigation in which plaintiffs seek to enjoin some activity of the defendant. One common example of this type of litigation appears in nuisance cases, where the plaintiff may sue for damages and to enjoin the defendant's nuisance-generating activity. A settlement could involve the defendant agreeing to discontinue his activity.

Competition-blocking litigation provides the most prominent examples today of injunctive and reverse settlements. Competition-blocking litigation typically involves a plaintiff with market power against a defendant who intends to undercut the plaintiff in its market. The plaintiff's interest is to maintain the profit it earns from its monopoly. The defendant's interest is to maintain the profit it earns from undercutting the price set by the plaintiff.

Let  $G_p$  represent the gain to the plaintiff (incumbent monopolist) from blocking competition and  $L_d$  represent the loss to the defendant when competition is blocked. The interests at stake in competition blocking litigation can be described by Figure 1. The rectangle denoted  $G_p$  shows the profit earned by the plaintiff when he charges the monopoly price  $p_m$  rather than the competitive price (given his cost structure)  $p_c$ . The social cost (or deadweight loss) from monopolization is shown by the triangular area  $W$ .

The competitive price for the plaintiff  $p_c$  is equal to its unit cost. The rectangle denoted  $L_d$  represents the profit earned by the defendant competitor when he undercuts the unit cost of the plaintiff. The minimum price for the defendant is  $p_r$ , which is equal to its unit cost.

In the antidumping context, a domestic cartel earns the profit shown by  $G_p$  when it excludes foreign competition. If the cartel cannot block foreign competition, the foreign firms will enter and charge a price slightly below  $p_c$  and take the market to themselves, capturing  $L_d$ . Since  $L_d$  represents the profit available to the foreign sellers, it also represents the loss imposed on them by a competition-blocking injunction.

In the patent-antitrust context, the drug patent holder charges  $p_m$  when it blocks competition from the generic. If it cannot block the generic's entry, the patent holder will reduce its price to  $p_c$ . Still, the generic seller may be able to earn a profit of as much as  $L_d$  by undercutting  $p_c$ .<sup>3</sup>

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<sup>3</sup> This is an admittedly simple version of competition between an incumbent and a generic seller. In many instances the generic entrant sells to price-sensitive consumers while the incumbent sells to brand-loyal consumers. As a result, the entry of a generic is sometimes followed with a price increase by the incumbent seller, see Blair & Cotter (2002).

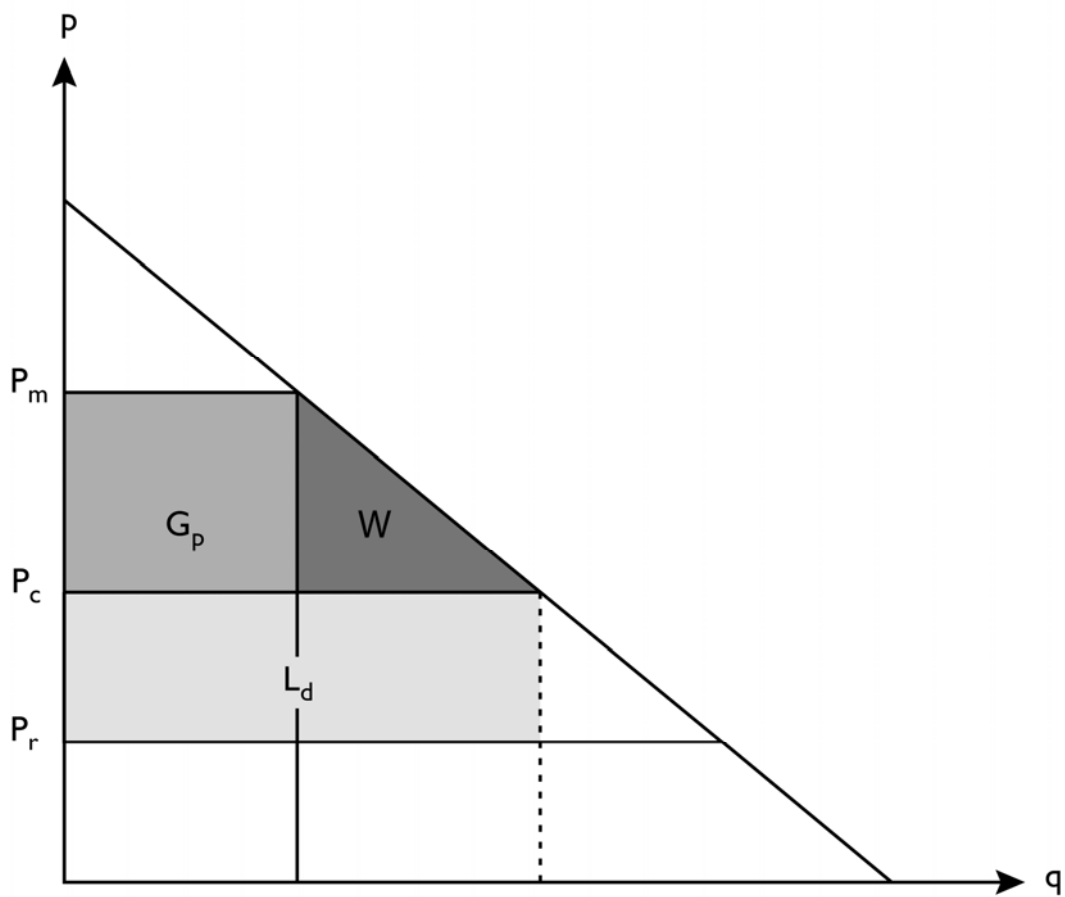


Figure 1: Diagram of Plaintiff's Gain ( $G_p$ ), Defendant's Loss ( $L_d$ ), and Deadweight Loss ( $W$ )

### III. Basic Model

In this part we examine the incentives driving parties to litigate and to settle when the lawsuit seeks both damages and an injunction (injunctive litigation). The standard economic analysis of litigation examines the lawsuit for damages (standard litigation). Since the standard economic analysis of litigation is familiar, we will devote some effort here to explaining how it applies to competition-blocking lawsuits.

The litigation process is one in which the plaintiff files a complaint, which is then either settled or prosecuted to a final judgment. The final judgment enjoins the defendant's activity. In a competition-blocking lawsuit, the final judgment would require the defendant to increase its price and cede market share, thus losing its gain from low-price entry, and perhaps to transfer money as compensation to the plaintiff.

In the patent infringement setting, the plaintiff prosecutes his own claim against the low-price defendant. That claim can lead to an injunction against the generic seller as well as damages for the losses suffered by the plaintiff from infringement. In the antidumping context, a government agency (the U.S. Department of Commerce) prosecutes the claim. But the plaintiff (the industry whose interests are represented by the Department of Commerce) can lay claim to the antidumping penalty under the "Byrd Amendment" (repealed in 2005).<sup>4</sup> The final judgment typically requires the defendant to increase its price, thus losing its gain from low-price entry, and to pay an antidumping penalty.

Let  $P_p$  be the plaintiff's perception of the probability of winning its complaint,  $J_p$  the payoff to the plaintiff and  $C_p$  the cost to the plaintiff. Complaints are filed when the net reward from litigation is positive,  $P_p J_p - C_p > 0$ , a basic assumption in the economics of litigation (Shavell, 1982a). In the patent infringement setting, the plaintiff's perception of the probability of winning is determined by his prediction that the court will find that infringement has occurred, which is both a function of the patent's validity and the nature of the defendant's conduct. In the antidumping context, the plaintiff's perception of the likelihood of victory, which is guaranteed by a dumping finding, is high in comparison to the civil litigation context because disputes are tried within an agency that is charged with representing plaintiffs' interests.

The plaintiff's judgment is made up two components, the gain the plaintiff gets from the injunction,  $G_p$ , and the damage award  $D$ . A plaintiff will file a claim when the expected net gain from litigation is positive,

$$(1) \quad P_p(G_p + D) - C_p > 0 .$$

A suit may be filed even though the anticipated damage award is zero, provided that the plaintiff values the injunction (or the precedent effect) highly enough. Conversely, a

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<sup>4</sup> On the Byrd Amendment, see "Byrd's Bad Idea is Back, Wall Street Journal, Opinion Section, Monday, August 11, 2008, at A14. Although repealed in 2005, there have been efforts to reenact the Byrd Amendment.

lawsuit may be filed even though the injunction, or precedent effect, is harmful to the plaintiff, provided the anticipated damage award is high enough. For example, a plaintiff might sue to shut down a nuisance-generating enterprise even though its shuttering actually harms the plaintiff (say, because he loses his job). Of course, the plaintiff could avoid the loss by not seeking the injunction. But the plaintiff may prefer to seek the injunction because of its effect on the settlement value of the case.

#### *A. Continued Prosecution of Complaints*

The defendant has to worry about the total cost of the lawsuit, which consists of the cost of an adverse finding and the cost of the process. Let  $P_d$  represent the defendant's prediction of the likelihood of a finding a violation,  $C_d$  the litigation cost borne by the defendant, and  $J_d$  the defendant's assessment of the cost of the judgment. The judgment consists of the loss to the defendant from the injunction and the damage award against him:  $J_d = L_d + D$ . The total cost of the lawsuit to the defendant is therefore

$$(2) \quad P_d(L_d + D) + C_d .$$

The total cost of litigation to the defendant may be substantial even if the anticipated damage award is zero. Conversely, the total cost to the defendant may be substantial even when the injunction benefits the defendant, as when the defendant is forced to shut down a money-losing business.

In the context of competition-blocking litigation, the cost of the judgment to the defendant consists of the loss that results from being forced to raise price and cede market share plus the amount the defendant will have to pay as compensation to the plaintiff.

If the expected net gain to the plaintiff from the lawsuit (1) is less than the defendant's total cost of litigation (2), the parties will settle. Thus, settlement occurs when

$$(3) \quad P_p G_p - P_d L_d + (P_p - P_d) D < C_p + C_d ,$$

which is the familiar settlement condition of the Landes-Posner-Gould model, modified to take asymmetric stakes into account.<sup>5</sup> Litigation is essentially a bet with process costs. The left hand side of (3) is the ex ante joint expected value of the lawsuit (the bet). The bet is maintained until the payoff event only if the joint value exceeds the process costs.

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<sup>5</sup> This assumes that the probability of an injunction is the same as the probability of an award of damages. That may not be valid in all cases. For example, in nuisance litigation, courts are quicker to provide damages than they are to provide issue an injunction. If the probabilities of a damage award and an injunction differ, the settlement condition changes to  $P'_p G_p - P'_d L_d + (P_p - P_d) D < C_p + C_d$ , where  $P'_p$  and  $P'_d$  represent the perceptions with respect to an injunction and  $P_p$  and  $P_d$  represent the perceptions with respect to damages. To keep the model simple, we will stick with the assumption that the probability of damages is the same as the probability of an injunction. The results are easily changed for the case in which the probabilities differ.

The joint value of the bet consists of two components: the injunction and the transfer of a fixed sum of money. Think of the injunction as a token transferred from the defendant to the plaintiff. The expected value of the token to the plaintiff is equal to his estimate of the probability of victory multiplied by the value of the token to him. The joint value of the token transfer game is positive only if the plaintiff's expected value exceeds the defendant's.

This analysis suggests that the economics of injunctive litigation are similar to the standard litigation analysis (Landes-Posner-Gould) in which the parties have asymmetric stakes. In the standard litigation scenario, consistent beliefs on the litigation outcome ( $P_p = P_d$ ) implies that all cases settle, unless the parties have asymmetric stakes. Similarly, litigation to judgment in the competition blocking context may occur, even though the parties have consistent beliefs, because the stakes differ.

However, the Landes-Posner-Gould framework is incomplete in this setting. In spite of the similarity between injunctive and standard litigation, there are substantial differences between the two settings. Unlike the standard litigation context, the prospects for settlement in the injunctive context are not explained entirely by the Landes-Posner-Gould model. The reason is that the standard approach does not incorporate the incentives for a settlement in which the defendant agrees to forgo his preferred option (thus, forfeiting  $L_d$ ) in order for the plaintiff to obtain his preferred outcome (obtaining  $G_p$ ). We consider these types of settlement below.

The results explored here extend beyond the competition blocking context. They apply to any type of litigation in which the plaintiff has the option of both enjoining the defendant's conduct and receiving a damage award. For this reason, we will refer to the types of settlements examined below as *injunctive settlements* – settlements that implement the terms of an injunction sought by the plaintiff.

The model applies generally to litigation in which the plaintiff's and defendant's stakes differ. If the parties are involved in a lawsuit that will establish a precedent that affects their future wealth levels, the model below would apply. For example, suppose there is a dispute between two ranchers over whether the law should require "fencing in" or "fencing out" of cattle (Ellickson, 1991). The model below extends the standard analysis of settlement to such disputes.

### *B. Economics of Injunctive Settlements*

The economics of settlement in injunctive litigation are not fully explained by the traditional Landes-Posner-Gould model, which assumes a settlement that preserves the status quo and merely transfers money between the parties. This ignores settlements that implement the injunction sought by the plaintiff. For example, in the antidumping context, a settlement implementing the terms of the injunction sought by the plaintiff involves the defendant stepping out of the way to let the plaintiff firm or cartel sell at the collusive price.

## 1. Settlement Incentives: Standard versus Injunctive Settlements

The litigation context examined here is one in which the plaintiff sues both to enjoin the defendant's conduct and to obtain a damage judgment from the defendant.<sup>6</sup> Two types of settlement will be examined: the standard settlement in which the defendant pays the plaintiff money in order to drop his lawsuit, and the injunctive settlement that implements the terms of the injunction sought by the plaintiff.

### a. Standard Settlements

The standard settlement is achieved by the transfer of money from the defendant to the plaintiff in exchange for the plaintiff dropping his lawsuit. A standard settlement will be reached under the modified Landes-Posner-Gould condition in (3). Since the settlement payment must exceed the expected net reward to the plaintiff from suing (1), and since the expected net reward must be positive for the plaintiff to have a credible claim of suing, the standard settlement will involve a (positive) payment from the defendant to the plaintiff.

### b. Injunctive Settlements

In the injunctive settlement, the defendant agrees to accept the terms of the injunction sought by the plaintiff. The settlement results in a cost to the defendant that is equal to the sum of the settlement transfer and the defendant's loss from the injunction. Settlement is desirable to the defendant if the total cost of the settlement to the defendant is less than the total cost of the lawsuit:

$$(4) \quad S + L_d < P_d(L_d + D) + C_d .$$

Settlement is desirable to the plaintiff if the sum of the transfer and the gain from the injunction exceed his net payoff from the lawsuit:

$$(5) \quad S + G_p > P_p(G_p + D) - C_p .$$

It follows that the injunctive settlement will be observed if

$$(6) \quad (1 - P_d)L_d - (1 - P_p)G_p + (P_p - P_d)D < C_p + C_d .$$

Intuitively, injunctive litigation still remains equivalent to a bet with process costs, involving the transfer of a token and fixed sum of money. However, the joint valuation of the token (the court-imposed injunction) changes in comparison to the standard settlement scenario. The reason is that the injunctive settlement involves a voluntary transfer of the token from defendant to plaintiff. Given this, the only thing that can

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<sup>6</sup> One case that we have not examined here is that in which the plaintiff brings a standard lawsuit for damages, and the parties reach an "injunctive settlement". This is an easy case to examine, and at the same time probably unlikely to occur. The additional complications and expanded space may not be a worthwhile effort.

happen of relevance in litigation is for the plaintiff to lose, leaving the token in the defendant's hands. The joint value of litigation is enhanced by this prospect only if the defendant's expected gain from having the token awarded to him exceeds the plaintiff's expected loss.

The individual settlement incentive conditions (4) and (5) imply that the injunctive settlement, unlike the standard settlement, may require a negative settlement payment – i.e., from plaintiff to defendant. This is the case of a *reverse settlement*.<sup>7</sup>

An injunctive settlement can be achieved by the plaintiff sharing his gain with the defendant, rather than through the transfer of the settlement payment. Such a settlement would be desirable to the plaintiff if the share of the gain from the injunction that the plaintiff retains exceeds his net payoff from the lawsuit.<sup>8</sup> The settlement would be desirable to the defendant if his net loss in settlement – which is the difference between the defendant's loss from the injunction and his share of the plaintiff's gain – is less than the total cost of the lawsuit to the defendant.<sup>9</sup>

Since the reverse settlement is particularly controversial, it is worthwhile to examine the conditions under which it will be observed. The foregoing analysis of settlement incentives implies the following.

*Observation 1: A reverse (injunctive) settlement will be observed when the plaintiff's gain from the injunction exceeds his expected net payoff from the lawsuit and the defendant's loss from the injunction exceeds the expected total cost of the lawsuit to the defendant.*<sup>10</sup>

The reverse settlement is determined by the parties' predictions of the likelihood of plaintiff victory and the size of the stakes (i.e., the plaintiff's gain and the defendant's loss from the injunction). Reverse settlements are more likely when the parties think the plaintiff's likelihood of victory is low and when the stakes are high (relative to damages and litigation costs).

<sup>7</sup> Suppose the gain to the plaintiff ( $G_p$ ) is \$500 and the loss to the defendant ( $L_d$ ) is \$200. The cost of litigation is \$10 for the plaintiff and \$20 for the defendant. The plaintiff and the defendant both believe that the probability of plaintiff victory is 75%. The damage award is \$10. In order to accept a settlement, the defendant has to consider whether  $S + 200 < (75\%)(10) + (75\%)(200) + 20$ , which requires  $S < -22.5$ . In order to prefer the injunctive settlement the plaintiff considers  $S + 500 > (75\%)(500) - 10 + (75\%)(10)$ , or, equivalently,  $S > -127.5$ . In this case we observe a reverse settlement payment from the plaintiff to the defendant between \$22.5 and \$127.5

<sup>8</sup> In terms of the model,  $(1-\alpha)G_p > P_p(G_p+D) - C_p$ , where  $(1-\alpha)$  is the share retained by the plaintiff.

<sup>9</sup>  $L_d - \alpha G_p < P_d(L_d+D) + C_d$ . Consider a numerical example of a gain-sharing injunctive settlement using the same assumptions as in note 7, supra. Recall that  $\alpha$  is the share offered by the plaintiff to the defendant. The defendant has to consider whether  $200 - \alpha(500) < (75\%)(10) + (75\%)(200) + 20$ , or  $-\alpha(500) < -22.5$ . The plaintiff considers whether  $(1-\alpha)(500) > 372.5$ . This requires the plaintiff to find a share that satisfies  $.045 < \alpha < .255$ . If the plaintiff offers the defendant a share of the gain between .045 and .255, they will achieve a settlement.

<sup>10</sup> Using (4) and (5), the reverse settlement will be observed when  $L_d > P_d(D + L_d) + C_d$  and  $G_p > P_p(D + G_p) - C_p$ , or equivalently, when  $(1-P_d)L_d > P_dD + C_d$  and  $(1-P_p)G_p > P_pD - C_p$ . If the probabilities of a damage award and of an injunction differ, then these conditions change to  $(1-P'_p)G_p > P_pD - C_p$  and  $(1-P'_d)L_d > P_dD + C_d$ .

The intuition behind the reverse settlement is simple. Assume the defendant's loss from an injunction is large relative to the damages and litigation cost. An injunctive settlement requires the defendant to bear the loss from the injunction with certainty, while litigation involves only a risk of such a loss. Under these conditions, the defendant will often demand to be paid in order to accept the injunctive settlement. If he is not paid, he will prefer to take the gamble of litigation. Similarly, as the defendant becomes more optimistic (i.e., believes the plaintiff is more likely to lose), he will demand a payment in order to settle.

Reverse settlements may signal a weak claim on the part of the plaintiff (where both plaintiff and defendant know that it is weak). However, they may be observed even when the plaintiff has a strong claim (and both sides believe so) if the stakes associated with the injunction are high. Alternatively, a reverse settlement may be observed, even though the plaintiff believes he has a strong case, when the defendant is optimistic about his likelihood of victory (so must be paid to settle) and the plaintiff's gain from the injunction is large.<sup>11</sup>

## 2. Comparing Injunctive and Standard Settlements

An injunctive settlement may be possible under conditions in which a standard settlement may not be possible, and the converse is also true. Thus, consideration of the two types of settlement enhances the set of potential settlement agreements.

Intuition would suggest that the injunction should be awarded to the plaintiff when the plaintiff's gain from the injunction is greater than the defendant's loss. This is equivalent to awarding a property right to the party who values it the most. It follows that a wealth-maximizing voluntary agreement would reach the same result. That intuition is borne out in this model. In particular, *the injunctive settlement is more likely to occur than the standard settlement if the gain to the plaintiff from the injunction is greater than the loss to the defendant*. This is easily demonstrated: using (3) and (6), an injunctive settlement is more likely than the standard settlement if

$$(7) \quad (1 - P_d)L_d - (1 - P_p)G_p < P_p G_p - P_d L_d \quad ,$$

which holds only when  $L_d < G_p$ .

Settlement incentives for injunctive litigation are greater than in the standard analysis in which the only issue is whether money will be transferred from the defendant to the

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<sup>11</sup> The defendant optimism explanation is emphasized in Schildkraut (2004). One example that may serve as an illustration of a case where the defendant is optimistic and the plaintiff's gain from the injunction is large is the trademark dispute between Microsoft and Lindows (Holman, 2007, 501). Microsoft sued Lindows for trademark infringement, alleging that the Lindows was confusingly similar to the Windows trademark. A pretrial ruling permitted the jury to be instructed to consider whether "windows" was a generic term before Microsoft introduced its operating system software (Holman, at 502). Rather than risk losing its trademark, Microsoft settled by making a reverse payment of \$20 million to Lindows in exchange for Lindows agreeing to change its name (to Linspire) (Holman, at 502).

plaintiff. Figure 2 shows the settlement incentive for different combinations of the plaintiff's gain from the injunction and the defendant's loss from the injunction.

Figure 2 examines the case in which the plaintiff's estimate of the probability of plaintiff victory exceeds the defendant's estimate of that probability and the dispute would settle if it were only about monetary damages.<sup>12</sup> The line *SS* shows the boundary on standard settlements. Standard settlements will occur in the shaded space above *SS*. Injunctive settlements will occur in the shaded space below line the line *IS*. Both types of settlement will be observed for loss-gain combinations in the intersection of the two shaded areas. Litigation to judgment will occur in the white pie-shaped region of the diagram.

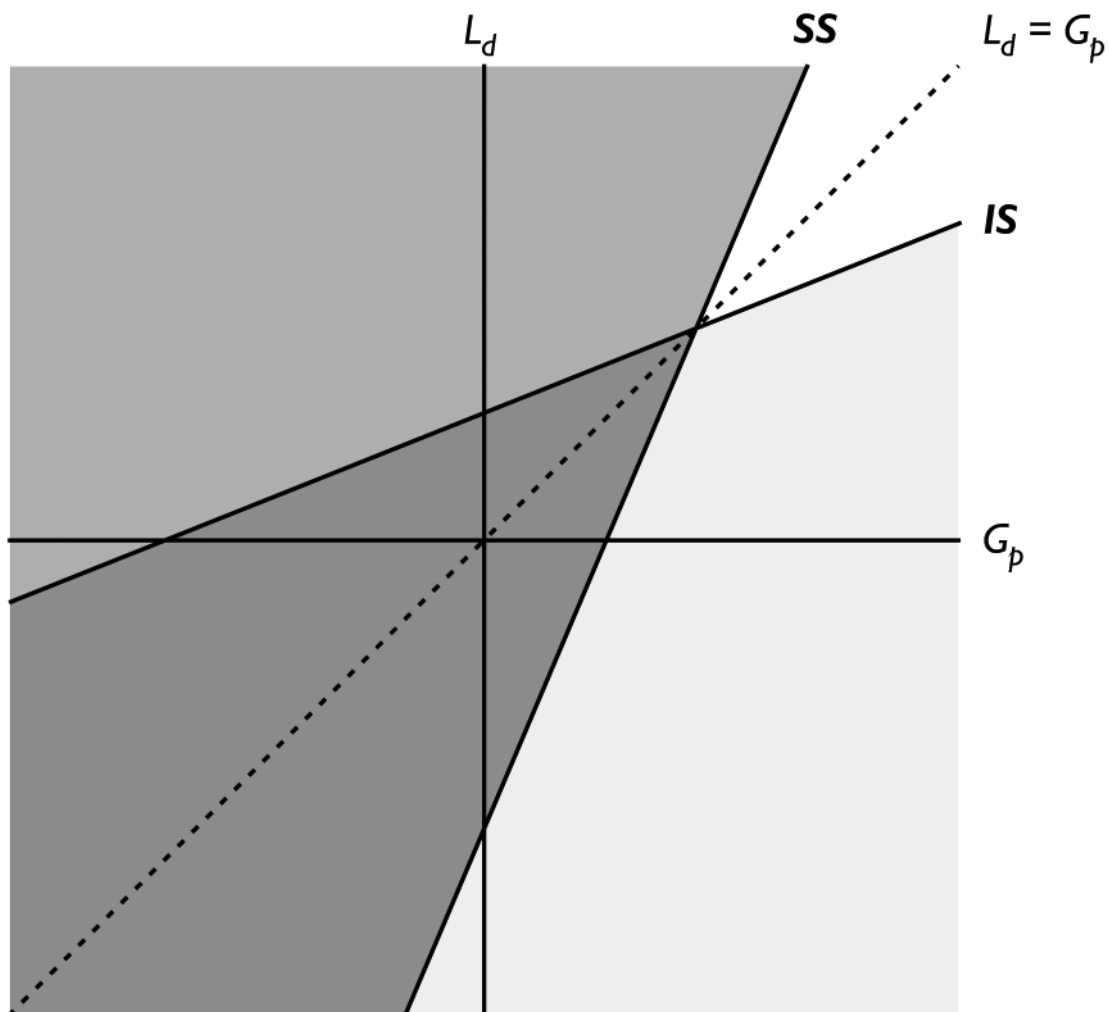
Incorporation of injunctive settlements in the analysis of litigation drastically reduces the set of outcomes in which litigation to judgment occurs. In the standard settlement model, litigation to judgment would be observed for all of the gain-loss combinations below *SS*. With injunctive settlements taken into account, litigation occurs for only a fraction of those combinations.

Consider the broader implications. The standard analysis of settlement has led to the general view that the vast majority of cases settle because trial-outcome beliefs are similar and litigation stakes are similar.<sup>13</sup> But incorporating injunctive settlements upends that story. In this analysis, if trial outcome beliefs and stakes are randomly assigned settlements should still greatly outnumber the disputes going to litigation. The observation that most cases settle does not necessarily imply symmetric stakes or similar trial-outcome beliefs in this analysis.

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<sup>12</sup> Specifically, Figure 2 assumes  $P_p > P_d$  and  $(P_p - P_d)D < C_p + C_d$ . There are two other parameter configurations to examine: (1)  $P_p > P_d$  and  $(P_p - P_d)D > C_p + C_d$ ; and (2)  $P_p < P_d$  and  $(P_p - P_d)D < C_p + C_d$ . The "litigation cone" is larger in these two alternative diagrams. In the first, the slopes of *SS* and *IS* are the same, but their intersection occurs in the third quadrant. In the second configuration, the *SS* and *IS* curves switch places (in comparison to Figure 2), and the litigation cone covers the small positive and the negative values of  $L_d$  and  $G_p$ . The parameter configuration  $P_p < P_d$  and  $(P_p - P_d)D > C_p + C_d$  is infeasible.

<sup>13</sup> There is some controversy concerning the measurement of settlements. Eisenberg & Lanvers (2008) report lower settlement rates than the common 90% estimate, and considerably variation in settlement rates across areas of litigation. The model of this paper provides an approach to explaining variation in settlement rates across areas of litigation.



$$P_p > P_d \text{ and } (P_p - P_d)D < C_p + C_d$$

- litigation
- injunctive settlements only
- standard settlements only
- standard and injunctive settlements

Figure 2: Diagram of Litigation and Settlement Areas for  $P_p > P_d$  and  $(P_p - P_d)D < C_p + C_d$ .

### 3. Consistent Beliefs

As we noted earlier, it has been argued that many legal disputes settle because the plaintiff and the defendant come to similar predictions of the likelihood of a plaintiff victory in the dispute. For this reason we think it is important to examine the incentives for the different types of settlement in the case of consistent beliefs.

Given consistent beliefs ( $P_p = P_d = P$ ), the standard settlement condition is  $P(G_p - L_d) < C_p + C_d$ , so that a standard settlement occurs when

$$(8) \quad L_d > G_p - (C_p + C_d)/P.$$

An injunctive settlement will occur when

$$(9) \quad L_d < G_p + (C_p + C_d)/(1-P).$$

These individual settlement conditions imply that some type of settlement is always feasible under consistent beliefs. The general message is as follows.

*Proposition 1: Under consistent beliefs, litigation to judgment will not occur. All disputes will settle, whether stakes are asymmetric or not.*

This is not an implication of the modified Landes-Posner-Gould analysis. The Landes-Posner-Gould analysis does not by itself imply that all disputes will settle. In addition, these results ignore strategic interactions and transaction costs, either of which could generate litigation under the conditions in which this model predicts that litigation will not occur.

Before considering the detailed implications of Proposition 1, consider its implications for the literature on settlement and litigation. One view advanced in the literature is that when beliefs are consistent, litigation will not occur unless the parties have asymmetric stakes. Deviations from the Priest-Klein (1984) theorem's fifty percent win rate prediction are often explained on this basis.<sup>14</sup> The argument runs as follows: when the trial outcome is least uncertain (not close to 50 percent), the parties will have consistent beliefs so litigation will not occur unless stakes are asymmetric. Deviations from 50 percent are therefore due to asymmetry in the stakes. But the analysis here shows that even if stakes are asymmetric, all disputes should settle when the parties have consistent beliefs. In other words, when the full panoply of settlement agreements are taken into account, deviations from the 50 percent prediction cannot be explained (at least not easily) by the existence of asymmetric stakes.<sup>15</sup>

<sup>14</sup> For an empirical application of the asymmetric stakes theory, see Siegelman & Waldfogel (1999). An alternative to the asymmetric stakes theory is the asymmetric information theory explored in Hylton (2006).

<sup>15</sup> Rather than asymmetry in stakes, the explanation for litigation would have to be pinned on incomplete "ownership" or fragmentation of stakes. One potential litigant from a mass affected by the defendant's conduct would not have an adequate incentive to seek an injunction.

Figure 3 shows the distribution of settlement outcomes under consistent beliefs. Again, standard settlements occur in the region above  $SS$ . Injunctive settlements occur in the region below  $IS$ . Above  $IS$ , only standard settlements will occur. Below  $SS$ , only injunctive settlements occur. In the space between  $IS$  and the 45 degree line, both types of settlement can occur though standard settlements are more likely than injunctive settlements. The converse holds for the space between  $SS$  and the 45 degree line. It follows that for the consistent beliefs case:

*Observation 2: As the probability of plaintiff victory approaches one, the likelihood of an injunctive settlement increases relative to that of a standard settlement. Conversely, as the probability of victory approaches zero, the likelihood of a standard settlement increases relative to that of an injunctive settlement.*<sup>16</sup>

The intuition is straightforward. Suppose the plaintiff's probability of winning at trial approaches one. Even if the plaintiff's gain is less than the defendant's loss, the injunctive settlement may be attractive because it avoids the cost of litigation. The defendant is almost surely going to lose anyway, and the court will impose the injunction. It follows then that as the plaintiff's probability of victory approaches one, the injunctive settlement becomes increasingly attractive because it avoids litigation costs.<sup>17</sup> A similar litigation-cost-avoidance argument applies to the case in which the plaintiff's probability of victory approaches zero.

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<sup>16</sup> In Figure 3, as  $P$  approaches one,  $IS$  shifts upward, expanding the range of conditions in which the injunctive settlement is feasible. Similarly, as  $P$  approaches zero,  $SS$  shifts downward, expanding the range of conditions in which the standard settlement is feasible.

<sup>17</sup> This observation applies especially to antidumping litigation. The likelihood of plaintiff victory is understood to be high in antidumping prosecutions (Cho, 2009). Moreover, the litigation costs borne by defendants (foreign competitors) are large, especially in comparison to the light burden on the domestic industry plaintiffs (Cho, 2009).



### III. Applications of Basic Model

The preceding analysis has focused on the incentives for injunctive settlements and contrasting those incentives with the analysis of standard settlements. Allowing for injunctive settlements expands the range of settlement agreements available to the parties, and explains the observation of reverse settlements. Indeed, when the plaintiff and defendant have the same beliefs regarding trial outcome, including injunctive settlements in the analysis leads to the conclusion that all disputes settle. When the plaintiff and defendant have different beliefs, litigation can occur, but only under narrow conditions.

In addition, the analysis has shown that injunctive settlements are more likely to be observed when the plaintiff's gain from the injunction is greater than the defendant's loss. This makes intuitive sense because the surplus from an agreement implementing the injunction may be so large that the plaintiff is willing to pay the defendant for the settlement. The second condition under which the injunctive settlement is likely to be observed is when the plaintiff's probability of victory is high.

#### A. Nuisance Example: Compensated Injunctions

The general results on injunctive settlements have implications for several areas of litigation. Consider, for example, a nuisance lawsuit. Suppose the defendant is a smoke-belching factory and the plaintiff is a class consisting of homeowners downwind from the factory. A standard settlement would involve a payment from the factory to the homeowners, permitting the factory to continue emitting pollution. This was the solution adopted by the court in *Boomer v. Atlantic Cement Co.*<sup>18</sup> An injunctive settlement would involve the factory abating the pollution, perhaps by shutting down. In a reverse injunctive settlement, the homeowners would pay the factory to shut down. This is the remedial combination first suggested in Calabresi and Melamed (1972) and later observed as a court order in *Spur Industries v. Del E. Webb Development Co.*<sup>19</sup>

The results of the previous section imply that the injunctive settlement is more likely to be observed than the standard settlement when the gain to the homeowners from the injunction exceeds the loss to the factory. Thus, if the value of the homeowners' property exceeds the value of the factory by a substantial amount, the injunctive settlement is likely to be observed. The compensated injunction is another term for the reverse settlement. The reverse settlement (compensated injunction) is likely to be observed, based on the analysis of the preceding section (Observation 1), when the stakes are high relative to the damages suffered by the homeowners.

Suppose the value of the homeowners' property declines from \$10 million to \$1 million because of the pollution. An injunction would cause the property value to rise back up to the initial value of \$10 million. The gain from the injunction would therefore be \$9 million. Suppose also that the homeowners have suffered some adverse health effects

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<sup>18</sup> 257 N.E.2d 879 (N.Y. 1970).

<sup>19</sup> 108 Ariz. 178, 494 P.2d 700 (1972).

amounting to \$1 million in damages. Assume consistent beliefs with  $P = .6$ , and that the cost of litigation for the plaintiffs is \$50,000. On the factory's side, assume the value of the factory is \$5 million, and that the cost of litigation for the factory is \$20,000. Given these assumptions,  $(1-P)G_p = (.4)(\$9 \text{ million}) = \$3.6 \text{ million}$ .  $PD - C_p = (.6)(\$100,000) - \$50,000 = \$10,000$ .  $(1-P)L_d = (.4)(\$5 \text{ million}) = \$2 \text{ million}$ .  $PD + C_d = (.6)(\$100,000) + \$20,000 = \$80,000$ . Since the stakes are large relative to the damages and the litigation costs in this example, a reverse injunctive settlement (compensated injunction) will be observed.

## B. Competition-Blocking Litigation

Our focus is on competition-blocking litigation, specifically antidumping prosecutions and patent infringement litigation.

### 1. Antidumping

Before examining the implications of the foregoing for antidumping litigation, we should set out some details on the antidumping process. Antidumping investigations and prosecutions are conducted by two federal agencies, the International Trade Administration (part of the United States Department of Commerce) and the International Trade Commission (Cho, 2009). An investigation is carried out in response to a complaint filed by a group of domestic firms,<sup>20</sup> and seeks to determine whether the domestic firms have suffered a material injury (Cho, 2009). If the ITC's preliminary injury determination is positive, the ITA issues its own preliminary determination on the existence of dumping, which is defined as a domestic sale at less than fair value.<sup>21</sup> The two agencies subsequently issue final determinations on dumping and injury, respectively.

Because the investigation and prosecution are carried out by government agencies, the litigation costs borne by the domestic complainants are relatively small. Conversely, the litigation costs borne by foreign defendants are relatively large. Defendants are forced to litigate against a government agency that works on behalf of domestic complainants, and under procedural rules that are biased in favor of domestic complainants and burdensome on foreign defendants (Cho, 2009). If there is a finding of remediable dumping, the ITA calculates a damage award that is equal to the difference between the agency's estimated "home price" for the imported item (fair value) and the actual price of the item in the import market. This difference is known as the dumping margin.

Although the agency's only remedy is to impose antidumping duties to the extent of the dumping margin, the final judgment often has the effect of requiring the defendant to increase its price and cede market share, thus losing its gain from low-price entry. In addition, under the Byrd Amendment (repealed in 2005), the antidumping penalty is transferred to the complainants.

<sup>20</sup> The current antidumping statute permits domestic producers to petition relevant government agencies to investigate alleged dumping practices by foreign producers. 19 U.S.C. § 1673a(b)(1).

<sup>21</sup> 19 U.S.C. § 1673b(b).

In terms of the model in this paper, antidumping litigation can be described as a setting in which  $C_p$  is small,<sup>22</sup>  $C_d$  is large,<sup>23</sup> and  $P$  is high. Moreover,  $P$  will be the same for both sides, since both plaintiffs and defendants know that the process is biased in favor of plaintiffs.

Although the litigation is undertaken by the government, the plaintiff domestic cartel has the option of withdrawing its complaint against the foreign seller (or threatening to file the complaint and then never filing it). Withdrawing a complaint is equivalent to settling the dispute.<sup>24</sup> We will therefore treat the antidumping prosecution process as private litigation between the plaintiff domestic cartel and the foreign seller.

Given that the probability of plaintiff victory is high, injunctive settlements are likely in antidumping litigation (Observation 2). In addition, injunctive settlements are more likely if the plaintiff cartel's gain is greater than the foreign seller's loss from the injunction.

Most importantly, in the antidumping context transaction costs will rule out the standard settlement that preserves the status quo. The plaintiff cartel will be unlikely to accept and unable to enforce an agreement in which they receive a side payment from the foreign exporter in order to relinquish the market to the foreign firm. Given this, we explore only the injunctive settlement.

Consider an example that captures some of the features of antidumping litigation. Suppose the gain to the plaintiff cartel (alternatively, the potential domestic cartel profit) is \$500 and the loss to the defendant foreign seller is \$200. The cost of litigation is \$1 for the plaintiff domestic cartel (because the government, in effect representing the domestic cartel, bears most of the expenses) and \$20 for the defendant. The probability of plaintiff victory is 90%. The damage award, which is equal to the dumping margin, is \$10. This is not necessarily a compensatory measure; it may exceed actual losses by the plaintiff. In order to accept a settlement, the defendant has to consider whether

$$S + 200 < (90\%)(10) + (90\%)(200) + 20$$

or  $S < \$9$ . In order to prefer the injunctive settlement the plaintiff considers

$$S + \$500 > (90\%)(500) - 1 + (90\%)(10),$$

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<sup>22</sup> Petitioners can expect the government to absorb most of the litigation costs under the statutory proceeding, *see* Calvani & Tritell (1986).

<sup>23</sup> An antidumping proceeding imposes enormous costs on the defendants, *see* Music Centers S.N.C. Di Luciano Pisoni & C. v. Prestini Musical Instruments Corp, 874 F.Supp. 543, 547 (1995). Therefore, an antidumping petition itself can be a very effective method of non-price predation against small yet efficient foreign producers. The existence of such non-price predation tends to facilitate an injunctive settlement between antidumping petitioners and respondents. Cho (2009)

<sup>24</sup> Taylor (2001) observes that some antidumping cases withdrawn during the period 1990 to 1997 revealed the same pattern of changes in price and quantity as observed in collusive agreements.

or, equivalently,  $S > -\$42$ . In this case, settlement will occur with a payment from the defendant to the plaintiff that satisfies  $-\$42 < S < \$9$ .

A settlement in this example requires the plaintiff domestic cartel to drop its complaint against the foreign seller. The settlement could be reached in this example by a small payment by the defendant foreign seller to the plaintiff cartel, say of \$8. Alternatively, the agreement might involve the plaintiff domestic cartel either sharing part of its profits, or paying a sum no greater than \$42 to the defendant foreign seller. Of course, even in the latter case, the foreign seller will be sharing in the domestic cartel's profits. Or the arrangement may be one in which foreign sellers both receive a reverse payment and are permitted to continue selling in the domestic market at a higher price. For example, suppose the reverse payment is \$25. This is 5 percent of the potential cartel profit of \$500. One way to carry out such a settlement would be to assign 5 percent of the domestic market to the foreign seller.<sup>25</sup>

The direction of the settlement payment is largely determined by the relationship between the stakes, the damage payment (dumping margin in this case), and the cost of litigation. The greater the stakes relative to the sum of the dumping margin and the cost of litigation, the more likely is a reverse settlement.

## 2. Antidumping Continued: Welfare Implications

Antidumping litigation typically pits a domestic cartel against a foreign seller. The gain to the domestic cartel from ousting the foreign seller comes out (or, is taken out of) of the potential consumer surplus available to domestic consumers. The cartel's payoff is not attributable to efficiency gains that result from the exclusion of the foreign seller. Figure 1 describes the possible outcomes. The end result of the injunction, or the injunctive settlement, is unambiguously inefficient.

The foregoing analysis shows that injunctive settlements are more likely as the probability of plaintiff victory (being awarded the injunction) increases and as the plaintiff's gain from the injunction increases relative to the defendant's loss. Moreover, reverse settlements are more likely as the stakes increase relative to the damage payment and the cost of litigation.

When the injunctive settlement results primarily because the plaintiff's probability of victory is high (e.g., in a dispute where the plaintiff's gain from the injunction is less than the defendant's loss) it reflects the parties' desire to avoid litigation costs. Injunctive settlement in this case reflects the outcome likely to result from litigation. There is no reason to believe that these settlements are especially harmful to social welfare.

When the injunctive settlement occurs primarily because the plaintiff's gain is greater than the defendant's loss, then there is reason to worry that these settlements are especially harmful to social welfare. The reason is, as Figure 1 shows, the gain to the plaintiff will be positively correlated with the social waste. However, these cases are not

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<sup>25</sup> On collusion and injunctive settlements of antidumping disputes, see Prussa (1992).

necessarily the most harmful in terms of social welfare costs. Consider the case of an injunctive settlement where the plaintiff's gain is both substantial and only slightly greater than the defendant's loss. In this case the cost to social welfare is at its greatest, because the injunction excludes from the market a foreign seller with a great cost advantage over the domestic firms.<sup>26</sup>

When the plaintiff's gain is greater than the defendant's loss, the reverse settlement is correlated with the degree of social harm. Reverse injunctive settlements occur when the stakes are large relative to the costs of litigation. Since the plaintiff's gain is correlated with the social waste of the injunction, reverse settlements will tend to be observed in instances in which both the plaintiff's gain and the social waste are large.

We have confined ourselves to antidumping cases, where the injunction has an inefficient result. The question we have considered so far is if the injunctive settlement is a signal, in this set of instances, of particularly worrisome cases. The answer is yes.

Should the injunctive settlement be banned? Social welfare could be improved by banning the injunctive settlement if the gain to society from non-settled cases is greater than the litigation costs. The injunctive settlement should be banned if

$$(10) \quad (1-P)(W + L_d) > C_p + C_d.$$

If this holds, the payoff to society from the non-settling cases in which courts deny injunctions (i.e., the social gain from competitive entry) exceeds the costs generated by litigating those cases. A policy of banning all injunctive settlements is not necessarily welfare enhancing, because of litigation costs. Of course, a policy of encouraging injunctive settlements is also not necessarily welfare enhancing.

Should antidumping reverse settlements be banned? Recall that the reverse settlement will be observed only when the injunction stakes are high relative to litigation damages and costs (Observation 1). This implies the following conclusion.

*Proposition 2: A reverse antidumping settlement should be prohibited if the plaintiff's expected damages, evaluated objectively, exceed the plaintiff's cost of litigation ( $PD > C_p$ ).*

From (10), we know that the reverse settlement is welfare reducing if  $(1-P)W + (1-P)L_d > C_p + C_d$ . If  $(1-P)L_d > PD + C_d$ , then any settlement will be a reverse settlement (Observation 1), and it will be welfare reducing whenever  $PD > C_p$ .

The condition  $PD > C_p$  is likely to hold in antidumping litigation, because  $C_p$  will be relatively small from the perspective of the plaintiff domestic cartel. The reason is that a government agency prosecutes the cartel's complaint. It follows, then, that social welfare

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<sup>26</sup> Prussa (1992) provides empirical evidence that settled antidumping disputes are associated with reductions in trade that are at least as large as those resulting from adjudicated disputes.

would be improved by banning the reverse injunctive settlement in the antidumping context.

The intuition behind this argument runs as follows. A reverse settlement is welfare reducing if the welfare loss from the injunction, discounted by the likelihood of the injunction being overturned in court, is greater than the total litigation cost. A reverse settlement will occur, if any settlement occurs, when the defendant's loss from the injunction is large relative to the damages and litigation costs. But since the defendant's loss from the injunction, which equals his profit from competitive entry, is part of the welfare loss from the injunction, any reverse settlement is likely to be more costly to society than the litigation costs that would result in the absence of the settlement.

Since antidumping injunctions lead to inefficient results, the suggestion that the reverse injunctive settlement be banned should not be seen as a surprise. Still, in the presence of substantial litigation costs, it is not clear that every reverse injunctive settlement will be socially undesirable. They should not be banned if the consumer welfare gains from banning them are modest relative to the litigation costs. Proposition Two shows that the case for banning reverse injunctive settlements remains strong, even with substantial litigation costs taken into account.

There are other settings that share the general structure of the antidumping problem. A hush money settlement saves society litigation expenses, but may also impose welfare costs (Daughety & Reinganum, 1999). Or consider the procurement setting, with two contractors. The incumbent contractor can seek to have the efficient entrant contractor deemed ineligible, a costly process like litigation (Marshall, Meurer, & Richard, 1994). The incumbent may prefer to pay off the efficient entrant, which is the same as a reverse settlement.

#### IV. Patent Antitrust and More General Applications

Unlike antidumping prosecutions, patent infringement cases cannot be treated as consistent-belief disputes with a high probability of plaintiff victory. Many of the cases involve low-probability claims on the part of the plaintiff patent holder and disparate beliefs as to the plaintiff's likelihood of success. On the other hand, in many of the patent infringement cases the plaintiff's gain from the injunction exceeds the defendant's loss. Given this, and the foregoing analysis, the reverse settlement should be taken as a sign of potentially harmful welfare consequences in the patent-antitrust context.<sup>27</sup>

However, the patent infringement setting is more complicated than the antidumping setting. The patent infringement cases involve dynamic innovation incentives and static demand-inducement incentives that are likely to be affected by the willingness of courts to grant competition-blocking injunctions.

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<sup>27</sup> There is a large literature identifying the potential welfare costs of reverse settlements in the patent context. See, e.g., Shapiro (2003); Hovenkamp, Janis, & Lemley (2003); Cotter (2004).

Consider the static demand-inducement factor. Suppose the plaintiff firm – e.g., a drug company – invests in creating demand for its new product – a drug. If the injunction is awarded in its favor, it will have an incentive to continue to invest in promotion. Thus, unlike the antidumping scenario, excluding the low-cost rival causes supports product promotion, which causes the demand curve to shift outward, as in Figure 4.



Because the injunction itself could be socially desirable, the injunctive settlement could be a socially desirable outcome. Indeed, whenever the injunction itself is socially desirable, the injunctive settlement is also socially desirable. However, we do not know in advance whether a particular injunction is socially desirable – that is, we do not know in advance whether the dispute is best characterized by Figure 1 or by Figure 4. Given the uncertainty, a policy of banning reverse settlements may be undesirable.

#### A. Modifying the Basic Model

The settlement model can be modified to take into account the special considerations in patent infringement litigation. The new features to take into account are the static and dynamic efficiency effects. As in Figure 4, let  $\Delta G_p$  represent the captured portion of the static efficiency gain.

The dynamic incentive is difficult to model from the ground up, but we will simplify matters by assuming that there is a potential dynamic incentive cost resulting from the rejection of the plaintiff's infringement claim. Let the social cost of the dynamic incentive effect be  $\Psi$ . The social cost is likely to be a function of the ex ante probability of infringement.<sup>28</sup> For example, if the ex ante probability of infringement is close to zero because the patent is invalid, then the social cost of a rejection of the plaintiff's infringement claim is probably close to zero. As a general rule, then, the social cost of the dynamic incentive effect is an increasing function of the ex ante probability of infringement.<sup>29</sup> The portion of the social cost borne by the plaintiff will be represented by  $\gamma\Psi$ .

The injunctive settlement is desirable to the infringement plaintiff if

$$(11) \quad S + G_p + \Delta G_p > P_p(G_p + \Delta G_p + D) - C_p - (1 - P_p) \gamma\Psi$$

where the last term reflects the plaintiff's perception of the dynamic incentive cost of losing his patent monopoly. The condition determining whether the settlement is desirable to the defendant is the same as in the basic model (5).

An injunctive settlement will be desirable, as between the litigating firms, when

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<sup>28</sup> The term ex ante probability of infringement was introduced in Crane (2002). Crane suggests that the social cost of rejecting an infringement claim is positively correlated with the ex ante probability of infringement (Crane, 2002, at 780).

<sup>29</sup> More precisely, the social cost will be a function of the probability that the patent is valid and that it was infringed, and it should be an increasing function in both variables. However, the marginal contribution of each variable to the social cost will not be the same. The social cost is also a function of the wealth generated by the patent incentive. The wealth generated by a patent is the sum of the consumer surplus and monopoly profits generated by the patent. Specifically, the term  $\gamma\Psi$  will be determined in part by the expected stream of patent profits forgone because of the discouragement effect. The remainder term  $(1 - \gamma)\Psi$  will equal be determined in part by the expected residual consumer welfare forgone because of the discouragement effect. These terms are capable of estimation.

$$(12) \quad (1-P_d)L_d - (1-P_p)(G_p + \Delta G_p) + (P_p - P_d)D - (1-P_p)\gamma\Psi < C_p + C_d$$

To simplify matters, consider the consistent beliefs case. In the consistent beliefs case, the injunctive settlement condition becomes

$$(13) \quad (1-P)(L_d - G_p - \Delta G_p - \gamma\Psi) < C_p + C_d,$$

or

$$(14) \quad L_d < G_p + \Delta G_p + (C_p + C_d)/(1-P) + \gamma\Psi.$$

It follows, from Figure 4, that incorporating efficiencies does not greatly change the analysis from the basic model examined earlier in this paper. The scope for injunctive settlements expands because the gain to the plaintiff is now greater than in the previous analysis (because of the static efficiency effect), and because the cost of failing to settle is greater too (because of the dynamic efficiency effect).

$P$  represents the objective probability that the plaintiff will prevail, or the *ex ante* probability of infringement. We can also treat  $P$  as an index of the patent's validity.<sup>30</sup> Using Figure 4, injunctive settlements should be banned if

$$(15) \quad (1-P)[W + L_d - (\Delta G_p + Z)] > C_p + C_d + (1-P)\Psi$$

The first two terms on the left hand side of (15),  $W + L_d$ , equal the expected welfare gain from competitive entry. The next two terms,  $(\Delta G_p + Z)$ , equal the static efficiency gain from the injunction. The last term on the right hand side is the expected dynamic efficiency loss. It should be clear that  $(1-P)[W + L_d - (\Delta G_p + Z) - \Psi]$  is the social return from litigation.<sup>31</sup> The injunctive settlement should be banned if the social return from litigation exceeds the cost of litigation.

Thus, in patent infringement litigation, *banning the injunctive settlement is socially desirable only if the expected welfare gain from competitive entry exceeds the static efficiency gains from the injunction, the cost of litigation, and the dynamic incentive cost.*

As suggested in Shapiro (2003), the strength of the underlying patent infringement claim  $P$  plays an important role in determining the social desirability of an injunctive settlement. However, the scope of the patent and the market, the size of the efficiency

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<sup>30</sup>  $P$  is the product of the probability of validity and the probability of infringement (assuming the two are independent). Treating it as an index of patent validity is clearly imprecise because it implicitly assumes that the probability of infringement is one.

<sup>31</sup> If there is a strong correlation between  $\Psi$  and  $P$ , the social return from litigation should be expressed as  $(1-P)[W + L_d - (\Delta G_p + Z) - \Psi(P)]$ , which reflects the assumption of Crane (2002). If  $\Psi$  increases strongly in  $P$ , then the social return to litigation would not only approach zero as  $P$  increases, but is also more likely to be negative for high  $P$  values. Focusing on  $P$  might serve as a short cut to trying to determine the social return from patent litigation. In general, the relationship between  $\Psi$  and  $P$  is an empirical question.

gain from entry, static and dynamic efficiency costs,<sup>32</sup> and litigation costs also play a role. These factors suggest that a rule of reason analysis of competition blocking settlements in the patent setting could be quite complicated.

## B. Incentive Alignment and Optimal Penalty

Given the ambiguous welfare effects of the injunctive settlement in the patent context, one solution to the settlement problem is to alter the incentives of the plaintiff so that he seeks an injunctive settlement only under conditions in which it is socially desirable.

### 1. Incentive Alignment under Consistent Beliefs

Consider an example in which the parties have consistent beliefs. The private settlement condition (13) can be used with the social incentive condition (15) to determine a penalty (or subsidy) that would align the incentives of the individual firms with the social incentive on settlement. If the plaintiff is required to pay,

$$(16) \quad G_p + W - Z - (1 - \gamma)\Psi$$

upon gaining his injunction, then the social incentive to settle will be the same as the private incentive to settle,<sup>33</sup> which means that the parties will seek a settlement only when it is socially desirable. The optimal penalty requires the plaintiff to regurgitate the monopoly rent and to pay for the deadweight loss; however, it also subsidizes the plaintiff an amount equal to the “uncaptured” static and dynamic efficiency gains. The optimal penalty should be applied to the monopolist whether it gains its injunction through a court order or through settlement.

The optimal penalty in (16) is a generalized version of the monopolization penalty of Landes (1983). If the static and dynamic efficiency effects are zero, as in the antidumping scenario, the optimal penalty is equal to the monopoly transfer plus the deadweight loss ( $G_p + W$ ). Similarly, if the static efficiency gain is captured completely by the monopolist and the dynamic cost is borne in its entirety by the monopolist, the optimal penalty is again equal to the monopoly transfer plus the deadweight loss.

### 2. Incentive Alignment and Inconsistent Beliefs

We have so far considered incentive alignment in the case of consistent beliefs. The optimal penalty would require the monopolist to pay for the welfare transfer from consumers as well as the deadweight loss, and subsidize the monopolist to the extent of uncaptured static and dynamic efficiency gains. We explore in this section whether this approach remains valid in cases in which the litigants have inconsistent beliefs regarding the ex ante probability of infringement.

<sup>32</sup> The dynamic incentive effect is emphasized in Langenfeld & Li (2004) and in Blair & Cotter (2002).

<sup>33</sup> If the penalty is set equal to (16) the plaintiff’s net reward will be  $G_p - (G_p + W - Z - (1 - \gamma)\Psi) = -W + Z + (1 - \gamma)\Psi$ . This implies that the private settlement condition will be equivalent to the social settlement condition.

Suppose the general process determining litigants' beliefs is as follows:

$$(17) P_p = P'_p + \varepsilon_p$$

$$(18) P_d = P'_d + \varepsilon_d,$$

where  $P'_p$  and  $P'_d$  are rational expectations estimates based on the information available to the plaintiff and to the defendant respectively (Hylton 2006).

First, consider the setting in which litigating parties' beliefs are consistent with the Priest-Klein (1984) hypothesis. Trial-outcome predictions diverge but only because of random differences in beliefs. Under the Priest-Klein model, trial-outcome beliefs are generated according  $P_d = P + \varepsilon_d$ ,  $P_p = P + \varepsilon_p$ , where  $\varepsilon_d$  and  $\varepsilon_p$  have mean zero, and where  $P$  is the objective estimate of the likelihood of a verdict for the plaintiff (the probability of a finding of patent infringement). If the optimal penalty is imposed on the patent holder then settlement will be acceptable to the parties when

$$(19) \quad (1-P)(W - (\Delta G_p + Z) + L_d - \Psi) - \varepsilon_p(W - (\Delta G_p + Z) - \Psi) \\ - \varepsilon_d L_d + (\varepsilon_p - \varepsilon_d)D < C_p + C_d$$

and since  $\varepsilon_p$  and  $\varepsilon_d$  have mean zero, the private and social incentives to settle will be the same in expectation. Thus, in the Priest-Klein scenario, the optimal incentive alignment penalty accomplishes its objective.<sup>34</sup>

Now consider the inconsistent beliefs (or asymmetric information) scenario. Assume  $P_d = P$  and  $P'_p = P + Q$ , where  $1-P > Q > 0$ . In this scenario the defendant's prediction is equal to the objective probability of infringement. The plaintiff is excessively optimistic and overestimates the likelihood the patent will be upheld. The joint private return from litigation is equal in expectation to

$$(20) \quad (1-P)(L_d - G_p - \Delta G_p - \gamma \Psi) + Q(G_p + \Delta G_p + \gamma \Psi) + QD$$

where the first term reflects the potential net gain if the injunction is overturned. The last two terms reflect the differences in the parties' expectations of the trial outcome. The social return from litigation is equal to

$$(21) \quad (1-P)(W + L_d - (\Delta G_p + Z) - \Psi) .$$

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<sup>34</sup> The Priest-Klein generates a plaintiff win rate prediction of 50 percent. This is consistent with the evidence on patent litigation. Plaintiff win rates in patent infringement litigation are roughly 50 percent, see Allison & Lemley (1998). Thus, the empirical evidence suggests that patent infringement trials can be described by the Priest-Klein model. However, this does not imply that half of patents are invalid. The evidence on win rates shows that only the most uncertain patents are litigated all the way to judgment, and that within the sample of litigated patents plaintiffs are no better than defendants at determining the validity of the patent.

The optimal penalty equates the private and social returns from litigation. Unlike the Priest-Klein scenario, the optimal penalty is no longer the generalized monopolization penalty (Landes, 1983) in (16). In this case, the optimal penalty is

$$(22) \quad G_p + \delta(W - Z - (1 - \gamma)\Psi) + (1 - \delta)[Q(\Delta G_p + \gamma\Psi + D)]$$

where  $\delta = (1 - P)/(1 - P - Q) > 1$ . The intuitive explanation for (22) is easier seen under the assumption that there are no static or dynamic efficiency concerns. In that case, the optimal penalty would be

$$(23) \quad G_p + \delta W + (1 - \delta)QD$$

Since the litigation decision is influenced by the divergent trial-outcome expectations of the parties, the optimal penalty reduces the relative importance of this effect by increasing the weight on  $W$ . In addition, since divergent expectations already push the parties into litigation, there is a lesser need in this case to use a large penalty (because some monopolies will be overturned by the court). This is the reason for the last term in (23), which is negative.

The lesson suggested here is that when divergent beliefs (or asymmetric information) drive the parties into litigation (because plaintiffs believe that the likelihood of a finding of infringement is greater than defendants think it is), the optimal penalty is less than under consistent beliefs (16) because the worst-case monopolization scenario will be overturned more often in the courts. Conversely, when divergent beliefs cause the parties to litigate infrequently (because defendants believe the likelihood of a finding of infringement is less than plaintiffs think it is), the optimal penalty will be greater than under consistent beliefs.

### C. Waivers

A policy of banning reverse or injunctive settlements would lead parties to opt for pre-dispute settlements, or waivers. Since the private and social returns from litigation are not the same, pre-dispute waivers will be exchanged under conditions in which they may not be socially desirable.

Some patents are infringed intentionally. In other cases, the rival firm infringes the patent because it has not taken care (e.g., engaged in a search of patent records) to avoid the infringement. It follows that the infringement problem can be treated like that of accidental injuries.

Suppose the rival firm has a choice of taking care (search) or not taking care (no search). Let  $x$  be the cost of taking care to avoid infringement. Let  $\lambda_c$  be the probability that infringement occurs when the rival firm has taken care, and let  $\lambda_{nc}$  be the probability that infringement occurs when the rival firm has not taken care.

We will make a few simplifying assumptions for the analysis of waiver agreements. First, we will assume consistent beliefs regarding the patent's validity ( $P_p = P_d = P$ ). Second, in the analysis below we will assume that the patent holder loses his monopoly only through some conduct by the rival that could form the basis of an infringement claim – even if it is not technically infringement. This rules out instances in which the rival firm takes some action that causes the incumbent to lose its monopoly, but the incumbent has no credible basis at all for an infringement claim. Third, we will simplify matters by assuming that the patent holder does not introduce any ex post static efficiencies (e.g., demand inducement). Fourth, we will assume that the patent monopoly is socially desirable, which means that  $\Psi - W - L_d > 0$ .

A patent holder could enter into a predispute waiver, in which the monopolist agrees not to sue the rival for infringement. First, let's consider a *standard waiver*. In a standard waiver, the potential plaintiff (patent holder) accepts a payment in exchange for an agreement not to sue the rival firm when it infringes the patent. The minimum price demanded by the patent holder for the waiver is

$$(24) \quad \lambda_{nc}(G_p + \gamma\Psi) - [\lambda_c(1-P)(G_p + \gamma\Psi) + \lambda_c C_p] .$$

This is the difference between the patent holder's expected loss in the absence of the right to sue for infringement and his expected loss given the right to sue for infringement.<sup>35</sup> The maximum offer from the rival (or potential defendant) would be

$$(25) \quad x + \lambda_c C_d + \lambda_c P L_d ,$$

which reflects the expected costs of search, litigation, and infringement liability.<sup>36</sup> It follows that a standard waiver will be exchanged when

$$(26) \quad (\lambda_{nc} - \lambda_c(1-P))(G_p + \gamma\Psi) - \lambda_c P L_d - x < \lambda_c(C_p + C_d) .$$

In other words, when the joint benefits of deterrence, as between the two parties, are less than the total cost of litigation, a standard waiver will be exchanged.

Now let us consider an *injunctive waiver*. In the injunctive waiver, the potential plaintiff (patent holder) accepts (or gives) a payment in exchange for an agreement not to sue the rival and for the rival to forgo the infringing activity.

The injunctive waiver is acceptable to the potential plaintiff if

$$(27) \quad S + \lambda_{nc}(G_p + \gamma\Psi) > \lambda_{nc}(G_p + \gamma\Psi) - [(\lambda_c(1-P)(G_p + \gamma\Psi) + \lambda_c C_p)]$$

<sup>35</sup> For the formal analysis of waiver incentives in the context of ordinary litigation, see Hylton (2000).

<sup>36</sup> To simplify we are ignoring the possible damage claim component, which would be purely speculative at the stage of a waiver negotiation. Moreover, under the Hatch-Waxman Act, pioneer drug developers can file infringement suits after being notified that a generic intends to enter the market (see, e.g., Blair & Cotter (2002), at 505-506). This model applies especially to litigation under the Hatch-Waxman provisions, which is the most common source of reverse patent settlements today.

The second term on the left hand side reflects the assumption that the monopolist will lose nothing in the event that an infringing act takes place, because the waiving defendant will immediately forgo the infringing conduct. As a result, the injunctive waiver is far more valuable to the patent holder than is the standard waiver.

The injunctive waiver is acceptable to the potential defendant if

$$(28) \quad S + \lambda_{nc}L_d < x + \lambda_c C_d + \lambda_c P L_d .$$

An injunctive waiver will be mutually agreeable when:

$$(29) \quad (\lambda_{nc} - \lambda_c P)L_d - [\lambda_c(1-P)(G_p + \gamma \Psi)] - x < \lambda_c(C_p + C_d)$$

Finally, consider the social interest in waivers. In a setting in which no one litigates, so patents are infringed at will, the social cost would be

$$(30) \quad \lambda_{nc}(\Psi - W - L_d)$$

With infringement litigation available, the total social cost is

$$(31) \quad x + \lambda_c(1-P)(\Psi - W - L_d) + \lambda_c(C_p + C_d)$$

It follows that patent litigation is not socially desirable if

$$(32) \quad [\lambda_{nc} - \lambda_c(1-P)](\Psi - W - L_d) - x < \lambda_c(C_p + C_d) ,$$

which means that the social benefit from deterring infringement less the cost of avoiding infringement is less than the patent litigation costs. Even if all patents are socially desirable, patent litigation may not be socially desirable.

More importantly, comparing the social waiver incentive condition (32) to the private waiver incentive conditions [(29) and (26)], it is clear that the private and social incentives for waiving infringement litigation are not the same. Because of the externalities present in the patent context, the private waiver incentive conditions diverge from the social waiver conditions. This is not true in the normal (e.g., tort) litigation context, where the private waiver condition and the social waiver condition are the same (Hylton, 2000).

In the standard litigation context, predispute waivers provide a Coasean solution to the problem of inefficient litigation.<sup>37</sup> In the patent infringement setting, private waiver agreements do not provide a solution to the problem of inefficient infringement litigation.

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<sup>37</sup> On the inefficiency of litigation, see Shavell (1982b). On waivers as a Coasean solution, see Hylton (2000).

There is more to be said about the private and social incentive conditions for waivers. First, compare the standard private waiver condition (26) to the social waiver condition (32). They imply the following:

*Proposition 3: If the probability of infringement is the same whether or not the rival takes care ( $\lambda_{nc}=\lambda_c$ ), then the optimal penalty  $G_p + W - (1-\gamma)\Psi$  guarantees that standard waivers will be exchanged when and only when patent infringement litigation is socially undesirable.*

To see this note that if  $\lambda_{nc}=\lambda_c$ , then (26), the condition for privately optimal waivers, becomes

$$(33) \quad \lambda_c P(G_p + \gamma\Psi - L_d) - x < \lambda_c(C_p + C_d)$$

and (32), the condition for socially optimal waivers, becomes

$$(34) \quad \lambda_c P(\Psi - W - L_d) - x < \lambda_c(C_p + C_d)$$

Thus, if  $\lambda_{nc}=\lambda_c$ , and if the monopolist pays a penalty equal to  $G_p + W - (1-\gamma)\Psi$ , private waivers allowing infringement to occur will be exchanged when and only when patent litigation is socially undesirable. If the probability of infringement is not independent of the care taken by the rival, then the optimal penalty is more complicated.<sup>38</sup>

Now compare the injunctive waiver condition (29) to the social waiver condition (32). If  $\lambda_{nc}=\lambda_c$ , then (29) becomes

$$(35) \quad \lambda_c(1-P)(L_d - G_p - \gamma\Psi) - x < \lambda_c(C_p + C_d)$$

and it is socially desirable to enforce patents when

$$(36) \quad \lambda_c P(\Psi - W - L_d) > x + \lambda_c(C_p + C_d)$$

If the monopolist is required to pay the penalty  $G_p + W - (1-\gamma)\Psi$ , then the private incentive for the exchange of injunctive waivers (preventing infringement) becomes

$$(37) \quad \lambda_c(1-P)(\Psi - W - L_d) > x + \lambda_c(C_p + C_d) .$$

*Proposition 4: If the probability of infringement is the same whether or not the rival takes care ( $\lambda_{nc}=\lambda_c$ ), and if the ex ante probability of infringement is greater than fifty percent*

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<sup>38</sup> The optimal penalty in the general standard waiver case is  $G_p + W - (1-\gamma)\Psi + [(\lambda_{nc}-\lambda_c)/(\lambda_{nc}-\lambda_c(1-P))]L_d$ . The last term is an additional charge to the monopolist because his contract has increased the rate of infringement and at the same time denied society the gain from that increased rate of infringement.

$(P \geq 1/2)$ , then the optimal penalty  $G_p + W - (1 - \gamma) \Psi$  guarantees that injunctive waivers will be exchanged only when patent infringement litigation is socially undesirable.<sup>39</sup>

These results show that the internalization approach to the optimal penalty, which yields (16), is a possible solution to the incentive alignment problem in the waiver setting, but only under special conditions. The conditions seem unlikely because the probability that unintentional infringement occurs should in general be a function of the care taken by the rival firm.

Although the incentive alignment approach is possible in the waiver context, it requires much more information than in the settlement context. The informational requirements are so steep, in the waiver context, that the optimal penalty approach may not be a practical solution.

#### d. Risk Aversion, Clouds over Patents, and Other Costs

There are other costs that could be incorporated into the model of this paper. Some commentators have noted that risk aversion is a factor that drives some patent holders to seek injunctive settlements.<sup>40</sup> In any event, the cost of risk could be incorporated into this analysis as another cost that, like litigation costs, the parties can avoid by entering into a settlement.

Some commentators have pointed to the uncertainty surrounding the patent as a motivating factor behind injunctive settlements. A patent, as commentators have noted, is not a right to exclude, but a right to *try* to exclude. It is a probabilistic property right.<sup>41</sup> However, the holder of a patent clearly has an incentive to increase its value by reducing the likelihood that it will be found insufficient as a bar to some rival.

Transaction cost reduction provides another motivation to seek an injunctive settlement. Patents are traded. If the uncertainty concerning validity can be reduced, it will be easier to trade in patents. Uncertainty is a transaction cost that obstructs efficient trades in the market for patents.

## V. Practical Implications

Although this paper is for the most part an examination of the economics of settlement, there are implications for the practical issues generated by competition-blocking litigation.

As a preliminary matter, the reverse settlements that have become controversial in competition-blocking litigation, particularly in the patent antitrust and antidumping settings, reflect features that are observed generally in injunctive litigation. The parties in

<sup>39</sup> The optimal penalty in the general injunctive waiver case is  $G_p + \Pi W - (\Pi - \gamma) \Psi - [(1 - 2P)/(1 - P)]L_d$ , where  $\Pi = [(\lambda_{mc} - \lambda_c(1 - P))/\lambda_c(1 - P)]$ .

<sup>40</sup> See Crane (2002).

<sup>41</sup> Shapiro (2003)

injunctive litigation have the option of choosing a standard settlement that preserves the status quo or an injunctive settlement that implements the terms sought by the plaintiff. Both types of settlement are potentially wealth enhancing to the litigating parties, and to society as well, because they avoid expenditures on litigation. Injunctive settlements are likely where the gain to the plaintiff from the injunction exceeds the loss to the defendant. Reverse settlements, in which the plaintiff pays the defendant, are likely to be observed whenever the stakes from the injunction are large relative to the damages and the costs of litigation.

These general observations may take on a special importance in the context of competition blocking litigation. The gain to the plaintiff from the injunction, in the competition blocking context, will be correlated with the consumer welfare loss from blocking competition. Injunctive lawsuits will tend to be filed in areas where the potential consumer harm is greatest. Injunctive settlements will be among those lawsuits with the greatest potential harm to consumers. Reverse settlements will be observed in a still smaller subset in which potential harm is even greater. For these reasons, the suspicions concerning injunctive and reverse settlements in the competition blocking context are warranted.

Those suspicions, however, have to be balanced against the social welfare gains that are generated by injunctive settlements. They reduce litigation costs. Moreover, if the reason for blocking competition is to support dynamic (innovation) or static efficiency incentives (market development), then the settlements may improve welfare in some cases. The mere fact that a large reverse settlement payment has occurred is not a sufficient basis for inferring that the settlement reduces social welfare.<sup>42</sup> These straightforward observations have been disregarded in some of the critical discussions of reverse settlements.

The core source of controversy surrounding injunctive settlements is that the social incentive to settle differs from the private incentive. This is also a feature observed generally in litigation. In the general litigation context, commentators have noted that parties may settle when it would be better from society's perspective if they litigated in order to enhance the stock of legal capital (Fiss 1984; Hylton 2000). The mere existence of litigation costs does not imply a divergence between private and social settlement incentives. Litigation costs (in most models) are borne entirely by the parties. Given this, any settlement achieved to avoid litigation costs is also consistent with social welfare. But once we consider broader societal effects from litigation – such as effects on the stock of legal capital or the congestion of courts – then we must assume that the private and social settlement incentives diverge.

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<sup>42</sup> If the stakes are sufficiently large, reverse payments will occur even though the likelihood of a finding of infringement is high. Moreover, if the dynamic efficiency cost is substantial, the reverse settlement may enhance social welfare. These are basic implications of the model in Part IV of this paper. It is in contrast to one of the most widely-accepted views in the patent-antitrust literature that a large reverse payment should be taken as a clear sign that the patent is invalid, see, e.g., Hovenkamp (2004, at 28) (“a firm willing to pay roughly \$75 million per year to keep an alleged infringer out of the market when a successful preliminary injunction would have done the same thing for the cost of obtaining the injunction indicates that the prospects for a preliminary injunction were very poor.”)

The divergence between private and social incentives is especially noticeable in the competition blocking scenario. The reason is that there is a third party, the consumer, who is directly affected by the parties' settlement agreement.

#### A. Variations on Settlement

The model in this paper assumes that the settlement agreement follows a legitimate competition-blocking lawsuit – such as an antidumping prosecution or a patent infringement claim. However, this need not be the case, and this raises some important issues that are not directly addressed by the model. One can expand the model to take these additional issues into account.

There are several types of competition-blocking settlements, some of which seem to fall outside of the model examined here. One type is a competition-blocking settlement that is reached in connection with a lawsuit that has no connection to competition. For example, the plaintiff could sue the defendant for defamation, and condition settlement on the defendant's agreement to stay out of his market. Suppose, for example, that the lawsuit is nothing more than a ruse to allow the parties to enter into a competition-blocking agreement under the cloak of settlement. If the lawsuit itself is ginned up for the sole purpose of cloaking an anticompetitive agreement, then both the social welfare loss from prohibiting competitive entry ( $W + L_d$ ) and the litigation costs are elements of waste. Unless there is some efficiency that is generated by the settlement, it should be considered per se illegal.

A second variation based on the settlement just mentioned is one attached to a legitimate lawsuit. Suppose the plaintiff brings a legitimate defamation lawsuit against the defendant and conditions settlement on the defendant agreeing to stay out of his market. The settlement saves society the litigation costs in this case. Still, the lawsuit itself could not have led to the same result. If there is no efficiency generated by the settlement, its social desirability will be determined by a comparison of the welfare loss and the avoided litigation costs.

A third variation involves a real competition-blocking lawsuit, such as antidumping or patent infringement, that generates a settlement, as in this model; but the settlement is more restrictive of competition than the lawsuit itself. For example, the settlement may require the defendant to stay out of several markets. This variation is in fundamental respects the same as the second variation. Assuming no efficiency gain generated by the settlement, its social desirability will be determined by a comparison of the total welfare loss (including the loss due to the additional restrictions) and the avoided litigation costs.

There is a strong case for treating the second and third variations as per se violations. The settlement could be efficient in both cases. But the anticompetitive potential is clearly greater than in the case examined in the model of this paper. And since the anticompetitive potential is virtually limitless in the second and third variations, a per se rule may be appropriate.

These variations suggest the need for legal doctrines that distinguish settlements in (a) legitimate competition blocking lawsuits that are (b) within the boundaries of the lawsuit's anticompetitive effect the lawsuit itself. Settlements that do not satisfy these two conditions raise serious suspicions under the antitrust laws.

## B. Proposals for Regulating Settlements

There are several types of proposals that have been suggested for regulating injunctive and reverse settlements. Perhaps the simplest is to declare all such settlements per se unlawful under the antitrust laws. Hovenkamp, Janis, and Lemley (2003) proposed that *reverse settlements that exceed the cost of litigation should be deemed per se illegal*. The FTC, in the *Schering-Plough* litigation,<sup>43</sup> adopted this position, though it was rejected by the appellate court.

The analysis in this paper provides little support for such a per se prohibition. First, the reverse settlement is a signal that the gain to the defendant from competitive entry (equivalently, the defendant's loss from the injunction) is large relative to the damages and costs of litigation. That is consistent with the claim that the settlement poses a risk to consumers. However, the reason the plaintiff is willing to pay for the reverse settlement is that the plaintiff's gain from the injunction is also large relative to the damages and litigation costs. The plaintiff's gain could be large because of the static (market development) or dynamic (innovation) gains from the injunction. The mere fact that a large reverse payment is observed does not imply that the settlement reduces either overall social welfare or consumer welfare.

Suppose the reverse settlement is less than the total cost of litigation, which would be permitted under the Hovenkamp, Janis, and Lemley proposal. It should be clear that the plaintiff and defendant can alter the terms of settlement to bring about this result, whatever the social welfare effects of their settlement. For example, the parties could agree to share all or parts of their markets rather than let the settlement payment be the only variable term of the agreement.

Another per se rule was proposed in Crane (2002), which is to prohibit, on a per se basis, reverse settlements when the ex ante likelihood of a finding of infringement ( $P$  in the model examined earlier) is low and to adopt a per se legality rule when the likelihood of a finding of infringement is high. This would require a preliminary determination of the likelihood of patent infringement as part of the antitrust trial.<sup>44</sup>

This paper's model indicates that there are other factors in addition to the ex ante likelihood of a finding of infringement that should be part of the analysis. Certainly if the ex ante likelihood of a finding of infringement is close to one the settlement should be

<sup>43</sup> In re Schering-Plough Corp., No. 9297, at 12 (F.T.C. Dec. 18, 2003), <http://www.ftc.gov/os/adjpro/d9297/031218commissionopinion.pdf>, vacated, 402 F3d 1056 (11th Cir. 2005).

<sup>44</sup> For arguments against such an approach, see Brodley & O'Rourke (2002).

permitted. This rule would be advisable even when there were no possible efficiency bases for enjoining competitive entry. If the ex ante likelihood of a finding of infringement is almost one, prohibiting the injunctive settlement would be socially harmful because it would force wasteful litigation expenses.

However, even if the ex ante likelihood of plaintiff success in the infringement suit is not high, a reverse settlement may be defensible on welfare grounds. The reason is that in addition to the static welfare losses created by the settlement, a social planner would have to take into account the potential efficiency gains from the injunction. For example, suppose the likelihood of a finding of infringement is only 50%. Suppose the static welfare loss (from monopoly pricing) is \$100, the gain from competitive entry is \$100, and the total cost of litigation is only \$20. If there are no potential efficiency gains, the social gain from continued litigation would be \$100, and the cost of that litigation would be only \$20. It would make sense, then, to ban the reverse injunctive settlement. However, suppose the efficiency gain from market development is \$180. In that case, the expected social gain from continued litigation would be \$10, which is less than the total cost of litigation. Even if the ex ante likelihood of an infringement finding were only 40%, it would still be desirable in this case to enforce the reverse injunctive settlement. This example shows that the potential efficiency gains do not have to overwhelm the potential static welfare losses for the reverse injunctive settlement to be socially desirable – and that is because of the existence of litigation costs. The greater the litigation costs, the less demanding society should be on the size of the potential efficiency gains and the ex ante likelihood of success in an infringement action.<sup>45</sup>

Shapiro (2003) proposes a standard that would require settlements to give consumers the same level of welfare in expectation that they would receive had litigation occurred. Although it is not clear how such a standard would be implemented, it probably would require a comparison of the expected static welfare losses with expected efficiency gains. Presumably the settlement would be permitted under this standard only when expected efficiency gains exceeded expected welfare losses. This approach ignores the risk of judicial error and litigation costs as factors that might justify a settlement on social welfare grounds. The basis for ignoring these factors is unclear. The risk of error and litigation expenses are real costs.

A rule-of-reason approach<sup>46</sup> to the review of a reverse settlement should take into account the ex ante likelihood of a finding of infringement, the likely welfare losses (a function of the scope of the patent), efficiency costs, and litigation costs. Such a standard would be difficult to implement, and might lead to a recommendation to forbear from prohibiting reverse patent settlements unless there is clear evidence that market development and innovation incentives are not implicated by the dispute, which is likely to be rare. Judge

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<sup>45</sup> One factor that weighs in favor of Crane's approach is the fact that the social cost of rejecting an infringement claim is likely to be positive correlated with the ex ante probability of infringement. In light of this Crane's approach may be preferable because it comes close to the right answer in most cases without requiring an enormously difficult rule-of-reason analysis.

<sup>46</sup> See Blair & Cotter (2002), suggesting a rule of reason approach to reverse patent settlements.

Posner, in *Asahi Glass v. Pentech Pharmaceuticals*,<sup>47</sup> suggests that injunctive settlements should be upheld unless there are “suspicious circumstances” indicating anticompetitive effect.<sup>48</sup> Suspicious circumstances might indicate that the patent settlement agreement is merely a device to facilitate collusion.<sup>49</sup> This approach could provide the basis for a rule of reason test of settlements. It would stay the hands of courts in cases where suspicious factors were not present. The danger is that courts may expand the set of suspicious circumstances to include factors that are not reliable signals of anticompetitive effect.

The strongest case for a per se prohibition of reverse settlements is offered by the antidumping setting. In the antidumping setting we observe a domestic cartel seeking to exclude a low-price foreign rival. The end result of a successful prosecution will be a reduction in consumer welfare. The plaintiff cartel is not involved in innovation or the creation of static efficiencies that might justify a protected market. In this scenario there is a strong case for prohibiting reverse settlements, or treating them as per se antitrust violations. Under the conditions in which a reverse settlement is attractive, the settlement will very likely reduce social welfare, because the litigation costs avoided will be much smaller than the expected welfare losses. However, even this “strongest case” does not extend to all injunctive settlements in the antidumping context. There may be cases in which the litigation costs are large relative to the expected welfare losses, and as a result the injunctive settlement could be socially beneficial.

Outside of the antidumping setting, the case for a per se prohibition of reverse of injunctive settlements – even a conditional one based on the merits of the infringement claim or the size of litigation costs – becomes considerably weaker. In the patent antitrust setting, the per se approach requires society to forgo static and dynamic efficiencies that might be supported by the injunction.

Another version of the rule-of-reason approach would rely on *Noerr-Pennington* doctrine to remove antitrust immunity for settlement agreements that are clearly anticompetitive. One argument against applying antitrust law to settlements is that the settlements are merely the byproduct of litigation, and legitimate (not objectively baseless) litigation is immune from antitrust prosecution.<sup>50</sup> An alternative approach for regulating settlements would involve the courts either narrowing the antitrust immunity granted to litigation, or treating anticompetitive settlements under a different set of rules. The courts could simply refuse to enforce anticompetitive settlement agreements. Although the proper way to distinguish undesirable settlements from the rest would be to weigh all of the factors mentioned earlier (ex ante likelihood of a finding of infringement, potential static welfare losses, potential efficiency gains, and litigation costs), an approximately correct result might be reached through an intent test based on objective evidence. Under such a test, if the plaintiff pressured the defendant to reach a settlement under conditions in

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<sup>47</sup> 289 F.Supp. 986 (N.D. Ill 2003).

<sup>48</sup> *Id.* at 992.

<sup>49</sup> *Id.*; see also Priest (1977). Brodley & O’Rourke (2002) prefer to use suspicious circumstances in a per se framework that would enable courts to infer anticompetitive intent.

<sup>50</sup> *Professional Real Estate Investors, Inc. v. Columbia Pictures Industries, Inc.*, 508 U.S. 49, 60-61 (1993).

which he knew or had reason to know that the likelihood of infringement ( $P$ ) is extremely low, the court would consider the settlement a sham.

One problem with both the per se prohibition and the rule-of-reason approaches, as regulatory methods, is that the regulatory effect can be evaded if the potential litigants enter into waiver agreements. Indeed, a per se ban would simply cause firms to rush into waiver agreements.

This paper proposes a third approach to regulating injunctive settlements. That is to impose an optimal penalty (or subsidy) on to the plaintiff seeking to block competition. If the optimal penalty were imposed in the antidumping context, no firms would seek to block competition. In the patent context, an optimal penalty could be negative (i.e., a subsidy) so that firms may still attempt to block competition even when paying the penalty. The penalty, which generalizes the approach suggested in Landes (1983), would internalize the welfare losses (transfer plus deadweight loss) as well as the uncaptured efficiency gains.

The optimal penalty approach would be administratively difficult, but perhaps no more so than a rule of reason standard applied with accuracy. Indeed it might reduce administrative costs by switching the penalty assessment to some administrative process rather than using the courts to generate complicated legal doctrines to assess the legality of injunctive settlements.

The optimal penalty approach has the additional feature that it will not necessarily lose its regulatory impact if firms opt for waiver agreements. If the likelihood that infringement takes place is not greatly dependent on the patent search efforts of rival firms, the optimal penalty approach need not be changed in order to correct incentives even in the predispute waiver setting. On the other hand, if the likelihood of infringement does depend on the patent search efforts of rivals, then agencies could apply a different set of penalties to predispute injunctive waiver agreements.

### C. Some General Implications

This expanded analysis of settlement has implications for some long-standing issues in the economics of litigation. The design-space of settlement agreements is considerably broader than suggested by the Landes-Posner-Gould model, which implies a greater likelihood of settlement. The compensated injunction (Rule 4) of Calabresi and Melamed (1972) is one of the settlements implied by this model. The model allows one to predict the circumstances in which compensated injunctions will be adopted in settlement.

The model also has implications for the generation of efficient norms. Where the stakes attached to legal rules are high relative to the damages in litigation, the parties may adopt settlement agreements that reverse the law. Agreements of the sort examined in Ellickson (1991), sometimes reversing the law, are likely to be observed. Indeed, the parties may adopt litigation waiver agreements that reverse the law as between themselves.

Rubin (1977) focused on litigation as a primary force pushing the law toward efficient rules (see also Hylton, 2006). Where the stakes are high, parties will challenge inefficient legal rules in court more often than efficient rules. This model suggests that settlement and waiver agreements will have the same effect. Rather than challenge inefficient rules until they are overturned in court, this paper's model shows that parties will sometimes have incentives to enter into settlement agreements that reverse the legal rule as between the parties. This suggests a stronger push toward common law efficiency than implied in Rubin's analysis.

## V. Conclusion

This paper extends the economic analysis of settlements and draws some practical implications for injunctive and reverse settlements. The analysis shows that the design space for settlements is considerably broader than in the traditional analysis, so settlements are more likely to occur than acknowledged in the standard analysis. Asymmetric stakes, in this model, are not sufficient to stop settlements from occurring.

The most controversial applications of this model are to competition-blocking litigation in the patent-antitrust and antidumping settings. Because of the consumer welfare implications of settlements, some commentators have suggested competition-blocking settlements should be banned. The general issue is the divergence between private and social incentives to settle. This paper identifies the factors that account for that divergence and offers a framework for evaluating the social welfare implications of settlement.

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