COMPETITION, INALIENABILITY, AND THE ECONOMIC ANALYSIS OF PATENT LAW

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ABSTRACT

Most influential economic theories about private disputes, including the Coase theorem, assume that there are no legal restraints on alienability. However, the parties to a patent dispute are often competing firms, and their private dealings may thus be constrained by the antitrust laws. Antitrust prohibits private transactions that allocate commercial rights in ways that unreasonably subvert competition between the parties. This creates an asymmetry between (1) the allocations of rights that the parties can effect through contract; and (2) those a court can effect through its judgment. For example, antitrust may condemn a "reverse payment" settlement in which a monopolist-patentee pays an accused infringer to stay off the market for several years. But if the dispute were litigated to judgment, a court could produce the same exclusionary outcome by issuing an injunction. The result is ultimately that, in contrast to familiar Coasean logic, a court's delimitation of patent rights can influence the final allocation of such rights, even if the parties can bargain. Further, the parties may (rationally) litigate to judgment even if they have common expectations about litigation, and even if they are perfectly capable of entering into a lawful settlement ex ante.

Antitrust limits on alienability may thus critically alter the nature of a private dispute, distinguishing it from the more conventional property conflicts studied in classical law and economics. Aside from altering the parties' incentives and behavior, it changes the appropriate normative policies toward settlement and litigation. The parties may be settling not simply to avoid litigation costs, but rather to avoid a pro-competitive

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judgment they cannot lawfully bargain around (e.g. patent invalidation), or to obtain a judicial stamp on what would otherwise be an unenforceable contract. As such, when a proposed settlement concerns rights that are not entirely alienable, the court should carefully review its terms to ensure they do not defy the relevant inalienability rule. Unfortunately, the patent courts have missed this important point (although it has been recognized implicitly in some other areas of law). They continue to treat patent suits as ordinary private conflicts over fully-alienable rights, approving virtually all settlement proposals as a matter of course. I explain the benefits of reviewing patent settlements in certain cases, and I offer a detailed account of how such review ought to operate in practice.

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I. INTRODUCTION

Why do private parties litigate their disputes? The canonical answer is that they are beset by some kind of bargaining failure. For example, the parties may disagree as to which of them is likely to prevail, preventing them from agreeing on settlement terms. But a bargaining failure is not the only possible explanation. It may be the law itself that induces the parties to litigate—namely legal restraints on private contracting, broadly known as *inalienability rules*.[1] Such restraints may prohibit the parties' preferred exchange of rights on public policy grounds. In any such case, the parties' preferences are necessarily in conflict with some protected public policy interests. As a result, the question of whether a disputed property right is alienable is critical to determine the proper role of the court in facilitating an appropriate resolution.

To illustrate, suppose two private parties are involved in a property dispute, and consider the following question: What can the court infer simply from the fact that the parties are litigating? If there are no inalienability rules that might constrain the parties' private dealings—as is typical in private disputes—then the court knows they were free to strike whatever agreement they like prior to litigation. Perhaps that hypothetical contract would have imposed some externalities[2] on third parties—many contracts do—but the fact is they were

1. More specifically, an inalienability rule is a legal restriction prohibiting the transaction of a particular property right, at least under certain circumstances. For example, a person cannot sell her right to vote in a political election. Professors Calabresi and Melamed were the first to highlight inalienability rules as one of three policy levers the courts use to protect property interests. *See* Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1092 (1972).

2. An externality problem arises when one party's conduct inadvertently affects another party (for better or worse), but the actor does not take this into account when choosing his

permitted to form it. Thus, the court may infer that the parties are litigating due to a bargaining failure. Accordingly, settlement should generally be regarded as the best possible resolution,[3] for it signals that the parties have overcome the bargaining problem that led them to court. Furthermore, there is no particular reason the court should fuss over the *terms* of a proposed settlement. The parties were free to adopt them before trial, so why scrutinize them now?

But what if the disputed property rights are subject to some restraints on alienability? Now the court cannot presume that the parties were entitled to strike their preferred agreement to avoid litigation.[4] That hypothetical contract might be unlawful and unenforceable, and the parties may be litigating only because there is no lawful alternative that they mutually prefer to litigation. Thus the court cannot infer a bargaining failure. This ought to shift its policies on how the dispute should be resolved. It is no longer appropriate to approve any settlement as a matter of course. Rather, the court should carefully scrutinize the terms of a proposed settlement to ensure they are not antithetical to the policies underpinning the relevant inalienability rule. By the same token, litigation to judgment should not necessarily be viewed as problematic,[5] for it may reflect that the only arrangements the parties can agree on would run counter to some protected public policy interests. That means the court may be better-suited than the parties to elicit an appropriate resolution, even if the parties suffer no transaction costs.[6]

Consistent with the latter scenario, patent disputes often arise in the shadow of alienability restraints, although the courts have recognized neither this fact, nor the important normative implications that flow from it. The parties to a patent dispute are often competing firms with market power, and their private dealings may thus be constrained by antitrust law.[7] Antitrust often prohibits competing

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course of conduct. *See, e.g.*, James M. Buchanan & W. Craig Stubblebine, *Externality*, 29 *Economica* 371, 371 (1962).

3. Settlement is generally viewed as the most desirable way for a private dispute to resolve. *See, e.g.*, Carrie Menkel-Meadow, *For and Against Settlement: Uses and Abuses of the Mandatory Settlement Conference*, 33 *UCLA L. Rev.* 485, 485 (2015) (noting that many judicial administrators and rule drafters agree that "dispute resolution outside of full adjudication is a good thing").

4. For example, suppose that zoning law prohibits a homeowner from selling her land to an adjacent factory. Then, if the homeowner and the factory are embroiled in a property dispute, they may be prohibited from entering into a settlement in which the factory takes possession of some of the homeowner's land, even though this might be their mutually-preferred option.

5. In law and economics, the conventional wisdom is that litigation is generally an undesirable way to resolve a private dispute. *See, e.g.*, Kathryn E. Spier, *Litigation*, *in* 1 Handbook of L. & Econ. 259, 268 (A. Mitchell Polinsky & Steven Shavell eds., 2007) ("[T]rials are a decidedly inefficient way for private parties to resolve their disputes.").

6. A common example that I will reference throughout this paper is patent invalidation. In many instances, the invalidation of a patent is socially efficient. But private parties (even non-competitors) will virtually never form an agreement that effectively rescinds the patent. They would both prefer a royalty-free licensing deal, as this would still exclude third parties.

7. Section 1 of the Sherman Act prohibits "every contract, combination . . . , or conspiracy, in restraint of trade . . . ." 15 U.S.C. § 1 (2012).

firms from transacting commercial property (which could be real property or IP) with one another.[8] The result is *antitrust inalienability*—antitrust laws prohibiting commercial property transactions that unreasonably suppress competition between the parties.[9] This paper is the first to provide a comprehensive theory of antitrust inalienability in patent disputes, and to demonstrate how such inalienability distorts the law and economic analysis of private conflicts over property rights. I then use this theory to explain why adjudicative policies in patent disputes ought to differ from those normally embraced in private law, at least when the parties are competing firms.

Antitrust inalienability may condemn various kinds of patent agreements. For example, a firm may be prohibited from buying patents covering technologies that compete with its own, just as competitors are often prohibited from selling stock or commercial assets to one another.[10] Competitors may be prohibited from striking a cross-licensing deal under which they agree to divide the market, with each firm permitted to make only one distinct variety of the patented product.[11] Firms are also generally prohibited from striking agreements imposing restraints "beyond the scope of the patent." For example, a patentee and its licensee cannot strike an agreement that requires the latter to continue paying royalties after the patent expires or is invalidated.[12]

The Supreme Court's recent *Actavis* decision highlights a particularly interesting form of antitrust inalienability.[13] It held that "reverse payment settlements"—also known as "pay for delay"—may violate the antitrust laws.[14] In a typical case, the plaintiff has a patent-based monopoly, and it sues a rival that is planning to sell an allegedly-infringing product. The rival's defense—which, if successful, will permit it to enter the market—is that the patent is either invalid or uninfringed. But in a reverse payment settlement, the monopolist-patentee simply pays the defendant-rival to stop challenging the patent and stay off the market for some material period of time (but no later than the date of patent expiration).[15] This agreement is certain to achieve exclusion, whether or not the

8. The Clayton Act prohibits mergers or acquisitions between rivals where the result is "substantially to lessen competition." 15 U.S.C. § 18 (2012).

9. Antitrust inalienability often arises outside the patent context. For example, firms are often prohibited from buying stock in one another, or from merging. But, unlike patents, these kinds of property are unlikely to be the subject of a (non-antitrust) private dispute.

10. *See U.S. Dep't of Justice & Fed. Trade Comm'n, Antitrust Guidelines for the Licensing and Acquisition of Intellectual Property* § 3.1 (1995) ("An acquisition of intellectual property may lessen competition in a relevant antitrust market"); *See also id.* at § 5.7 (noting that IP acquisitions should be evaluated under the same antitrust statutes that apply to ordinary mergers or acquisitions). *See also* Erik Hovenkamp & Herbert Hovenkamp, *Buying Monopoly: Antitrust Limits on Damages for Externally Acquired Patents*, *Tex. Intell. Prop. L. J.* 101, 102 (forthcoming 2017).

11. *See* Hartford-Empire Co. v. United States, 323 U.S. 386, 392–400 (1945).

12. Kimble v. Marvel Enters., 727 F.3d 856, 857 (2013).

13. *See* F.T.C. v. Actavis, Inc., 133 S. Ct. 2223 (2013).

14. *Id.* at 2227. *See also* Aaron Edlin et al., *The Actavis Inference: Theory and Practice*, 67 Rutgers U. L. Rev. 585, 588 (2015).

15. *Actavis,* 133 S. Ct. at 2227.

patent is valid and infringed. This maximizes the joint profits of the parties, since competition and profits are inversely related.

Reverse settlements are best known for their prevalence in pharmaceutical markets, which have four important properties that make them vulnerable to collusion. First, a drug monopolist (or a cartel) can earn huge profits, since consumers are generally willing to pay high prices for health care products. Second, in lieu of monopoly, competition is particularly intense, because a branded drug and generic equivalent are essentially fungible.[16] Third, in a drug market, even individual patents may create substantial barriers to entry.[17] Finally, poorly designed statutes in the Hatch-Waxman Act prevent (or at least discourage) most generic drug makers—namely all but the first to file for FDA approval—from challenging the patents on branded drugs, even if those patents are likely invalid.[18] The result is that a reverse payment settlement can effectively block generic entry (and thus preserve monopoly rents) even if most generic firms are not paid to stay out of the market.

In *Actavis*, the defendants were drug monopolist Solvay and a number of generic drug makers, including the eponymous Actavis. Solvay's patent monopoly covered a product called AndroGel, which is used to treat testosterone deficiency in men.[19] The generic firms filed applications for FDA approval to begin selling generic versions of AndroGel, notwithstanding that it was covered by an active patent. These applications required them to "certify" that the AndroGel patent is either invalid or uninfringed.[20] That certification entitled Solvay to sue for infringement, which temporarily stayed FDA approval of the generic drug applications. The firms quickly settled, however. Solvay agreed to make annual payments of several million dollars to the generic firms, who agreed to stop challenging the patent and stay off the market for about a decade.

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16. Of course, consumers might pay a few dollars more for a branded drug than a generic equivalent. Thus, for example, the price of Bayer is higher than off-brand aspirin. But such examples involve off-patent drugs that are sold at competitive price levels (even branded aspirin costs just a few dollars a bottle, after all). If the branded drug is patented and costs, say, $1000 per dose, consumers will be much more price-sensitive, and will be eager to find a generic equivalent at a lower price.

17. Drugs are usually covered by a relatively small number of patents—in contrast to, say, a smartphone, which typically reads on more than a thousand narrow or incremental technologies. The result is that barriers to entry—on a per-patent basis—are much larger.

18. To encourage patent challenges, the Hatch-Waxman Act gives 180 days of generic exclusivity to the first generic firm to file for FDA approval. If the first-filer enters into a reverse settlement with the branded firm, later-filing generics cannot get that exclusivity for themselves by filing their own approval and successfully challenging the patents. *See* 21 U.S.C. § 355(j)(5)(B)(iv); Michael A. Carrier, *Unsettling Drug Patent Settlements: A Framework for Presumptive Illegality*, 108 MICH. L. REV. 37, 47 (2009); Scott Hemphill, *Paying for Delay: Pharmaceutical Patent Settlement as a Regulatory Design Problem*, 81 *N.Y.U. L. Rev.* 1553, 1583-88 (2006). However, this paper will not delve into the complex statutory structure that helps to support reverse payment settlements, which has been widely addressed throughout the literature.

19. *Actavis*, 133 S. Ct. at 2229.

20. For an overview of the generic approval and litigation process, *see* Hemphill, *supra* note 18, at 1578-79.

The Supreme Court held that reverse payment settlements may be unlawful, depending on a number of factors.[21] The most important factor is the magnitude of the payment, which provides a basis for an economic inference as to the likely function of the agreement. If the payment is large—in particular, if it is larger than the anticipated cost of continued litigation—then this creates an inference that the patent is likely invalid, and that the patentee is offering a share of the monopoly rents to stop the generic firm from securing a procompetitive judgment (invalidation of the patent) that would serve to destroy those rents.[22] Since patent-based exclusion is appropriate only if the relevant patent is both valid and infringed, this suggests the agreement likely restrains competition without justification.

A reverse payment settlement occurs before any court has issued a judgment on the patent's validity. Hence, at the time of settlement, no court has upheld the patentee's right to exclude the defendant from the market. By contrast, if the dispute proceeded to judgment, and if the patentee were successful, the court might issue an injunction, excluding the defendant's product from the market. This elicits the same allocation of rights as a reverse payment agreement: it strips the defendant of any right to sell its product, at least temporarily. The only difference, which does not bear on the allocation of rights, is that the injunction does not compel the patentee to make a payment.

Thus, while a court's judgment may act to exclude the defendant, the parties may be prohibited from entering into a pre-judgment settlement that achieves the same result. In the same vein, if a district court holds a patent invalid or uninfringed, the parties cannot bargain around this in order to restore the patent's exclusionary power, but the Federal Circuit could do just that by reversing the district court judgment on appeal. Additionally, through its patent-granting decisions, the Patent and Trademark Office (PTO) can influence how patent rights are ultimately allocated on the market, even if the relevant firms can bargain.[23]

This highlights an asymmetry created by antitrust inalienability, which is that it constrains only *private* influences on the allocation of commercial rights, not public ones. A court's holding may inherently diminish competition, but the parties may be prohibited from entering into a private agreement that does the very same thing. This asymmetry distinguishes antitrust inalienability from more typical inalienability rules, most of which would never be circumvented by a

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21. *Actavis*, 133 S. Ct. at 2234-37.

22. *Id.* at 2235 (noting that a large payment may "provide strong evidence that the patentee seeks to induce the generic challenger to abandon its claim with a share of its monopoly profits that would otherwise be lost in the competitive market"). *See also* Gregory Dolin, *Reverse Settlements as Patent Invalidity Signals*, 24 *Harv. J. L. & Tech.* 281, 322 ("If the size of the settlement exceeds reasonable litigation costs and cross-license fees, it would indicate that the doubts [about patent validity] are substantial."); Edlin et al., *supra* note 14, at 585 ("[A] large and otherwise unexplained payment, combined with delayed entry, supports a reasonable inference of harm to consumers from lessened competition.").

23. *See* Section II(B).

judgment. For example, person *A* is prohibited from selling his kidney to *B*, but there is also no conceivable circumstance under which a court might order *A* to provide a kidney to *B*. Thus, this inalienability rule creates no asymmetry between private and public influences on the allocation of "kidney rights."

As a result of antitrust inalienability, patent disputes arising in antitrust's shadow are distinct from most conventional private disputes. Most theories that shape our understanding of private conflicts over property rights assume implicitly that there are no noteworthy restraints on alienability. Perhaps the best-known example of this is the Coase theorem, which posits that, if the relevant parties can bargain,[24] then the initial assignment of rights (or a court's delimitation of property rights) will not influence the efficiency with which those rights are ultimately allocated.[25] Instead, the initial assignment or rights (or a court's judgment) merely influences who must pay, and how much. A corollary is that parties who can bargain effectively will always settle in advance of costly litigation; their expectations about litigation influence only the terms of the exchange, not the allocation of rights.

However, these propositions rest critically on Coase's assumption that "it is always possible to modify by transactions on the market the initial delimitation of rights."[26] That is, Coase assumed the disputed rights were entirely alienable. And in the kinds of tort and real property disputes he explores in *The Problem of Social Cost*, that assumption is perfectly appropriate.

But the Coase theorem's familiar logic does not carry over to disputes whose parties are constrained by inalienability, as is often the case in patent disputes between competing firms. In such a case, the court may influence the final allocation of patent rights, even if the parties can bargain. The same is true of the "initial assignment" of patent rights by the PTO. In effect, the joint profits of competing parties are largest when commercial rights are allocated in ways that diminish competition. Thus, if a court's judgment serves to suppress competition, then the parties often have no joint interest in bargaining around it, although they are permitted to do so. On the other hand, if the court's judgment enhances competition—in particular, if it holds the patent invalid or not infringed—then the parties would *like* to bargain around it but antitrust prohibits them from doing so.[27]

24. When I say "the parties can bargain," it is just as good to say there are no prohibitive transaction costs between those two parties. However, it is usually impossible for a firm to bargain with its consumer base so as to maximize aggregate welfare, so there are substantial transaction costs between the party firms and nonparty consumers, which is of course why antitrust exists. But the Coase theorem allows for the possibility that the parties to a legal dispute can bargain with each other but cannot bargain with outsiders who are indirectly affected by their dealings. In such a case, the Coase theorem implies only that a court's delimitation of rights will not affect the final allocation of rights (the one that maximizes the joint welfare of the parties); it does not imply that this final allocation will be *socially* efficient.

25. Ronald H. Coase, *The Problem of Social Cost*, 3 *J.L. & Econ.* 1, 15 (1960). *See also, e.g.*, Richard Posner, *Nobel Laureate: Ronald Coase and Methodology*, 7 J. *Econ. Persp.* 195, 195 (1993).

26. Coase, *supra* note 25, at 15.

27. If a patent is held invalid or uninfringed, then patent law becomes irrelevant, and an-

If the threat of antitrust sanctions sufficiently deters the parties from executing an anticompetitive settlement, they may (rationally) litigate to judgment. This is so even if they have common expectations about litigation, and even if they are perfectly capable of forming a lawful settlement before trial.[28] Such litigation occurs when there is no lawful settlement agreement that both parties prefer to litigation, which may have positive expected value for both parties.[29] For example, it may be that the parties would like to enter into a reverse payment settlement, but antitrust precludes them from doing so. And the patentee may prefer litigation to any licensing settlement that an accused infringer would accept, since litigation to judgment offers the possibility of preserving its monopoly, while licensing generally does not, and the defendant will pay only so much for a license. Section II provides an intuitive and accessible model demonstrating these points.

A third departure from traditional law and economic analysis is that, even if the parties settle *ex ante*, the agreed-upon allocation of rights (and the efficiency of that allocation) may vary depending on the parties' expectations about litigation.[30] This would never happen in a conventional private conflict. On the contrary, if allocation X maximizes the parties' joint welfare, and if there are no limitations on alienability, then the parties will always wind up at X—both in an *ex ante* settlement and after any possible final judgment. In a pretrial settlement, their expectations about litigation affect only the monetary terms on which they arrive at X. Note, however, that allocation X is not necessarily *socially* efficient, for the litigants may fail to take account of some third parties who are indirectly affected by their dealings. But the point is that, if the parties can bargain with one another, the court's judgment will not affect the efficiency of the final allocation of rights.[31]

titrust alone governs the permissibility of the firms' agreement. And, in lieu of patent law, competitors are virtually always prohibited from striking agreements that serve to exclude one of them from the market. *See, e.g., Actavis*, 133 S. Ct. at 2230 (noting that antitrust precludes a firm from paying a competitor to stay out of its market).

28. Section II(A) demonstrates this using a model in which reverse payment settlements are unlawful if the payment is sufficiently large. As a means of preserving monopoly rents, an alternative to reverse settlement would be for the patentee to permit entry by the other firm, but to fix prices or output in the product market, effectuating a cartel. In a game-theoretic model of licensing settlements, Michael Meurer shows that antitrust restrictions on collusive *licensing* terms may prevent the firms from settling. *See* Michael J. Meurer, *The Settlement of Patent Litigation*, 20 *RAND J. Econ.* 77, 77 (1989) ("This incentive for licensing is diminished, however, by antitrust rules that impair the ability of parties . . . to maintain monopoly output restrictions.").

29. For a monopolist-patentee, successful litigation allows it to preserve monopoly rents without having to share them. On the other hand, the defendant, if successful, will secure the right to compete without having to pay royalties.

30. For example, in the Appendix, I show that an *ex ante* settlement between competitors may take two forms: a licensing agreement, or a *lawful* reverse payment (i.e., one in which the payment is sufficiently small), depending on the parties' expectations about the patentee's likelihood of winning in court.

31. Consistent with this, Judge Richard Posner states the Coase theorem as follows: "if transaction costs are zero, the initial assignment of a property right . . . will not affect the effi-

These deviations from classical law and economic analysis have important legal policy implications. The conventional wisdom on private disputes is that the parties are generally better suited than a court to resolve the dispute efficiently,[32] implying that settlement is the best possible outcome. And, as already noted, there is little reason to fuss over the terms of settlement in the absence of any legal restraints on alienability, for such absence signals that the parties are entitled to allocate the relevant rights however they like. But this is not the case in a patent dispute whose parties are subject to antitrust inalienability. Now the courts ought to scrutinize settlements carefully to ensure that they do not undermine the underlying inalienability rule. In the patent-antitrust context, that means the settlement should not suppress competition to a greater extent than is reasonably justified by patent law.[33] By the same token, litigation to judgment should not necessarily be regarded as undesirable or inefficient, for it may reflect that the socially efficient outcome is one that the parties would never implement volitionally, such as invalidation of the patent.[34]

Although private settlements are almost always awarded as a matter of course, there are other important situations in which settlement proposals are closely scrutinized. A familiar example involves judicial review of class action settlements. When a settlement is proposed in a class action lawsuit, courts carefully review them to ensure they are fair to the plaintiff class.[35] In lieu of such scrutiny, lawyers for the plaintiff class have an incentive to strike settlements that provide them with large legal fees, but offer comparatively little relief for class members.[36] The problem is that class members' interests are often not adequately "internalized" by class attorneys, because the large number of parties makes it very difficult to negotiate the terms of legal representation.

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ciency with which resources are allocated." Richard Posner, *Nobel Laureate: Ronald Coase and Methodology*, 7 J. *Econ. Persp.* 195, 195 (1993). If there are also no transaction costs between the parties and any nonparties who might be indirectly affected by the allocation, then the final allocation of rights will be *socially* efficient.

32. *See, e.g.*, Spier, *supra* note 5, at 270.

33. Antitrust condemns patent agreements that suppress competition and are not justified on patent policy grounds. *See, e.g.*, *Actavis*, 133 S. Ct. at 2232 (noting that "[Supreme Court] precedents make clear that patent-related settlement agreements can sometimes violate the antitrust laws"); Hovenkamp & Hovenkamp, *supra* note 10, at 112 (noting that, even if the Patent Act creates a broad authority to do something like assign a patent, such conduct may be unlawful when used substantially to diminish competition).

34. No matter their own beliefs about patent validity, the parties generally have an interest in preserving validity by settling. This allows them to exclude third party competition, which benefits them both.

35. *Fed. R. Civ. P. 23*(e) (noting that a court may approve a proposed class action settlement only upon a "finding that it is fair, reasonable, and adequate"). *See also* In re Online DVD-Rental Antitrust Litig., 779 F.3d 934, 944 (9th Cir. 2015) (enumerating various factors for assessing the fairness of a class section settlement); In re Trulia, Inc. Stockholder Litig., 129 A.3d 884, 890-91 (Del. Ch. 2016) (noting that Delaware law requires that courts "examine the fairness of a class action settlement before approving it").

36. *See, e.g.*, Edward A. Purcell, Jr., *The Class Action Fairness Act in Perspective: The Old and the New in Federal Jurisdictional Reform*, *156 U. Pa. L. Rev.* 1823, 1852-53 (2008).

The rationale for evaluating settlements in inter-competitor patent disputes is similar. Here, too, there are some parties who are not effectively represented: consumers. In fact, here they are not parties at all. But antitrust nevertheless protects them from certain anticompetitive settlements. As this reflects, the impetus for antitrust inalienability—and for most inalienability rules—is an externality problem.[37] Thus we apply inalienability rules when some group of parties have the interest and ability to enter into a transaction that improves their own joint welfare, but which imposes a large negative externality on third parties, generating an overall reduction in aggregate social welfare.

Since the Supreme Court has noted that patent settlements may violate the antitrust laws, all courts should take care not to rubber-stamp patent settlements that create an actionable antitrust injury. Of course, one might think that the courts are already inclined to review patent settlements carefully before approving them. After all, the *Actavis* opinion was hardly the first to recognize that some patent settlements run afoul of the antitrust laws. The majority cited some longstanding precedents to that effect.[38] But the truth is that these precedents have had relatively little impact on how courts adjudicate *patent disputes*, as distinguished from subsequent antitrust actions challenging settlements of those disputes. In particular, the courts generally continue to approve settlement proposals summarily, just as they do in ordinary private conflicts over fully-alienable rights.[39] In some cases, the consent decrees do not reflect the parties' full agreement, leaving some terms (such as profit-sharing[40]) to be achieved through separate, private contracts,[41] reflecting that the courts do not make the requisite effort to see the entirety of the parties' agreement.

The paradoxical result is that, while all courts acknowledge that some patent settlements may violate the antitrust laws, they usually do not review proposed

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37. *See* Calabresi & Melamed, *supra* note 1, at 1111 (noting that inalienability rules may be efficient "when a transaction would create significant externalities").

38. *Actavis*, 133 S. Ct. at 2232. For example, the Court cited the well-known *Singer* case in support of its claim that patent settlements may violate the antitrust laws if they restrain competition to a greater extent than is justified by patent law. *See* United States v. Singer Mfg. Co., 374 U.S. 174, 196-97 (1963) ("[T]he possession of a valid patent or patents does not give the patentee any exemption from the provisions of the Sherman Act beyond the limits of the patent monopoly.").

39. *See, e.g.*, In re Androgel Antitrust Litig., No. 1:09-cv-955, 2014 WL 1600331, *2 (N.D. Ga. Apr. 21, 2014) (observing that the patent judge had simply "rubber-stamped the proposed consent judgment"); In re Ciprofloxacin Hydrochloride Antitrust Litigation, 261 F. Supp. 2d 188, 212-213 (E.D.N.Y. 2003) (noting that the patent court had "played no role [in the settlement of the patent suit] other than signing the Consent Judgment"); *In re* Nexium (Esomeprazole) Antitrust Litig., 968 F. Supp. 2d 367, 396 (D. Mass. 2013) (noting that consent decrees are often much more like private contracts than judicial opinions, because the courts do not carefully review them on the merits, and are "hard-pressed" to reject them).

40. The profit-sharing term, the payment, is important, for as already noted, this is the principal basis for economic inference as to the settlement's competitive effects.

41. *See, e.g.*, *Androgel*, 2014 WL 1600331 at *7 (N.D. Ga. Apr. 21, 2014) (noting that the parties' proposed settlement had not disclosed the profit-sharing component of the deal, which was instead implemented in a separate, private agreement).

settlements before approving them. This reflects an institutional failure to recognize how antitrust inalienability distinguishes many patent disputes from ordinary private conflicts over fully-alienable rights. The impetus for settlement may have little to do with avoiding costly litigation, and may rather reflect the parties' interest in avoiding a procompetitive judgment that they would be prohibited (on antitrust grounds) from bargaining around later.[42]

I propose that if the parties' patent dealings appear reasonably capable of materially suppressing competition (in a way that is not authorized by patent law), then the patent court should carefully review a proposed settlement before approving it (i.e., before entering it as a consent decree). This could come entirely from the judge's own deliberations, or the court could rely on an evaluation solicited from one of the antitrust agencies,[43] or from an appointed expert. Although the court's refusal to approve a settlement cannot prevent the parties from dismissing the suit and striking the agreement privately, it can nevertheless undermine the stability of the settlement by making it more difficult to enforce.

First, judgments (including stipulated judgments) are generally easier to enforce than contracts. Second, and more importantly, a court's deliberation of the antitrust issues could have a preclusive effect on the parties. This requires that the reviewing court's deliberation suggests the antitrust issue was "actually litigated" in the sense required by *res judicata*.[44] This could make it enforceable (provided it is has not been successfully challenged by a third party) even if the approving court erred in finding the settlement antitrust-compliant, for it precludes either party from re-raising the antitrust issues as a defense for its failure to perform. The parties have a strong interest in ensuring that their agreement is enforceable, so judicial review would create an incentive to settle on less restrictive terms. Aside from explaining the benefits of review, I address the

42. The result, which many scholars have noted, is that the parties have a joint interest in striking a settlement simply to avoid patent invalidation. *See, e.g.*, Edlin et al., *supra* note 14, at 586 (noting that the parties' motivation is "to preserve patent exclusivity for as long as possible"). Note, however, that in an ordinary property disputes, the parties (assuming they can bargain) are not jointly concerned with "avoiding" any particular judgment, since they can bargain around any order they dislike.

43. At least one court has sought FTC review of a patent settlement before approving it. *See* In re Effexor XR Antitrust Litig., No. 11-5479, 2014 U.S. Dist. LEXIS 142206 *34, *38 (D.N.J. Oct. 6, 2014) (noting that, after the parties requested that their settlement be entered as a consent decree, the patent judge had "issued a scheduling order requiring the parties to provide the FTC with the proposed settlement and associated license agreements and soliciting the FTC's views on any antitrust issues concerning the proposed settlement"). This appears to be the exception to the rule, however.

44. *Charles Allen Wright Et Al., 18 Fed. Prac. & Proc.*, § 4419 (3d ed. 2017) (noting that a party is precluded from re-litigating an issue only if it was "actually litigated" and "actually decided"). The authors go on to write that "issue preclusion generally is appropriate if some effort is made to litigate the issue, but the evidence introduced is held insufficient to carry the burden of persuasion or even the burden of production." *Id.* As such, if the court reviews the settlement and finds no antitrust violation, this may have a preclusive effect on the parties even though the settlement review may be less procedurally rigorous than a bona fide antitrust litigation.

specific things courts should look for when evaluating settlements for antitrust compliance.[45]

The possibility that a private dispute may arise in the shadow of inalienability is not unique to patent law. To that end, the paper concludes by providing some examples of other kinds of disputes that center on rights that are at least partially inalienable. This paper's arguments about settlement review will often carry over to these other contexts.

II. COMPETITION AND INALIENABILITY IN PATENT DISPUTES

The Coase theorem posits that, if transaction costs are sufficiently low, the initial assignment of property rights will have no influence on the efficiency with which those rights are ultimately allocated through private bargaining.[46] The implication is that legal rules that serve to delineate property rights to resolve private disputes—such as tort standards that distinguish nuisance from privileged conduct—will not affect the final allocation of rights, provided that property rights are clearly defined and the relevant parties can bargain.[47] Coase's work is often misconstrued as suggesting that transaction costs are negligible and thus the government does not affect the allocation of property rights. In fact, however, Coase made no such claim, nor would he agree with it. Rather, the power of Coase's idea is in highlighting transaction costs as a key friction on market efficiency, and as a principal reason why legal rules matter.[48]

Importantly, even if the parties to a dispute can bargain, it does not follow that their negotiated allocation will be *socially* efficient. The parties will allocate the relevant rights in whatever way maximizes their joint welfare, but they may not account for nonparty interests.[49] That is, even if the parties can bargain, transaction costs may undermine bargaining between the parties and some affected nonparties. This can lead the parties to adopt an inefficient agreement. But the point is that the court's judgment will not affect the final allocation of rights, because the parties will always bargain to their privately-preferred allocation of rights, which may or may not be socially efficient. In patent disputes, the parties often impose externalities on consumers, for the allocation of patent rights affects the marketplace—it influences the prices, quality, and availability of products. This is just an embodiment of the more general fact that firms generally

45. *See* Section IV(B).

46. Coase, *supra* note 25, at 15. *See also* Posner, *supra* note 25, at 195.

47. *See, e.g.,* Calabresi & Melamed, *supra* note 1, at 1094 (In "the absence of transaction costs, Pareto optimality or economic efficiency will occur regardless of the initial entitlement.").

48. Coase, *supra* note 1, at 36 (noting that when bargaining is unlikely to achieve efficiency on its own, "a different set of circumstances may make it economically desirable to change the legal rule regarding the delimitation of rights").

49. This is an example of the well-known externality problem. *See* Stubblebine *supra* note 2.

do not internalize consumer welfare. If they did, the antitrust laws would be largely superfluous.[50]

However, this result—that the courts do not affect the allocation of rights when the parties can bargain—does not hold up if we depart from the classic Coasean framework and consider disputes over property rights that are not entirely alienable as between the parties. This is common in patent disputes between competing parties.[51] The reason is not simply that the firms compete, although this plays a critical role in shaping their incentives. Rather, the divergence occurs because antitrust inalienability may prohibit the parties from executing their preferred settlement, or from bargaining around a judgment they dislike. The result is that a court's judgment can influence the final allocation of patent rights, even if the parties can bargain. The same is true of the "initial assignment" of patent rights by the PTO.

There are a few things to note before demonstrating these points. First, the analysis does not rely on any particular *normative* claims about patent eligibility or patent scope. It does not presume, for example, that narrower patents are generally better for social welfare. Nor does it presuppose any particular theory about which patents are valid and which patents are invalid. Rather, it is deliberately agnostic on these questions, because the economic results do not hinge on the reader's own views about patent eligibility or scope.

Second, the analysis assumes that an injunction would keep the defendant off the market for a material amount of time. That is, the enjoined defendant cannot instantly invent around the patent (or simply remove the patented feature from its product). The assumption reflects this paper's focus on patent agreements that can materially influence the market. If the defendant can work around the patent with relative ease, then the patent does not create a significant barrier to market entry and is unlikely to support an anticompetitive patent agreement.

Third, the analysis will usually assume that total profits are higher under monopoly than under duopoly. This is true in most markets, particularly those in which products are not very differentiated. Among other things, this assumption implies that the parties would always prefer an exclusion agreement—such as reverse payment—to a licensing settlement that obliges them to compete.

Finally, this paper's analysis presents no challenge to Coase. The Coase theorem is like the Pythagorean theorem: if the relevant assumptions are satisfied, the stated result must follow. The preceding arguments merely reflect that, when the parties to a patent dispute are competing firms, Coase's assumptions about alienability are not satisfied. But it is nevertheless important to acknowledge how

50. If firms internalized consumer welfare in addition to profits, then they would never act in a way that generates deadweight loss, and thus all markets would operate efficiently, regardless of market structure.

51. An infamous contemporary example is the contentious litigation between rival smartphone makers Apple and Samsung. *See* Apple Inc. v. Samsung Electronics Co., Ltd., 727 F. 3d 1214 (Fed. Cir. 2013).

the results may differ from classical Coasean analysis, given the extent to which the Coase theorem has shaped our understanding of private disputes.

In fact, Coase did occasionally consider situations in which markets are not free, but focused principally on the extreme case in which the market is strictly regulated. In his 1959 article on the Federal Communications Commission (FCC),[52] Coase focused on its stringent regulation of radio frequencies. At that time, the FCC assigned a radio frequency to a particular applicant (e.g., a radio station), and it forbade the recipient from subsequently transacting those rights.[53]This served to displace the counterfactual market for "frequency rights." Since the FCC's initial assignment is unlikely to be optimal, Coase recognized that private parties could likely induce a more efficient allocation of frequency rights if they were permitted to transact them, casting doubt on the regulations' sensibility.[54] The problem was thus that, while a market would be beneficial, stringent regulations precluded its existence. In *The Problem of Social Cost,* Coase's attention moved from all-out regulation to the other extreme, focusing on (mostly bilateral) markets for real property rights, which are usually not subject to any noteworthy restraints on alienability.[55] In these cases, only transaction costs can thwart private exchange.[56] Patent rights, by contrast, do not correspond to either of these extreme cases. Certainly a market for patent rights exists, and such rights are *mostly* alienable.[57] But antitrust stipulates a few kinds of transactions that firms may not lawfully enter into. This results in some private disputes where the parties' preferred resolution involves an unlawful exchange of rights, which is not a possibility addressed in *The Problem of Social Cost.*

A. *Judicial Delimitations of Patent Rights*

The right to compete is generally inalienable. If a firm has a right to perform a competitive act against a rival, then antitrust generally prohibits any agreement in which the rival pays it to give up that right.[58] For example, a firm generally has

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52. Ronald Coase, *The Federal Communications Commission,* 2 J. L. & Econ. 1 (1959).

53. *Id.* at 5 (noting that the relevant statutes served "to prevent licensees establishing property rights in frequencies").

54. *Id.* at 16 ("It is not clear why we should have to rely on the Federal Communications Commission rather than the ordinary pricing mechanism.").

55. Of course, there are some important exceptions, like zoning laws that constrain what kinds of parties can occupy a particular tract of land.

56. In the first footnote of *The Problem of Social Cost,* Coase notes that this argument was implicit in his FCC paper. That is, eliminating the FCC's overbroad regulations would help only if private parties are capable of effectively bargaining over radio frequencies. *See* Coase, *supra* note 25, at 1.

57. The Patent Act provides that patents can generally be licensed or assigned. 35 U.S.C. §261. Antitrust simply creates a few important exceptions to this general rule, just as it creates exceptions to other general authorizations, such as the general rule that corporations are entitled to enter into contracts with one another.

58. *Actavis,* 133 S. Ct. at 2230 (2013) (noting that the antitrust laws prevent agreements in which a firm pays a rival not to compete).

the right to expand into its rival's territory, and thus the rival cannot lawfully pay the firm to stay out.[59] Patents create an exception to the rule that competitive activity is generally privileged. Accordingly, patent law gives a patentee the right to exclude (or demand royalties for) unlicensed uses of the patented invention. However, such exclusion is appropriate only if the patent is valid and infringed, which is not up to the parties to decide.[60] If a court holds that the patent is either invalid or uninfringed, then the defendant is entitled to sell its product in competition with the plaintiff, and thus antitrust prohibits the parties from bargaining around the judgment.

The result, which has been widely-recognized by scholars and jurists, is that patent litigants (particularly competing ones) generally have a joint interest in settling to avoid the possibility of patent invalidation, no matter the perceived likelihood of validity.[61] This preference exists not because litigation is costly (although this independently motivates settlement), but because invalidation would endow all third party rivals with an inalienable right to compete, which is something both parties prefer to avoid.

By contrast, if the relevant rights are entirely alienable, then the benefit of settlement is simply to avoid litigation costs. Indeed, if the parties can bargain and all rights are alienable, then they know they will end up at their jointly-preferred allocation one way or another. Thus, if not for antitrust alienability, traditional Coasean logic would carry over to patent disputes without a hitch. If exclusion of the defendant maximizes the firms' joint profits, they will always agree to allocate all commercial rights to the plaintiff, no matter what a court might do.

But this is not possible when antitrust imposes some limitations on how the firms resolve their dispute. The introduction discussed a number of such antitrust restrictions. This section focuses on the juxtaposition of two of them. The first is the antitrust limitation on patent settlements, namely those involving reverse payment.[62] The second is the antitrust prohibition of commercial restraints "beyond the scope of the patent" which, among other things, prohibits the firms from bargaining around a judgment that holds the patent invalid or uninfringed.

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59. That agreement would be naked market division, which is illegal *per se*.

60. 35 U.S.C. §282(b) (providing that a defendant can avoid any liability by showing that the patent is invalid or uninfringed).

61. The principal exception, which is largely immaterial here, is that a repeat litigant may prefer to litigate to judgment in order to build a litigious reputation that helps to ward off future litigation threats. *See, e.g.*, Erik Hovenkamp, *Predatory Patent Litigation: How Patent Assertion Entities Use Reputation to Monetize Bad Patents*, unpublished manuscript (2016), https://papers.ssrn.com/abstract=2308115 [https://perma.cc/PT3C-DZ2S].

62. The arguments also apply to other kinds of collusive settlements like those that call for the firms to fix prices in the product market. But reverse settlement is particularly helpful when illustrating how inalienability influences the law and economics of private disputes. A reverse settlement is directly analogous to a settlement that would be entirely innocuous in a typical real property dispute. For example, my neighbor may be entitled to display an ugly statue in his yard, but I can pay him to give up that entitlement, and there is nothing concerning about this agreement. By contrast, price fixing does not appear to be analogous to any aspect of a typical real property dispute.

It is this combination of antitrust rules that creates the asymmetry between (1)the allocations of rights the parties can effect through private contracting; and (2)those a court can effect through its judgment.

These two sources of antitrust inalienability fundamentally change the economic analysis of the dispute. They alter the manner in which the parties view litigation, and how parties will act to resolve the dispute (under the assumption that they can bargain). This phenomenon is evinced in a number of possible outcomes that are distinctly non-Coasean. For example, the parties may rationally litigate to final judgment even if they have common beliefs about patent validity, and even if litigation is costly. Alternatively, it could be that the parties enter into a settlement *ex ante*, but that its stipulated allocation of rights depends on the parties' beliefs about what a court would do on final judgment. Finally, if the parties do not settle, the court's judgment may influence the final allocation of patent rights.

The appendix establishes these possibilities formally using a model of negotiation and litigation between a patent holder (*P*) and potential market entrant accused of infringement, (*D*).[63] The model assumes that total profits are highest if *D* is excluded from the market, but that the antitrust laws may preclude them from entering into exclusionary agreements. The parties cannot bargain around a judgment that holds the patent valid and infringed. And, consistent with the *Actavis* decision, a reverse payment settlement is lawful if and only if the payment is no greater than the cost of litigation. The parties can bargain, and they have common beliefs about *P*'s likelihood of winning in court. To keep the exposition simple, I assume that, if licensing occurs, it is financed through a lump sum fee, rather than a royalty applied to output or revenue.

With these basic assumptions in place, the model's equilibrium takes one of four possible forms, depending on certain exogenous parameters, such as the plaintiff's probability of winning in court.[64] The four possibilities are explained below:

1) **Status Quo.** If *P* is very likely to win in court, then the parties will neither enter into a settlement agreement nor litigate. In this case *D* gets a negative expected value from challenging the patent in court, and thus *P* has no reason to offer a settlement, since *D*'s litigation threat is non-credible.
2) **Lawful reverse payment settlement.** If *P*'s probability of prevailing in court is fairly high, but not so high to as to make litigation unprofitable for *D*, then the parties will agree on a *lawful* reverse payment settlement: one whose payment is no larger than the cost of litigation.

63. *See* Appendix Section A.

64. The parties are assumed to have identical beliefs about the plaintiff's odds of succeeding on final judgment.

3) **Litigation to judgment**. If *P*'s probability of prevailing in court is intermediate–not particularly high, nor particularly low–then there is no lawful settlement that the parties mutually prefer to litigation. The parties rationally litigate to judgment, despite having common beliefs about what the court will do. The reason is twofold: first, *D* will not accept the largest reverse payment that *P* can lawfully make, because it gets a larger expected payoff from challenging the patent in court (which could permit it to enter the market without paying license fees). Second, the parties cannot mutually benefit from choosing licensing over litigation. In this case Litigation still has a non-negligible possibility of preserving monopoly rents, and it thus provides larger joint profits (in expected value) than licensing.
4) **Licensing settlement.** If *P*'s probability of winning is quite low, then the (certain) costs of litigation outweigh the (very unlikely) possibility of preserving monopoly through a successful infringement action. And, as in the preceding case, *D* will not agree to any lawful reverse payment, because it would not be high enough. Thus the parties will enter into a licensing settlement before litigation.

The first two outcomes are the only ones that maximize joint profits with certainty. The others provide much lower profits in expected value. That the latter two possibilities may also arise in equilibrium is a direct result of antitrust inalienability. Note that both possibilities 2 and 4 involve pre-litigation settlement, but these two settlements involve totally different allocations of rights. One excludes the defendant, while the other lets him enter the market for a fee. As this model illustrates, the allocation of rights effectuated by the parties' pretrial settlement varies depending on the plaintiff's likelihood of succeeding on final judgment.

The next section provides a simple numerical example, which ultimately results in outcome 3 from the above list. Since the parties litigate to judgment in this equilibrium, it becomes easy to see how the court's judgment influences the final allocation of rights.

1. *Numerical Example*

There are two drug companies, *P* and *D*. *P* sells a patented drug that treats some disease, X. *D* is a generic maker that seeks to make a generic version of *P*'s drug. Doing this will require that *D* either obtain a license or establish that *P*'s patent is invalid.[65] If *P* operates as a monopolist, it will earn a profit of 100. However, if *D* sells a generic, the resulting duopoly will result in profits of just 10 per firm, so that generic entry reduces total profits from 100 to 20.[66] This reflects

65. It could also show that the patent is not infringed, but for simplicity I will focus on the validity prong alone.

66. This reflects the fact that competition—even between a single pair of firms—

the intense price competition that tends to occur between drugs that are therapeutically equivalent. The game has two major stages: pre-trial negotiation and, if no agreement is reached, litigation. There is technically a third stage—post-trial negotiation—but as the results show, the parties will never bargain around the court's judgment, either because they do not want to or because antitrust prohibits it. (The appendix provides a generalized "game tree" that helps to visualize this model.)

- **Negotiation Stage.** The parties negotiate in the shadow of litigation. The negotiations are assumed to take the form of a take-it-or-leave-it offer by *P*. There are two kinds of settlements offers *P* could make. First, it could offer to license at a (lump sum) fee of f. Alternatively, it could offer a reverse payment settlement, with a payment of r (note that *P* chooses the values of f and r). However, the antitrust laws limit the magnitude of a reverse payment, requiring that it cannot exceed the cost of litigation. Litigation costs are assumed to be 1 for each firm, and thus *P* is constrained to set $r \leq 1$ if it chooses to make a reverse payment settlement offer. If *D* accepts any settlement offer made by *P*, the game ends. If not, then *D* chooses whether or not it wants to litigate. If it does not litigate, then the game ends. Otherwise, the game progresses to the litigation stage.

- **Litigation Stage.** *P* brings an infringement claim, and *D* argues that the patent is invalid. The parties both believe that the patent will be held valid and infringed with probability ½. If *P* wins, the court will enjoin *D*. If *P* loses, *D* has a right to sell its product without penalty. At the post-trial stage, the parties are free to bargain around the injunction if *P* wins, but antitrust prohibits them from bargaining around a verdict for the defendant, even though they would like to do so.[67]

To solve the game, it is helpful to note a few preliminary points. First, *D* would never pay more than 10 for a license, since this is the profit it would get from selling a generic. Second, if litigation gives *D* a positive expected payoff, then *D* must get at least that same value from any settlement offer made by *P*, or else it will reject the offer. Third, if *D* does not get positive expected value from litigation, then *P* knows that *D*'s litigation threat is empty. In this case *P*'s best option is to offer something that *D* would never accept, which can be interpreted as refusing to make any offer at all.

To discern what settlements the parties might agree to prior to litigation, we must know each party's expected payoff from litigating to judgment. That

substantially erodes profits when the firms' products are essentially fungible, as is true of a branded drug and a generic equivalent.

67. In particular, they would like to agree that *P* will pay *D* (some amount greater than 9) to stay out of the market, notwithstanding that *D* now has an unqualified right to do so. But this would be a naked antitrust violation.

requires us to discern what the firms' final payoffs would be for each of the two possible judgments. First suppose that P wins in court. At the margin (i.e., ignoring litigation costs, which are sunk by this point), if P enforces the injunction, it gets a payoff of 100 and D gets zero. By contrast, bargaining around the injunction and entering into a licensing deal would reduce the parties' joint profits to just 20 at the margin. Since joint profits are thus lower under licensing, there is no way for this to be mutually-preferred to the case in which the injunction is enforced. D cannot afford to compensate P for the reduction in profits it experiences as a result of letting D into the market. As such, if P wins in court, the ultimate result will be that the injunction is enforced. If we now adjust the payoffs in this case to account for litigation costs, they are 99 for P and -1 for D.

Alternatively, if P loses in court, then D is allowed to enter the market without paying license fees. Final payoffs (accounting for litigation costs) will thus be 9 for each firm. They are not permitted to bargain around this, even though they would like to do so. Based on these observations, we can already see that the results are at odds with traditional Coasean analysis. They demonstrate that, if the parties litigate, the final allocation will be entirely determined by what the court does, even though they can bargain.

This is enough to compute the expected value of litigation for each party and finish solving the game. Note that expected payoffs are computed as the net of litigation costs involved, since those costs are not sunk at the pretrial negotiation stage.

$$P\text{'s expected litigation payoff: } \tfrac{1}{2}(99) + \tfrac{1}{2}(9) = 54$$

$$D\text{'s expected litigation payoff: } \tfrac{1}{2}(-1) + \tfrac{1}{2}(9) = 4$$

Since D gets an expected benefit of 4 from litigation, it will definitely choose to litigate if P does not offer something that provides at least this amount. Does P want to offer a licensing settlement that provides that much value? It is easy to rule this out. In order to provide D with a payoff that it prefers to litigation, a licensing settlement could impose a license fee of at most $f = 6$.[68] But this would leave P with a final payoff of just 16, which is much worse than the payoff of 54 that it expects to get from litigation. Thus, there is no way the parties will mutually agree to a licensing settlement; any possible fee would leave one party worse off than the expected result of litigation.

What about a reverse payment settlement? This would, of course, be the parties' preferred option. In particular, P would like to simply offer a reverse payment of $r = 4$, which would be acceptable for D, and would provide the

68. This fee of 6 leaves D with a final net payoff of 10-6=4, which is the same as D's expected payoff from litigation. This is therefore the largest fee D would agree to pay.

highest possible joint-profit of 100. However, the antitrust laws prevent the parties from striking this deal. They are constrained to keep any reverse payment weakly lower than the cost of litigation (i.e., $r \leq 1$). But we know that D would not accept such a low reverse payment, since it gets a larger payoff of 4 from litigating. This reflects that the defendant will demand a large payment when there is a strong chance of invalidity, which supports the *Actavis* decision's assertion that we can generally infer an anticompetitive effect if the payment is large. The result of this antitrust restriction is that the parties will not enter into a reverse payment settlement, because there is no payment that is both lawful and mutually-preferred to litigation.

As this example demonstrates, the parties will not reach a settlement and will instead litigate to judgment, notwithstanding that they maintain identical beliefs about how litigation will play out. The appendix demonstrates the other possible outcomes of the game, and identifies the specific conditions under which they occur.

B. *The Initial Assignment of Patent Rights*

There is a second sense in which antitrust inalienability distorts the law and economics of private disputes. In this case considered below, the focus is on how the PTO's "initial assignment" of patent rights influences the final allocation of patent rights, under the assumption that the relevant firms can bargain. Here antitrust inalienability comes in the form of antitrust restrictions on purchases of patents covering substitute technologies.

Antitrust does not (and should not) condemn a monopoly earned through competition on the merits. But it prohibits a firm from acquiring or perpetuating a dominant position by simply purchasing rival firms or their commercial assets.[69] A natural application is that a firm cannot buy a monopoly[70] by combining substitute patents that it purchases from other parties.[71] This can suppress competition between substitute technologies that are covered under separate patents granted to separate parties—something the Patent Act never authorizes.[72]

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69. 15 U.S.C. §18 (1996) (declaring that mergers or acquisitions are anticompetitive and unlawful when the result is substantially to lessen competition).

70. The monopoly could be in a product market if the patents are sufficiently powerful to serve as a barrier to competing products. This will be our focus in this section. Alternatively, the monopoly could be in a market for licensing rights for a particular technology class.

71. *U.S. Dep't of Justice & Fed. Trade Comm'n, Antitrust Guidelines for the Licensing of Intellectual Property* § 3.1 (2017) ("[a]n acquisition of intellectual property may lessen competition in a relevant antitrust market"); *Id.* at §5.7 (noting that IP acquisitions should be evaluated under the same antitrust statutes that apply to ordinary mergers or acquisitions). Intellectual ventures, a well-known patent assertion entity, has recently been sued for violating the antitrust laws by acquiring many patents used for online banking. *See Intellectual Ventures I LLC v. Capital One Fin. Corp.*, 99 F. Supp. 3d 610, 623 (2015) (describing the practice of aggregating substitute patents from external patentees as a potential antitrust violation).

72. *See* Erik Hovenkamp & Herbert Hovenkamp, *supra* note 10 at 1 ("[t]he "monopoly" authorized by the Patent Act refers to the exclusionary power of individual patents. That is not

The Patent Act authorizes a party to exclude competition within the boundaries of its own "home-grown" patents. It does not authorize agreements that eliminate competition between separately-held patents.

The initial assignment of patent rights consists in the granting decisions of the PTO. This section will focus on PTO decisions to illustrate how broad patent claims may be in relation to the applicant's disclosure. The ideal breadth of patents has long been the subject of debate. For example, some scholars—most notably Edmund Kitch—have embraced the "prospect theory" of patents, which posits that patents should be quite broad to prevent rivals from stealing the fruits of the inventor's hard work, which would discourage invention.[73] Others are quite skeptical of this argument. They argue that some degree of competitive pressure helps to spur innovation.[74] This section will not attempt to resolve this debate. It purports only to show that, as a result of antitrust inalienability, the choice between alternative policies on patent breadth may influence how patent rights are ultimately allocated on the market,[75] even if the relevant firms can bargain.

The argument can be generalized as follows. Suppose the PTO awards a single broad patent covering a relatively large number of embodiments of the relevant invention. Then the patentee is entitled to exclude others from using any embodiment in this space of claimed technologies. And, assuming monopoly maximizes total profits, it has no incentive to invite competition by dividing up these rights with rival firms through licensing deals. Thus the final allocation is that one firm retains all patent rights over the relevant technological space. But suppose the same set of embodiments were instead covered by two or more narrow patents, and that those patents were granted to separate parties. Then the antitrust laws may prohibit an agreement that serves to aggregate these separate patent rights into a single firm's control, although such an agreement would enhance total profits. Thus, under the narrow patent regime, the final allocation involves several firms that each control only a portion of the same technology space.

The antitrust concerns are easiest to see in situations where even individual patents can create a substantial entry barrier in the product market. Pharmaceutical patents are a good example of this. Many patented drugs are covered by a relatively small number of patents. And their owners often earn

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the same thing as the acquisition of individual patent rights into portfolios that dominate a market, something that the Patent Act never justifies and that the antitrust laws rightfully prohibit.")

73. Edmund W. Kitch, *The Nature and Function of the Patent System*, *20 J. L. & Econ.* 265 (1977).

74. *See, e.g.*, Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 *Columbia L. Rev.* 839 (1990); Erik Hovenkamp, *Patent Prospect Theory and Competitive Innovation*, unpublished manuscript (2016). Available at https://papers.ssrn.com/abstract=2765478 [https://perma.cc/PT3C-DZ2S].

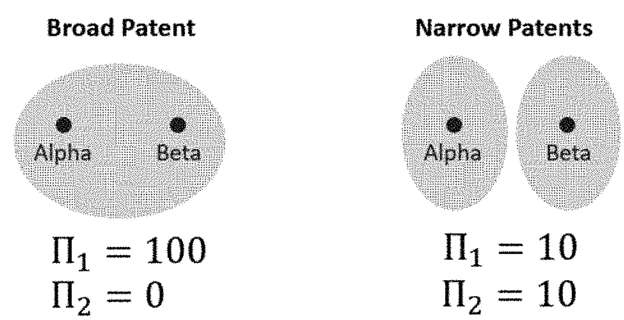
75. Note that a very liberal use of the doctrine of equivalents may have the same practical effect as awarding broad patents, and thus could similarly affect how patent rights are ultimately allocated.

massive profit during the patent term. But if just a few of the patents expire or are invalidated, rivals are able to enter the market with relative ease, and in time aggressive price competition will devastate market profits. The result is often that profits depend more on patents than on the drugs themselves.

With this, suppose there are two possible pharmaceutical compounds, Alpha and Beta, that are both effective in treating a particular disease. Assume that Alpha and Beta are equally effective, but that they are moderately distinct in composition. As such, a patentee who invents one of the drugs may or may not be able to obtain broad claims that also cover the other drug, depending on the PTO's granting policies. There are two pharmaceutical firms, F1 and F2. F1 initially discovers Alpha and applies for a patent. A year later, F2 comes up with Beta. Assume that, as in the last example, a monopolist in this drug market would earn a profit of 100, while two duopolists would earn 10 apiece, reflecting aggressive price competition.

Under the kind of broad patent regime endorsed by prospect theory, F1 gets a very broad patent that covers both Alpha and the moderately distinct Beta. By contrast, if patents are narrower, F1 cannot get broad claims that subsume Beta. In principle Beta could still be regarded as obvious in light of Alpha, but we will instead assume that it is independently patentable. Then F2 obtains a patent on Beta. These two possibilities are shown in the diagram below. The terms Π_1 and Π_2 denote the profits earned by F1 and F2, respectively.

Figure 1: Broad versus Narrow Pharmaceutical Patents



As the figure shows, the broad patent provides much larger total profits. Accordingly, if the PTO granted a narrow patent on Alpha, then the parties would benefit from an agreement that assigns the Beta patent to F1 (or vice versa) to concentrate ownership. That is, F1 would pay F2 some amount between 10 and 90 in exchange for the latter's patent on Beta. However, the antitrust laws may block that acquisition, since the acquisition transforms a duopoly market into a monopoly. Thus, the patent rights will remain divided between the two firms. By contrast, if F1 gets a single broad patent covering both drugs, it is perfectly entitled to split up the rights by selling a license for Beta to F2. But that would reduce joint profits to 20, and thus the parties cannot mutually benefit from such a deal. As such, when the initial assignment gives F1 a broad patent, the final allocation is that F1 controls all of the relevant patent rights. As this example illustrates, the result of antitrust restrictions on patent acquisitions is that the PTO's initial assignment of patent rights can influence how those rights are ultimately allocated on the market, even if the parties suffer no transaction costs.

C. *Patent Settlements and "Rule 4"*

Judgments delimit and protect legal rights in a number of different ways. Calabresi and Melamed famously generalized the different possibilities, organizing them into four types of "rules."[76] Each rule depends on two determinations. The first, which relates to the merits of the dispute, is the specification of which party holds the relevant "entitlement." The plaintiff has the entitlement if it has a protected legal right not to suffer the injury imposed on it by the defendant. For example, a landowner is generally entitled not to suffer a nuisance created by a neighbor. By contrast, the defendant holds the entitlement if it has a right to engage in the disputed activity, notwithstanding that it aggravates the plaintiff.

The second determination is of the remedy that is used to protect the entitlement. A property rule provides unqualified protection, giving the entitlement holder an absolute right to stop the other party from undermining its entitlement. Property rules are thus enforced through injunctive relief. By contrast, a liability rule is not so unyielding. It permits the non-entitled party to continue to encroach on the entitlement, provided that it pays damages to the entitlement holder. For example, if a factory's pollution is creating a nuisance for neighboring homeowners, the court may decline to issue an injunction that would serve to shut down the factory, and instead require the factory to pay damages to the homeowners as a condition of its continued operation.[77]

As illustrated in the table below,[78] each combination of these two determinations gives rise to a distinct rule. The table contemplates a generic private dispute in which the plaintiff (*P*) is suing the defendant (*D*) for doing something that injures the plaintiff, but which may or may not be unlawful. For example, it might be that *D* is producing a lot of noise, which may or may not rise to the level of an actionable nuisance.

	Property Rule	**Liability Rule**

76. Calabresi & Melamed, *supra* note 1, at 1118.

77. *See, e.g.*, Boomer v. Atlantic Cement Co., 257 N.E.2d 870 (N.Y. 1970) (declining to issue an injunction that would likely result in the closure of a large cement factory, and instead obligating it to pay "permanent damages" for the prospective harm created by its continued operations.)

78. This well-known matrix was first produced by Ian Ayres. *See* Ian Ayers, *Protecting Property with Puts*, 32 *Val. U. L. Rev.* 793 (1998).

***P* is the entitlement holder**	Rule 1 *D* is liable and enjoined.	Rule 2 *D* is liable, but can continue its activity by making a payment to *P*.
***D* is the entitlement holder**	Rule 3 *D* is not liable, and *P* cannot compel *D* to halt its activity.	Rule 4 *D* is not liable, but *P* can compel *D* to halt its activity by making a payment to *D*.

Rule 4, which lets the unentitled party pay to force the alienation of the entitlement, is unusual and somewhat counterintuitive. It has long been a subject of intrigue and debate among legal theorists, particularly within law and economics.[79] However, in practice it is very rarely applied.[80] The exceptions are typically cases of "coming to the nuisance," meaning that a plaintiff facilitated its own injury by carelessly situating itself in a position where it is likely to suffer a nuisance. For example, in *Spur,* the plaintiff, a housing development, sued an adjacent feedlot for creating a nuisance by causing various odors and insects to enter into the development.[81] However, the parties' proximity arose only because the development had expanded over time, bringing its boundary increasingly close to the feedlot. The development had thus "come to the nuisance," and the court ultimately held that it lacked an entitlement to be protected from the alleged injury. However, the feedlot's adverse impact on the development's residents was acute—and no longer avoidable—so the court held that the appropriate solution was to compel the feedlot to relocate, but make the plaintiff pay for it.

The Calabresi-Melamed framework is easily applied to patent disputes.[82] In a patent infringement case, the plaintiff is the entitlement holder if its patent is valid and infringed by the defendant's product. In that case it is entitled to exclude—or at least obtain damages for—the defendant's prospective sales.[83] An injunction order corresponds to Rule 1, while Rule 2 reflects an award of "ongoing royalties" for prospective infringement. By contrast, if the patent is either invalid or uninfringed, then *D* is the entitlement holder; it has the right to sell its product without penalty, and the patentee cannot force it to halt its sales through a liability rule. An unsuccessful patent infringement suit triggers the application of Rule 3,

79. *See, e.g.,* Peter DiCola, *Valuing Control,* 113 *Mich. L. Rev.* 663, 665 (2015).

80. *Id.* at 672.

81. Spur Industries v. Del E. Webb Development Co., 494 P.2d 700, 706-07 (Ariz. 1972).

82. For a more comprehensive discussion of how the framework may be applied to intellectual property, *see, e.g.,* Dan L. Burk, *Intellectual Property in the Cathedral, in Access To Information and Knowledge: 21st Century Challenges in Intellectual Property and Knowledge Governance* (Dana Beldiman ed., 2013); DiCola, *supra* note 79. This book chapter and paper do not discuss the sort of antitrust issues address here, however.

83. It can also recover back-damages for past infringement.

resulting in unrestrained competition between the parties because, once the plaintiff loses, antitrust prohibits the defendant from selling its entitlement to compete.

What is the policy justification for not applying Rule 4 in patent disputes? If the relevant entitlement surrounds the defendant's right to compete with the plaintiff, then Rule 4 has an important economic interpretation. It would effectuate an exclusionary transaction in which the plaintiff pays the defendant to take its product off the market, notwithstanding that the defendant is entitled to compete with the plaintiff.[84] Innovation policy offers no justification for this, while antitrust policy strongly opposes it. As such, to apply Rule 4 in patent disputes would be antithetical to the public interest. Note that this proposition does not hinge on the fact that the resulting transaction is executed through reliance on a court-fashioned liability rule. Rather, it is simply the nature of the resulting transaction—a payment to exclude privileged competition—that makes Rule 4 so adverse to social welfare. However, one result of antitrust inalienability is that the *parties* may be very attracted to Rule 4. As I demonstrate below, the parties may attempt to rely on a collusive settlement agreement to achieve substantially the same result as a Rule 4 judgment.

A plaintiff always prefers Rule 4 to Rule 3, since it gives him an option he would not possess under Rule 3. But contrary to other disputes studied in the law and economics literature (such as that in *Spur*), here the defendant may also prefer Rule 4 to Rule 3. This is highly unusual. A defendant would ordinarily have a clear preference for Rule 3, since this gives it unimpeachable control over the entitlement.[85] Indeed, even if the defendant is inclined to sell its entitlement to the plaintiff, it does not want a court's liability rule to place a cap on how much it can charge. The difference here is that, once a Rule 3 judgment officially names the defendant as the entitled party, antitrust inalienability prevents the defendant from selling that entitlement for *any* price.[86] That means the parties are obliged to stick with Rule 3, which facilitates open competition and thereby erodes monopoly rents. In contrast, Rule 4 would allow the parties to preserve and share those

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84. Dan Burk offers a different way one might interpret Rule 4 in intellectual property disputes. In Burk's characterization, Rule 4 would mean that the patent is in fact valid and infringed, but that the patentee must pay the defendant in order to obtain an injunction. *See* Burk, *supra* note 82, at 2. (The patentee is presumably still entitled to damages if it declines to pay for injunctive relief.) For example, Burk proposes that this might be an effective way to curb holdup problems created by litigious patent assertion entities ("patent trolls") who may seek injunctions despite not being commercially threatened. *Id.* at 6. The difference between Burk's and my characterizations is that he focuses on the patentee's entitlement *to enjoin the defendant*, while I focus more generally on the patentee's entitlement to be compensated in *some* way (damages or injunctive relief). Thus, in my analysis, to say the defendant is entitled means that he has the right to sell its product without penalty. This distinction is critical to the normative analysis, and thus my admonishment of Rule 4 is limited to my own interpretation of the rule.

85. Peter DiCola cites the defendant's value of control as something that might bear on a court's choice between Rule 3 and Rule 4. DiCola, *supra* note 79, at 672.

86. If the plaintiff loses in court, a subsequent exclusion agreement would be illegal *per se*. *See, e.g.*, *Actavis*, 133 S. Ct. at 2230 (noting that antitrust prohibits naked exclusion agreements in which one firm simply pays its rival not to compete).

rents, even though the price might not be exactly what the defendant would have preferred to charge.

This unusual result—that *both* parties may prefer Rule 4 to Rule 3—is emblematic of how antitrust inalienability fundamentally changes the law and economic analysis of private disputes. Note, however, that it is merely a positive observation about the firms' preferences; it does not undermine the normative case against Rule 4 in patent disputes between competing firms. Indeed, antitrust's goal is to promote competition, especially in cases where firms would rather avoid it.

If the parties think the patent would very likely be invalidated on final judgment, they may attempt to circumvent this policy against Rule 4 preemptively. If the patent is indeed invalid, a reverse payment settlement operates as a sort of contractual surrogate for Rule 4.[87] This is not *literally* Rule 4, since the terms were not fashioned by the court, although they may be entered as a stipulated judgment. But the settlement elicits precisely the same kind of transaction. It stipulates that the defendant—who is entitled to sell its product—must give up that entitlement, provided that the plaintiff makes the specified payment. Thus, we would undermine the clear policy against Rule 4 if the litigants were free to enter into reverse settlements when they think the disputed patent is invalid. Antitrust inalienability mitigates that problem by imposing some limits on how the parties may transact rights through settlement.

Of course, a reverse settlement preempts a judgment on the patent issues, at least between those two parties. But a patent's validity is generally uncertain until such a judgment issues. Thus, in a reverse settlement case, we cannot say with certainty that the defendant is the entitled party. However, antitrust often relies on economic inference to resolve uncertainty as to the likely nature or function of a commercial agreement, and we can make further use of it here. If the settlement requires the patentee to make a sufficiently large payment, this suggests the patent is likely invalid,[88] and by extension that the settlement likely elicits a "Rule 4 transaction"—one in which an unentitled plaintiff pays the defendant to give up its entitlement. A benefit for the parties is that they need not acknowledge it as such, for they can write a consent decree stating that the patent is valid and in-

87. Some other authors have discussed private agreements in which the parties effectively "contract into" (or "around") particular rules. *See, e.g.*, Robert P. Merges, *Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations*, 84 *Cal. L. Rev* 1293, 1296 (1996); Mark A. Lemley, *Contracting Around Liability Rules*, 100 *Cal. L. Rev.* 463, 464 (2012). Note that it is not exactly right to regard reverse settlement as "contracting out of Rule 3." A court has not yet issued a Rule 3 judgment, and the reverse settlement is designed to preempt such a judgment. If the court had already done so, the exclusion agreement would be transparently anticompetitive.

88. *See e.g.*, Dolin, *supra* note 22, at 322 ("[i]f the size of the settlement exceeds reasonable litigation costs and cross-license fees, it would indicate that the doubts [about validity] are substantial"); Edlin et al., *supra* note 14, at 1 ("a large and otherwise unexplained payment, combined with delayed entry, supports a reasonable inference of harm to consumers from lessened competition.").

fringed, even if this is very likely false.[89] This way, instead of calling it Rule 4, the parties may stylize the outcome as "Rule 1 plus a side-payment."[90]

In other contexts, Rule 4 may be appropriate, as is arguably reflected in the *Spur* example. This may be so when it is clear that the defendant has a right to engage in the disputed activity–and thus should not be penalized for it—but such activity appears to injure the plaintiff by much more than it benefits the defendant, and the parties appear incapable of striking an efficient bargain. In *Spur*, the relevant injury stemmed from the alleged nuisance, the effects of which were inarguably harmful. But in a commercial dispute between rivals, the plaintiff's injury is the profit-eroding impact of competition. Unless there is a valid patent that justifies exclusion, the public interest views competition not as an injurious, but as something to be encouraged. Hence, while we allow most entitlement holders to sell their rights to someone else, we generally prohibit firms from trading away their entitlements to compete with one another. It follows that Rule 4 is untenable when the defendant's entitlement is a right to compete.

III. JUDICIAL POLICY IN ANTITRUST'S SHADOW

Among Coase's most important contributions was his emphasis on transaction costs as a reason why legal rules are important to economic efficiency.[91] The Coase theorem is less a prediction of efficiency than an explanation of why we often fail to obtain it. If the parties to a property dispute cannot bargain, then they are reliant on the law (and the courts' administration of the law) to allocate the disputed rights. As such, in situations where transaction costs are likely to be high, well-crafted laws and effective enforcement by the courts are critical.[92]

In property disputes arising in the shadow of antitrust, we can make a similar statement, albeit for different reasons. If the parties have a joint-interest in striking agreements that suppress competition, and if their private dealings might be constrained by antitrust inalienability, then it becomes particularly important for the courts to "get it right," both in issuing judgments and in approving or rejecting settlements. Indeed, the judiciary is in a precarious position: if a court's

89. It is permissible (and quite common) for a defendant to forego an admission of wrongdoing in a consent decree, even if it is likely culpable in fact. *See, e.g.*, Dorothy Shapiro, *Lessons from SEC v. Citigroup: The Optimal Scope for Judicial Review of Agency Consent Decrees*, 15 *Mich. St. J. Bus. & Sec. L.* 63, 72 (2014). But here the parties prefer take the opposite approach: the consent decree will portray the defendant as a guilty infringer that must be estopped from making sales, even if that is likely untrue as a matter of law.

90. It is interesting to note that "Rule 1 plus a side-payment" is not consistent with any of the four rule types, and is largely nonsensical on its own terms. None of the rules compel the entitlement holder to pay the non-entitled party. Indeed, the principal significance of stipulating that a party is entitled is to ensure that, in the event of a conflict, it is the *other party* who will have to pay.

91. Coase, *supra* note 25, at 15.

92. Calabresi and Melamed, *supra* note 1, at 1091,

decision is socially inefficient as a matter of patent policy, the parties may be either unwilling or unpermitted to bargain around it.

On one hand, if the court's error is to allocate rights in a way that is overly restrictive of competition (e.g., to enjoin an infringer of a patent that should have been invalidated), then the parties will not bargain around this, for by hypothesis their joint profits are highest when the defendant is excluded.[93] On the other hand, if the court's error is to delineate rights in a way that elicits too much competition (e.g., by holding a patent uninfringed when the defendant should have been enjoined), then the antitrust laws prohibit the parties from bargaining around this judgment and instituting the efficient exclusionary allocation, even though they are otherwise willing and able to do so.

The prospect of social efficiency thus rests on a knife-edge: if the court's judgment fails to strike a socially efficient balance between competition and patent policy, then the judgment's inefficiency will persist *ex post*, even if the parties can bargain.

Although antitrust is usually regarded as private law, it deviates from more conventional examples of private law in some important respects.[94] Of particular significance is its insistence on considering nonparty interests–namely consumer welfare–when adjudicating disputes between private firms. This means that a court may (and should) not regard a particular resolution to be prudent simply because it is good for the parties, which reflects a strong public policy component of antitrust that is absent from most private law.

This difference arises in part because many private disputes will not have any significant impact on nonparties, or because the third parties do not have a legal right to be protected from the parties' dealings. For example, in many real property disputes, it is reasonable to presume that the "efficient allocation" is the one that maximizes the parties' joint welfare, either because this is literally the case, or because it would be imprudent to let nonparty interests influence the judgment. Thus, throughout most private law, the implicit policy is that the dispute would be best resolved through the market. This leads the courts to view settlement as the most desirable way to resolve a private dispute—and to view final judgment as an undesirable last resort. This reflects that, although the court's underlying objective is typically to reach the outcome that best serves the parties, the court does not know which allocation of rights will accomplish this and would prefer not to guess at it.

Scholars have proposed that a property rule is best when transaction costs are low, as this creates a clear bilateral market without forcing the parties into a compulsory transaction on judge-made terms. On the other hand, if transaction

93. Similarly, if the court awards an excessive ongoing royalty rate, the parties will not bargain around it by, for example, reverting to a two-part tariff fee schedule with a lower royalty rate since joint profits are larger with a more restrictive royalty rate.

94. *See, e.g.*, Randy E. Barnett, *Four Senses of the Public Law-Private Law Distinction*, 9 *Harv. J.L. & Pub. Pol'y* 267, 274 (1986) (noting that there is "an important 'public law' component of antitrust laws").

costs are high (i.e., if the bilateral market is likely to fail) then a liability rule may be the best option.[95] But in a patent dispute between powerful competitors the court faces precisely the opposite problem. It generally knows what allocation of rights will maximize the joint profits of the parties to the exclusion of the defendant. Instead, the biggest challenge is to determine whether that outcome is justified as a matter of legal policy. That means that when the parties seek approval of a settlement that erodes competition, the court should ask itself whether its restrictive terms are reasonable as a matter of patent law and competition policy.

The antitrust limits on the parties' private dealings reflect the law's determination to protect the interests of nonparty consumers. As such, there is much less reason to believe that the bilateral market between the firms would be an efficient medium for resolving the patent dispute. On the contrary, there is good reason to believe that unrestrained private contracting would elicit a result that is inimical to public policy. Thus, in contrast to most conflicts in private law, a determination that transaction costs are low would not justify a court in applying a property rule, nor would high transaction costs necessarily create a prescription for applying a liability rule.

These arguments highlight an important point about patent disputes between powerful competitors: until a final judgment is entered, the court cannot determine whether principles of private law or competition policy should carry the day. If the patent holder wins and the defendant is enjoined, then private law principles displace most of the relevant antitrust concerns. Indeed, the antitrust concerns underpinning *Actavis* center on the parties' efforts to *forestall* a final judgment that might serve to make the market more competitive. By contrast, if the patent is held invalid or uninfringed, then antitrust displaces patent law entirely: the parties are subsequently prevented from entering into any agreements that serve to restrain the defendants' sales (e.g., placing a cap on the defendant's sales) even though such restraints might be lawful if implemented within the scope of a valid patent.

At the pre-judgment stage, however, the nature of the dispute is not binary, and principles of both competition policy and private law may be relevant, particularly when appraising a proposed settlement. For example, the patent holder is perfectly entitled to charge the infringer royalties for a license (which looks like private law), but a large reverse payment may be unlawful (which looks like competition policy). And yet either one of these agreements—if implemented *after* judgment[96]—could be either permissible or impermissible, depending on the

95. If transaction costs are high and the property holder's injury seems smaller than the defendant's gain, the court can use a liability rule to preserve the efficient allocation of rights (which permits the defendant's conduct) while still giving the property owner a payout that covers his injury.

96. A pre-judgment reverse payment could be unlawful even if the patent goes on to be upheld as valid and infringed. Because the parties did not know that the patent holder would prevail in court at the time the reverse payment was made, it may suggest that they were conspiring to avoid a judgment that might increase competition, which is unlawful in its own right.

holding.[97] As such, at the pre-judgment phase, canons of private law ought not to dominate the analysis. Rather, both competition policy and private law considerations should enter into the fold.

A. *Policies Toward Settlement and Final Judgment*

When a dispute centers on rights that are not entirely alienable, the court cannot infer that the parties are litigating only because of a bargaining failure, as is usually safe to assume in most private disputes. Rather, the parties may be litigating only because their preferred agreement—which they are perfectly capable of forming—would be unlawful and unenforceable. Judicial attitudes toward private settlement should be very different in such cases. The impetus for settlement may have little to do with avoiding litigation costs. It may be motivated principally by the parties' interest in avoiding a procompetitive judgment that, if issued, cannot lawfully be bargained around. Or it might be an attempt to get a judicial stamp on what would otherwise be an unlawful contract.

The *Actavis* dissenters, who extolled the virtues of settlement,[98] thus failed to account for how antitrust inalienability fundamentally alters the nature of a private dispute. They failed to appreciate that, even if the cause of action is directed entirely at patent law, antitrust remains important to the efficient resolution of the dispute, for it provides a clear legal basis for preventing a settlement that would unreasonably injure nonparty consumers. The parties know that, if the proper judgment is to hold the patent invalid or uninfringed, then antitrust will displace patent law, leaving the parties with no basis for evading competition law. They thus have an interest in forestalling the effective administration of patent law, for they might not like what they get.

For the same reasons that settlement may produce deleterious results, final judgment may actually be a desirable way to resolve the dispute. We know that competing parties may be litigating only because they were prohibited from entering into an anticompetitive agreement that would have made litigation unnecessary. Thus, it may be that the only settlement on which they could mutually agree would likely be unreasonably injurious to consumers. Consequently, if the socially efficient judgment would deny the plaintiff a right to exclude the defendant, then litigation to judgment may be the *only* way to elicit the efficient allocation of rights, for the parties may be unwilling to settle on it. Hence, these cases may present an exception to the conventional wisdom that the parties, not the courts, are best-suited to resolve a private dispute efficiently.

97. Since royalties' diminish the defendant's sales (by acting like a marginal cost), a *post-trial* royalty agreement would be illegal if the court held the patent to be either invalid or uninfringed. In this case the royalty is a restraint beyond the scope of any valid patent. On the other hand, if a patent were held valid and infringed, then there would ostensibly be no antitrust ground for condemning a *post-trial* reverse payment (but, of course, this is just heuristic observation; the patent holder has no reason to offer a reverse payment if it has already prevailed in court).

98. *Actavis,* 133 S.Ct., 2223, 2242-44 (2013).

IV. JUDICIAL REVIEW OF PATENT SETTLEMENTS

The last section illustrated why conventional attitudes toward private settlement—namely that it is virtually always a good thing, regardless of the particular terms—do not carry over to patent disputes arising between competing firms. This suggests that a broader degree of settlement review would be beneficial, as it could prevent firms from securing a consent judgment embodying an anticompetitive agreement. However, at present, patent courts regularly decline to engage in any comprehensive settlement review, even when there are clear reasons to worry about the settlement's compliance with the antitrust laws. For example, the courts often do not carefully review settlements between pharmaceutical rivals, though such parties have a clear interest in writing an agreement that serves to exclude competition.[99] This wastes a valuable opportunity to improve and streamline antitrust oversight through proactive settlement review. To that end, I propose that, under certain circumstances,[100] the patent judge should review a proposed settlement on antitrust grounds before approving it.

No statute currently requires a patent court to review proposed patent settlements for antitrust compliance.[101] This contrasts with other contexts, such as class action litigation, where settlement review is compelled by the laws of civil procedure.[102] However, courts have discretion to review settlements before entering them as judgments, and some jurists posit that they ought to do this regularly as a matter of public policy. For example, Judge Richard Posner writes that a "judge in issuing [a consent decree] must determine that it does not offend public policy, as by harming third parties, before he can approve it."[103]

Even if a court rejects a proposed patent settlement on antitrust grounds, it cannot bar the parties from dismissing the suit and striking the agreement

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99. *See, e.g., In re* Androgel Antitrust Litig., No. 1:09-cv-955, 2014 WL 1600331, at *2 (N.D. Ga. Apr. 21, 2014) (noting that the patent court had simply "rubber-stamped the proposed consent judgment"); *In re* Ciprofloxacin Hydrochloride Antitrust Litigation, 261 F. Supp. 2d 188, 212-213 (E.D.N.Y. 2003) ("The challenged agreements in this case are private agreements between the defendants, in which [the patent court] played no role other than signing the Consent Judgment. The Consent Judgment did not include the terms of the agreements, nor was the judge even apprised of the terms before he 'so ordered' the Consent Judgment."); *In re* Nexium (Esomeprazole) Antitrust Litig., 968 F. Supp. 2d 367, 395-396 (2013) (noting that consent decrees are often more like private contracts that judicial opinions, because they merely reflect the parties' preferences and the courts "are hard pressed to reject" settlement proposals).

100. Such circumstances, which are discussed in a later section, are used to identify cases in which the parties appear reasonably capable of materially undermining competition in some relevant product market. *See* Section IV(A).

101. However, in some cases involving pharmaceutical patents, there is a statute requiring certain pharmaceutical patent settlements to be submitted to the FTC (as opposed to a court). Medicare Prescription Drug, Improvement, and Modernization Act. Pub. L. No. 108-173, § 112, 117 Stat. 2066, 2461.

102. *Fed. R. Civ. P. 23*(e) (noting that a court may approve a proposed class action settlement only upon a "finding that it is fair, reasonable, and adequate").

103. SmithKline Beecham Corp. v. Pentech Pharms., 261 F.Supp. 2d 1002, 1008 (N.D. Ill. 2003).

privately.[104] But settlement review would still help to discourage anticompetitive settlements by undermining their stability and enforceability. If the settlement is just a private contract, then its enforceability depends on whether it is lawful under the antitrust laws, which is a question that no court has addressed. This means that, if a party wishes to re-negotiate or simply abandon the agreement later, it may do so by arguing (or threatening to argue) that the deal violates the antitrust laws, which is a defense to a claim of contract breach.[105] This makes the agreement unstable, because neither party knows if it can actually enforce the agreement. By the same token, each party knows that if it wants to defect from its obligations, it may not suffer any penalty for it. Further, even ignoring the antitrust issues, enforcement of a private contract is much more burdensome than enforcement of a judgment. For example, a consent judgment can be enforced through simple contempt proceedings, but enforcement of a private agreement requires full-fledged contract litigation.

By contrast, if the court reviews the settlement on antitrust grounds before approving it, then this may have a preclusive effect on relitigation of the antitrust issues (as between the parties[106]), preventing such issues from being raised as a defense to breach of contract. If the antitrust issue was "actually litigated" or "actually decided" in the patent litigation, which could be reflected in the court's settlement approval and judgment, then issue preclusion may ensure that the agreement is enforceable as between the parties. Because the parties greatly prefer that their agreement be enforceable, settlement review would give the firms a strong incentive to reach settlement terms that comply with the antitrust laws. Thus, if the judge declines to sign off on their proposed agreement, they have an interest in making the terms less restrictive.

This is similar to how antitrust deals with some other kinds of collusive agreements, such as naked price fixing.[107] To impose antitrust liability on price-fixing firms, the plaintiff must prove that the parties had in fact formed an agreement to coordinate their price levels. This is often very challenging, since the firms know about this evidentiary requirement, and they are usually smart enough not to leave a paper trail. However, antitrust nevertheless has a major weapon to combat such agreements, which is that it renders them unenforceable, forcing the parties to search for other means of maintaining their agreement. As

104. *See id.* at 1005 (holding that a judge has "no authority to deny [a plaintiff's motion to dismiss] on the basis of concerns, however substantial they may be . . . that the motion is based on a settlement agreement that may be contrary to public policy as expressed in the antitrust laws, the doctrine of patent misuse, or any other source of policy; that may in fact be illegal.").

105. Continental Wall Paper Co. v. Louis Voight & Sons Co., 212 U.S. 227, 262 (1909) (holding that a party may defend itself from liability for breach of contract by showing that the contract violates the antitrust laws, since the contract is in that case unenforceable).

106. As a later section argues, this ought not to bar third parties from challenging the agreement on antitrust grounds. Though this sounds straightforward, it differs from how the antitrust courts are presently treating potentially-anticompetitive agreements that are memorialized consent decrees. *See* Section IV(B).

107. Naked price-fixing refers to an agreement between competing firms to keep prices high, and which is not justified by any countervailing procompetitive effects.

such, the firms have a very limited ability to prevent one another from "cheating" (i.e., lowering the price below the cartel level in order to capture more sales). Indeed, even if they attempt to enforce such a price through the threat of commercial retaliation, such punitive action might just persuade the cheating firm to blow the whistle and alert the antitrust authorities (which would significantly limit its own liability for participating in the agreement). These instability issues will tend to make collusive agreements non-viable in many cases.

In any case where an anticompetitive settlement is avoided through a judicial review process, the benefits for consumers may be immense. If it had not been forestalled at the conclusion of the patent suit, antitrust intervention would have to come from a subsequent antitrust litigation, which would be much slower and costlier. That means that drug prices will remain artificially high for a longer period of time, which may be devastating for patients with a limited ability to pay. A second issue is that third party antitrust actions are largely dependent on public enforcement, which is why the FTC is the plaintiff in most reverse settlement cases. However, like all agencies, the FTC has limited resources. It cannot afford to bring an antitrust action against every settlement it regards as a likely violation. By undertaking some initial review of patent settlements, the courts could help to alleviate this burden.

A. *The Scope and Focus of Review*

How should patent settlement review operate in practice? As a threshold matter, it is important to note that thorough settlement review should not be a categorical requirement. In most cases, the circumstances will suggest that no real antitrust concerns exist, either because the firms (or their patents) appear incapable of materially influencing the relevant product market, or because the terms of the agreement are plainly privileged under the Patent Act. As such, it is useful to begin by discussing some factors that will tend to make thorough settlement review unnecessary.

If the settlement effects an ordinary licensing agreement—meaning that the defendant continues to operate, and pays license fees for its sales—then there is no basis for antitrust intervention. This is so even if the parties have market power, and even if the royalty obligation is likely to raise the defendant's price by acting as a marginal cost. The reason is that the Patent Act creates a general authority to license patents,[108] and competition policy generally maintains a favorable attitude toward licensing, since it presumptively expands the competitive field. The exceptions, discussed below, arise when the licensing terms do more than simply apply a royalty obligation on the defendant's sales.

Additionally, if the firms appear to lack market power, this will likely allay antitrust concerns. Unless the settlement includes a clear *per se* violation—for example, if it calls for naked price fixing in the product market—there is no reason

108. 35 U.S.C. § 261 ("[t]he applicant, patentee, or his assigns or legal representatives may . . . grant and convey an exclusive right under his application for patent, or patents").

to suspect unlawful activity, for the firms are not powerful enough to create a consumer injury. That the parties' products are covered by a patent does not rule this possibility out, for many patents are narrow, and the Supreme Court has held that a patent does not itself create a presumption of market power.[109] Along similar lines, if the patents appear to have only an incremental effect on the relevant product (i.e., if they are not essential to a party's ability to be a viable competitor in the market), then antitrust concerns are unlikely to arise. In such cases, the patents cannot create significant barriers to entry in the product market, and thus are unlikely to provide a basis for suppressing competition. This would tend to make individual "tech patents" an unlikely basis for an anticompetitive settlement, since such patents are notoriously narrow.[110]

Finally, if the parties are not competitors in products–for example, if the patentee is a nonpracticing entity[111]-then the scope of antitrust intervention is quite narrow. In this case, the parties are in a "vertical relationship," meaning they are not competitors but rather transacting parties along a supply chain. But vertical restraints on competition are no longer the subject of significant antitrust enforcement.[112]

What is suggestive of a potentially-anticompetitive settlement? Delayed market entry by the defendant is a clear example. Unlike an ordinary licensing settlement, the defendant agrees to keep its product off the market for some material period of time. This is the hallmark of reverse payment settlements, which are often coined "pay for delay" agreements. The *Actavis* decision suggested that courts should review such settlements and it enumerated some factors for evaluating them.[113] But the opinion is somewhat nonspecific, and left many open questions. For example, the court focused on a cash payment, leaving it to lower courts to discern whether other kinds of payments may trigger antitrust liability under its decision.[114] These are the kinds of questions that could be addressed through initial settlement review once it has been determined that the settlement is likely to facilitate delay. The court should ask the parties if the settlement vests a license in the defendant immediately so as to permit it to make sales straight away. If the answer is no, the court should make further inquiries to discern

109. Ill. Tool Works, Inc. v. Indep. Ink, Inc., 547 U.S. 28, 45–46 (2006).

110. For example, a typical smartphone subsumes thousands of patented technologies, most of which cover very small features of the phone.

111. Nonpracticing entities–pejoratively known as "patent trolls"–are firms that own and enforce patents, but do not sell any goods or services that read on them.

112. Vertical restraints used to be *per se* illegal, but most are now evaluated by the rule of reason. Leegin Creative Leather Prods., Inc. v. PSKS, Inc., 551 U.S. 877, 882 (2007) (overruling *per se* rule against resale price maintenance); Continental T.V., Inc. v. GTE Sylvania, Inc., 433 U.S. 36, 47-48 (1977) (overturning the *per se* rule against vertical nonprice restraints).

113. *Actavis*, 133 S.Ct. 2223, 2234-37 (2013).

114. *See e.g.*, King Drug Co. of Florence, Inc. v. SmithKline Beecham Corp., 791 F.3d 388, 397 (3d Cir. 2015) (holding that a "no authorized generic" promise is a cognizable payment under the *Actavis* standard).

whether the parties have built delay into their agreement,[115] and whether such delay appears reasonable under the circumstances.

If the defendant does obtain a license without delay, the court should still review it to the extent that it includes some inordinate restraints on competitive activity. As already noted, an ordinary licensing settlement simply applies a royalty obligation to the defendant's sales. It does not affirmatively regulate the defendant's price or output (although it may affect them indirectly), and it certainly does not place restrictions on the *patentee's* competitive behavior. But a licensing settlement could include such provisions, and in that case it may or may not comply with the antitrust laws.[116] However, determining compliance [Not immediately clear what the "question" is] is complicated by the fact that any unsavory elements of the agreement must be balanced against its procompetitive function, which is to provide licensing rights to the defendant. Thus, as one commenter writes, "[d]rawing the line between 'price-fixing agreements' and 'procompetitive licensing arrangements' is not a simple matter."[117] If the licensing agreement serves to impose restraints on the licensee's price or sales, the court should ask whether the restraint appears to be reasonably justified, or reasonably necessary to facilitate a well-functioning licensing relationship. If the answer is no, then those restraints should not be approved. If the licensing agreement imposes price or output restraints on *both* parties, the court should be particularly cautious, for this kind of coordination may serve to effect a cartel between the parties.

Patent settlements are often quite complex, and it may be difficult for a generalist court to identify the salient antitrust concerns. As such, asking for the input of the antitrust agencies may be beneficial for the court. In fact, this has happened in at least one case. The court in *Effexor* noted that the patent judge had "issued a scheduling order requiring the parties to provide the FTC with the proposed settlement and associated license agreements" as a means of "soliciting the FTC's views on any antitrust issues concerning the proposed settlement."[118] Unlike the patent judge, FTC experts have extensive experience in evaluating patent settlement on antitrust grounds, and the patent court could take advantage of this. This strategy could also help to mitigate the most serious deficiency with settlement review, which is that it is generally ex parte with respect to prospective antitrust plaintiffs. Although not literally a party to the patent litigation, the

115. It could be that there will be delay, but for reasons outside the parties' control. For example, the defendant may require approval of its product by a federal agency before making sales. However, the court should take care to ensure the parties' agreement does not protract any such hurdles unnecessarily.

116. The antitrust agencies publish guidelines on patent licensing and antitrust. *See U.S. Dep't Of Justice & Fed. Trade Comm'n, Antitrust Guidelines For The Licensing And Acquisition Of Intellectual Property* (1995). *See also, e.g.,* Carl Shapiro, *Antitrust Limits to Patent Settlements*, 34 RAND J. Econ. 391, 391-97 (2003); Meurer, *supra* note 28, at 77.

117. Shapiro, *supra* note 116, at 394.

118. *In re* Effexor XR Antitrust Litig., No. 11-5479, 2014 U.S. Dist. LEXIS 142206, at *11 (D.N.J. Oct. 6, 2014).

FTC's input on the settlement's legality may help to identify serious antitrust concerns that the patent court might otherwise have missed.[119]

V. INALIENABILITY AND SETTLEMENT IN OTHER AREAS OF LAW

This paper focuses on antitrust inalienability in patent disputes, but analogous issues may arise in other areas of law. It is beyond the scope of this paper to address them comprehensively, but it is worth mentioning a few examples to illustrate that the underlying issues arise more broadly, so this paper's central arguments may apply in other contexts.

In some cases, policymakers have already recognized the underlying inalienability issue and the problems it can create in private settlements. For example, if a married couple wishes to divorce, the parties may be largely free to allocate their property however they like by mutual agreement. However, if the parties have children, a court will carefully review how the settlement resolves custody of the children. This reflects that a parent's custodial rights over her children are generally not alienable, and that the courts have recognized an obligation to prevent such rights from being exchanged or divided in ways that undermine the children's welfare.[120]

The inalienability issues are particularly salient when the dispute centers on fundamental constitutional rights, such as the right to vote. For example, suppose a state implements a requirement that all residents must obtain a state-issued photo identification card in order to vote. A class of minorities or low-income persons, who may be much more likely to lack such identification, may challenge this law as an unlawful abridgement of their right to vote. This very dispute recently arose in Texas, which had enacted photo ID requirements for voting in political elections. The Fifth Circuit condemned the law, which it described as "unconstitutionally burden[ing] the right to vote," among other things.[121] However, suppose that the parties had instead reached a settlement prior to judgment, with the state agreeing simply to pay the plaintiff class in exchange for dismissing the complaint (and preserving the ID requirement). That settlement may operate as an agreement in which one party pays another to give up her right to vote. Such a contract would of course be unlawful, since the right to vote is inalienable. As such, a court is very unlikely to approve (and would likely declare unlawful) any settlement that serves essentially to transact a party's right to vote.

My proposals about settlement review and preclusion may be appropriately applied in other contexts. If the parties' settlement is carefully reviewed (to evaluate its compliance with the relevant inalienability rule), then it may be appropriate for the court's approval to have a preclusive effect on the parties

119. In some cases, pharmaceutical firms have a statutory requirement to submit their settlement terms to the FTC for antitrust review. *See* Medicare Prescription Drug, Improvement, and Modernization Act, Pub. L. No. 108-173, § 1112, 117 Stat. 2066, 2461.

120. I am grateful to Kimberly Yuracko for pointing out this example to me.

121. Veasey v. Abbott, 830 F.3d 216, 225 (2016).

themselves. This makes it easier for the parties to enforce their agreement against one another (provided it has not been successfully attacked by a third party), since it prevents either party from invoking the relevant inalienability as a defense for its failure to perform. However, in lieu of such review, each party should be entitled to invoke the inalienability rule to render the settlement agreement unenforceable. Finally, whether or not the settlement was carefully reviewed, its approval should have no preclusive effect on third parties, since they were not afforded an opportunity to argue the case for condemning the settlement agreement. To forestall a collateral attack, the parties must bring a declaratory judgment action against the prospective challenger.

VI. CONCLUSION

Most influential theories about private disputes, including the Coase theorem, assume implicitly that there are no legal restraints on alienability. However, the parties to a patent dispute are often competing firms with market power, and their private dealings may thus be constrained by the antitrust laws. Antitrust precludes contracts that allocate commercial rights in ways that unreasonably subvert competition between the parties. But unlike a typical inalienability rule, this has no bearing on how a court might delimit commercial rights, namely through a patent judgment. This creates an asymmetry between (1) the allocations of rights that the parties can effect through contract; and (2) those a court can effect through its judgment.

The result is that, in contrast to traditional Coasean intuition, a court's delimitation of patent rights can influence how such rights are ultimately allocated, even if the parties can bargain. A corollary is that the parties may (rationally) litigate to judgment even if they have common expectations about litigation, and even if they are perfectly capable of entering into a lawful settlement *ex ante*.

Patent disputes arising in antitrust's shadow are thus critically distinct from conventional private disputes, even if no antitrust issues are being litigated. Unfortunately, the courts are inclined to view them as more or less ordinary private conflicts. This ignores antitrust's unseen role in distorting the parties' incentives. They may litigate to judgment only because their mutually-preferred settlement would be unlawful and unenforceable, not because they are beset by transaction costs. Alternatively, the parties may settle not to avoid litigation costs, but rather to preclude a procompetitive judgment that they could not lawfully bargain around *ex post* (e.g., patent invalidation).

Accordingly, appropriate policies toward settlement and litigation differ from those typically espoused in private law. Courts should maintain a generally cautious attitude toward settlement, as the impetus for settlement may be inimical to patent policy. I discuss a number of grounds on which these settlements should be evaluated. By the same token, litigation to judgment should not be viewed as necessarily undesirable. Indeed, it may be the only way to achieve the socially efficient specification of rights, whether or not the parties can bargain.

Appendix A

GENERALIZED LITIGATION MODEL

This section analyzes a more general model of negotiation and litigation in the presence of antitrust inalienability. This allows for a very broad understanding of precisely how antitrust alienability serves to distort private behavior and the allocation of rights. The setup is the same as in the numerical example: there is one patent holder (P), and a potential entrant (D) who wants to enter the market, but cannot do so without either obtaining a license or establishing that the patent is invalidor uninfringed. The only difference here is that we do not assign specific numerical values to the relevant variables. By allowing these parameter values to vary, we can compare a range of different possible outcomes.

$\pi^m > 0$ denotes the monopoly profit level, while $\pi^d > 0$ denotes the (per-firm) duopoly profit. We assume that monopoly profits exceed total profits under duopoly, so that $\pi^m = 2\pi^d + \mu$, where $\mu > 0$ denotes the monopoly rents that would be destroyed by duopoly competition. c denotes the cost of litigation faced by each party, while f and r denote a license fee offer and reverse payment offer, respectively. The probability that P will win in litigation is $w \in [0,1]$. We assume that $c < \pi^d$, which ensures that D may earn a positive expected payoff from litigation, provided that w is not too large. As in the numerical example, an ex-ante reverse payment is deemed lawful if and only if it is weakly lower than P's litigation costs: if and only if $r \leq c$.

FIGURE A1: GAME TREE

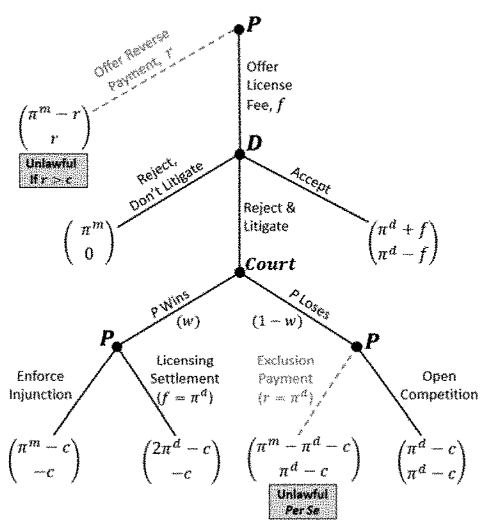

Figure A1 shows the game tree for this extended form game; this is just an explicit rendering of the game underpinning the numerical example. Payoffs are given in the parentheses, with P's payoff on top and D's payoff on bottom. Agreements that may violate the antitrust laws are distinguished with grayed text and dotted lines. The game allows for the parties to negotiate around a given litigation outcome –for example, to agree to license after P wins and D is enjoined – with the exception that, if P loses, then they cannot bargain around this through a reverse payment that keeps D out of the market, as this would be *per se* illegal. (For the sake of completeness, the tree still shows what the optimal such agreement would be.)

Note that, if P wanted to agree on licensing after winning in court, $f = \pi^d$ would be its uniquely best fee to offer (since D would not pay more), so this amount is simply imposed by default. Note that I have omitted D's accept/reject decision for the case where P offers an *ex ante* reverse payment, which helps to keep the game tree somewhat simpler.

Solving the game for a subgame perfect Nash equilibrium (SPNE) is straightforward. We begin by ignoring the possibility of a lawful *ex ante* reverse payment, and come back to this later. Note that, if P wins, it always does better by enforcing the injunction; similarly, since an exclusionary agreement is unlawful if P loses, a loss by P will always result in open competition between the parties.

With this, it is easy to compute expected payoffs from litigation. They are $\pi^d - c + w(\pi^d + \mu)$ for P, and $(1-w)\pi^d - c$ for D. This implies that D gets a positive expected value from litigation if and only if $w < \tilde{w}$, where $\tilde{w} \equiv (\pi^d - c)/\pi^d$. Intuitively, if P's probability of winning is not too high, then D has a good chance of earning payoff $\pi^d - c$ by litigating. Since competition erodes joint profits, it is obvious that P would never agree to *ex ante* licensing if it did not expect D to litigate. Thus, if $w \geq \tilde{w}$, P will offer an unacceptable amount (e.g., $f = \infty$) and D will optimally abstain from litigation, ending the game.

Suppose that $w < \tilde{w}$. Then we know that D will litigate if no *ex ante* agreement is reached. Let f_w denote the largest license fee offer that D would accept in this case. Solving $\pi^d - f_w = (1-w)\pi^d - c$ yields the solution $f_w = w\pi^d + c$. It is easy to verify that P prefers licensing (with fee f_w) to litigation if and only if $w \leq \hat{w} \equiv 2c/\mu$. Intuitively, if $w \leq \hat{w}$, then $w\mu \leq 2c$, which says that total litigation costs $(2c)$ exceed the expected monopoly rents that will be preserved by litigation $(w\mu)$. By contrast, litigation provides larger joint profits than licensing when $w > \hat{w}$.

Of course, it is easy to see that the parties' ideal choice would always be to strike a reverse payment settlement in advance of litigation. If litigation gives D a positive expected payoff (i.e., if $w < \tilde{w}$), then the lowest reverse payment D would accept is $r_w \equiv (1-w)\pi^d - c$. This gives D the same payoff it expects to get from litigation, while still preserving the monopoly rent μ; if not for the antitrust laws, the parties would always settle *ex ante* with a reverse payment of r_w. However, in light of the antitrust laws, such a settlement is lawful if and only if $r_w < c$, which is true if and only if $w \geq w^r$, where $w^r \equiv (\pi^d - 2c)/\pi^d$.

(Note that $w^r < \widetilde{w}$ for all parameter values.) The intuition is that, if w is sufficiently large, then D's expected payoff from litigation will be smaller than c, in which case the parties can mutually agree to a lawful reverse payment.

Note that, while we know $w^r < \widetilde{w}$, we cannot say anything about the magnitude of $\widehat{w}$ relative to $\widetilde{w}$ or w^r. This comparison is critical to determining how the equilibrium plays out. In particular, the SPNE path will take one of four forms, depending on the parameter values. These are given below.

Equilibrium Possibility #1 (Status Quo). If $w \geq \widetilde{w}$, then P refuses to offer anything (including a reverse payment), and D chooses not to litigate, resulting in final payoffs of π^m and 0 for P and D, respectively. Thus the parties remain at the status quo: P has an exclusive right to use the patented invention, and it does not pay any money to D.

Equilibrium Possibility #2 (Lawful Reverse Payment). If $w^r \leq w < \widetilde{w}$, then P offers reverse payment r_w in advance of litigation, which is lawful ($r_w \leq c$). D accepts this, and the settlement generates final payoffs of $\pi^m - r_w$ and r_w for P and D, respectively.

Equilibrium Possibility #3 (Litigation). If $\widehat{w} < w < w^r < \widetilde{w}$, then there is no *ex ante* settlement that is both lawful and mutually-beneficial. Thus the parties will litigate. If P wins, it will enforce the injunction; if P loses, they cannot lawfully reach an agreement that excludes D, and thus the parties will compete. Expected final payoffs are thus $\pi^d - c + w(\pi^d + \mu)$ for P and $(1 - w)\pi^d - c$ for D.

Equilibrium Possibility #4 (Licensing). If $w \leq \min\{\widehat{w}, w^r\} < \widetilde{w}$, then the parties will reach an *ex ante* licensing settlement at fee f_w, resulting in final payoffs of $\pi^d + f_w$ and $\pi^d - f_w$ for P and D, respectively.

Importantly, in a traditional Coasean framework (i.e., without legal restraints on alienability), there would never be four distinct kinds of equilibria. The parties would always settle *ex ante*, or else the equilibrium would be to remain at the status quo, and thus litigation will never occur and the final allocation will always be that which maximizes the joint welfare of the parties. Further, any litigation outcome deviating from that allocation would be bargained-around, so that all possible resolutions of the game lead to the same allocation.