

Licensee Patent Challenges

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We analyze contractual clauses which limit the ability of licensees to challenge patents at the basis of their licensing agreements. In particular, we study no-contest clauses, which prohibit licensees from contesting the validity of the patent, and challenge-penalty clauses, which penalize licensees for doing so. We develop a model that we use to compare three legal regimes: “No Restriction,” in which the patent holder is given complete contractual freedom, “Partial Restriction,” in which no-contest clauses are forbidden but challenge penalties are allowed, and “Total Restriction,” in which neither no-contest nor challenge penalty clauses are enforced. We show that No Restriction is unlikely to be optimal, and further, we provide necessary and sufficient conditions under which Total Restriction is optimal. The rule we suggest differs significantly from the one currently applied by most courts.

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Introduction

A firm is awarded a patent for a new technology, and it licenses the patent to a manufacturer. The licensing agreement contains a clause explicitly forbidding the manufacturer from challenging the validity of the patent. Later, once new information regarding the patent's validity is revealed, the manufacturer nonetheless brings a suit challenging the validity of the patent. Should the challenge be allowed?

Alternatively, suppose that the licensing agreement contains a different clause, requiring the manufacturer to pay a penalty if it chooses to bring a challenge. Should the court require the manufacturer to pay the penalty if a challenge is brought?

In the middle of the twentieth century, these questions would not have arisen. In that era, courts employed the principle of contractual estoppel to prohibit the licensee from challenging the validity of the patent even if the contract contained no limitation to that effect. However, the Supreme Court has since abandoned this doctrine, recognizing that invalid patents impose a large social cost. It is now settled that a licensee may challenge a patent when the contract is silent on this matter.

What is not settled, however, is whether a licensee may challenge a patent when the contract explicitly forbids him from doing so. While the Supreme Court has not yet ruled on this issue, lower courts have provided mixed decisions. Some courts have found no-contest and challenge-penalty clauses to be unenforceable based on the public interest in ridding the economy of invalid patents. Others have chosen to enforce them, at least under some circumstances, favoring contractual certainty and risk sharing between the parties. These clashing decisions make it likely that the Supreme Court will consider the validity and effect of these types of clauses in the future. We provide a framework within which no-contest and challenge-penalty clauses may be analyzed.

Patents play a central role in our modern knowledge-based economy. The patent holder reveals novel and non-obvious knowledge that will become public property at the end of the patent term.¹ In exchange, he is granted the

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exclusive use of the patent for its duration. This exclusivity allows the inventor to capture a significant portion of the value of the patent, and thereby increases incentives for innovation. At the same time, this exclusivity entails costs. Patents can cause all of the social harms that are normally understood to stem from monopolies—namely, underproduction of the patented good, high prices, and waste in the production process.² Furthermore, they create several patent-specific social costs. Production of multi-patent products might be limited by the anticommons problem,³ and future follow-on inventions may also be limited for similar reasons. To prevent this waste, it is important to ensure that patents are only granted when the patent holder has performed his part of the bargain.⁴

The Patent and Trademark Office (PTO) has the primary responsibility for determining whether an invention qualifies for a patent.⁵ Evaluating a patent is costly: it takes time, effort, and skill; and the PTO sometimes makes mistakes, such as granting a patent application when the invention is obvious or preempted. The number of mistakes is thought to have increased in recent years,⁶ as the resources allocated to examining patents have not kept pace with the substantial growth in the number and complexity of patent applications.⁷

Accordingly, the responsibility for eliminating unwarranted patents that impose significant social costs was partially transferred to the market. The law provides patents with a rebuttable presumption of validity that may be challenged by private parties.⁸ The Supreme Court has recognized that private patent challenges advance two public interests: “the important public interest in permitting full and free competition in the use of ideas that are in reality part of

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1. 35 U.S.C. §§ 101-03, 154 (2012).

2. See, e.g., Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 HARV. L. REV. 1813 (1984).

3. See, e.g., Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCI. 698 (1998).

4. For the purposes of this Article, we assume that patent law creates an efficient social contract. For a contrary view, see MICHELE BOLDRIN & DAVID K. LEVINE, *AGAINST INTELLECTUAL MONOPOLY* (2008).

5. 35 U.S.C. § 2 (2012).

6. See, e.g., ADAM B. JAFFE & JOSH LERNER, *INNOVATION AND ITS DISCONTENTS* (2004).

7. See, e.g., FED. TRADE COMM’N, *TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY* 9-10 (2003). For an argument that this allocation of resources is efficient, see Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495 (2001).

8. Under patent law, anyone can challenge the validity of the patent. 35 U.S.C. § 302 (2012). The Supreme Court has recognized as early as 1875 that a patent is a “prima facie right only . . . subject to an examination by the courts.” *Reckendorfer v. Faber*, 92 U.S. 347, 355 (1875). The Federal Circuit has also adopted this view. See, e.g., *In re Etter*, 756 F.2d 852, 856-57 (Fed. Cir. 1985).

the public domain,”⁹ and the public interest in preventing monopolies based on invalid patents.¹⁰

Patent licensees are in a special position to perform this role. Their practical experience with the subject matter of the patent often places them in a good position to evaluate the novelty of the invention.¹¹ They might also have an incentive to challenge the patent to avoid paying royalties to the patent holder.¹² In fact, as the Supreme Court stated in *Lear, Inc. v. Adkins*, “[l]icensees may often be the only individuals with enough economic incentive to challenge the patentability of an inventor’s discovery.”¹³

This is where no-contest and challenge-penalty clauses enter the picture. A licensee in a weak bargaining position might have little choice but to agree to a no-contest clause, forbidding him from challenging the patent, or a challenge-penalty clause, which penalizes him for doing so. A licensee with more bargaining power might also agree to such clauses in exchange for better contractual terms. These clauses lead to an increase in the expected joint profits of the licensee and the patent holder, who can then share the surplus. The public at large, however, loses from this arrangement.

Despite the impact of these contractual clauses, their enforceability has not yet received an in-depth analysis. Rather, most court decisions use general language, emphasizing one consideration over another, without providing the nuanced analysis that is required to ensure that the rule adopted actually furthers collective welfare. Academic scholarship on this question is relatively sparse and does not provide a clear answer.

This Article attempts to fill this void. We analyze the effects of no-contest and challenge-penalty clauses and consider whether or not enforcing these clauses maximizes social welfare. Making this determination is of high importance because these contractual limitations, which can significantly affect the motivation and ability of a licensee to challenge an invalid patent, are boilerplate provisions in many patent-licensing agreements. Patent licenses are an important and common means toward efficient dissemination of new products and technologies in the marketplace.

9. *Lear, Inc. v. Adkins*, 395 U.S. 653, 670 (1969).

10. See, e.g., *FTC v. Actavis, Inc.*, 133 S. Ct. 2223, 2232 (2013); *MedImmune, Inc. v. Genentech, Inc.*, 549 U.S. 118 (2007); *Scott Paper Co. v. Marcalue Mfg. Co.*, 326 U.S. 249 (1945) (protecting the competitive economy by keeping open the way for interested persons to challenge the validity of patents which might be shown to be invalid); *Mercoid Corp. v. Mid-Continent Inv. Co.*, 320 U.S. 661, 665 (1944) (“It is the public interest which is dominant in the patent system.”); *Pope Mfg. Co. v. Gormully*, 144 U.S. 224, 235 (1892) (“[T]he right to make the defense is not only a private right to the individual, but it is founded on public policy, which is promoted by his making the defense, and contravened by his refusal to make it.” (quoting *Crane v. French*, 38 Miss. 503, 532 (1860))).

11. See discussion *infra* Part III.

12. The contract might be based on multiple patents. This fact does not change the analysis significantly. For simplicity reasons, we assume throughout this article that one patent serves as the basis of each licensing contract.

13. 395 U.S. at 670.

In particular, this Article compares the welfare effects of three potential legal rules. These rules can be thought of as points along a spectrum. At one end is a rule of per se invalidity, which prohibits both no-contest and challenge-penalty clauses. We call this rule "Total Restriction." At the other end is a rule that prohibits neither type of clause. We call this rule "No Restriction." In the middle of the spectrum is "Partial Restriction," a rule that prohibits no-contest clauses but allows certain types of challenge-penalty clauses.

We provide conditions under which each rule is superior to the others. Our conclusions have important implications for public policy. In general, "Total Restriction," the rule of per se invalidity, will ensure that social welfare is maximized. This rule is very different from the one currently applied in the Federal Circuit, which has exclusive jurisdiction over appeals in patent cases. In some cases, however, it may make sense for courts to allow a very limited set of challenge-penalty clauses. The "No Restriction" rule will generally be inefficient, but could be optimal under certain circumstances.

The roadmap of this Article is as follows. Part I describes and analyzes the different rules that courts have applied to no-contest and challenge-penalty clauses. Part II provides an analysis of the competing interests. Part III offers a systematic analysis of the potential "Total Restriction," "No Restriction," and "Partial Restriction" legal rules. This analysis proceeds in two steps. First, we develop an economic model to analyze the effects of the three proposed legal rules on parties' conduct. Second, the three legal regimes are compared in terms of social welfare. We conclude by presenting the optimal set of legal rules for contractual limitations on licensees' ability to challenge patents.

I. Current Legal Rules

The legal doctrines governing the right of a licensee to challenge a patent have changed significantly over the past century. This Part analyzes the evolution and the current state of the law, emphasizing the different considerations to which courts have given primacy over time.

A. Licensee Estoppel and Actual Controversy Limitations

The doctrine of licensee estoppel, first established by the Supreme Court in 1855,¹⁴ held that a licensee is barred from challenging the validity of a patent.¹⁵ This doctrine was predicated on the view that a licensee's acceptance of a licensing agreement constituted implicit recognition of the patent's validity, regardless of whether the patent contained an explicit no-contest

14. *Kinsman v. Parkhurst*, 59 U.S. (18 How.) 289 (1855); *see also* *United States v. Harvey Steel Co.*, 196 U.S. 310 (1905).

15. *Kinsman*, 59 U.S. at 289.

clause. Equitable considerations were given decisive weight; public policy goals of invalidating unwarranted patents were largely ignored.

In the 1940s, the Supreme Court narrowed the doctrine of licensee estoppel in a series of decisions ruling that a licensee may challenge a patent when the patent monopoly is used to justify an otherwise impermissible agreement to fix prices.¹⁶ The Court regarded such a challenge as a service in the public interest.¹⁷ The Court, however, was careful not to abandon the entire doctrine, and held in *Automatic Radio Manufacturing Co. v. Hazeltine* that the general rule of licensee estoppel applied outside the specific context of price fixing.¹⁸ Then in 1969, in *Lear, Inc. v. Adkins*, the Court revisited the question of licensee estoppel and unanimously chose to repudiate the doctrine.¹⁹ *Lear* forms the bedrock of contemporary law on licensee estoppel.

Lear, an aerospace manufacturer, hired Mr. Adkins to develop a more efficient gyroscope. They entered into an agreement under which Lear would license and pay royalties for any discovery made by Adkins. Lear began producing a large number of gyroscopes based on one such discovery, which Adkins later attempted to patent. After several years and many rejected patent applications, Lear stopped paying royalties, claiming that the invention was anticipated by prior art. As soon as Adkins obtained a patent, he sued Lear. Though Lear attempted to raise the defense of patent invalidity, the lower courts applied the doctrine of licensee estoppel, barring the defense and directing a verdict for Adkins. The Supreme Court reversed, and in doing so overruled the line of cases, such as *Automatic Radio*, which had held that licensee estoppel was the “general rule.”²⁰ Rather, the Court gave decisive weight to the “important public interest in permitting full and free competition in the use of ideas which are in reality a part of the public domain.”²¹ The Court emphasized the importance of enabling licensees in particular to challenge the validity of patents, since “[l]icensees may often be the only individuals with enough economic incentive to challenge the patentability of an inventor’s discovery.”²² Accordingly, the decision was based on an assumption that allowing patent challenges furthers social welfare.

In 2007, the Court further expanded licensees’ rights to challenge patent validity in *MedImmune, Inc. v. Genentech, Inc.*²³ Until then, courts had thrown

16. *MacGregor v. Westinghouse Elec. & Mfg. Co.*, 329 U.S. 402 (1947); *Edward Katzinger Co. v. Chicago Metallic Mfg. Co.*, 329 U.S. 394 (1947); *Scott Paper Co. v. Marcalus Mfg. Co.*, 326 U.S. 249 (1945); *Sola Elec. Co. v. Jefferson Elec. Co.*, 317 U.S. 173 (1942). This exception to the general rule of licensee estoppel was also independent of whether the contract contained an explicit clause prohibiting challenges.

17. *Edward Katzinger Co.*, 329 U.S. at 401.

18. *Automatic Radio Mfg. Co. v. Hazeltine Research, Inc.*, 339 U.S. 827 (1950).

19. *Lear, Inc. v. Adkins*, 395 U.S. 653 (1969).

20. *Id.* at 671.

21. *Id.* at 670.

22. *Id.*

23. *MedImmune, Inc. v. Genentech, Inc.*, 549 U.S. 118, 137 (2007).

out licensee invalidity suits absent a threat of an imminent infringement suit (the “actual controversy” requirement). Previously, for example, in *Gen-Probe, Inc. v. Vysis, Inc.*, a 2004 case, the licensee challenged the validity of the patent while continuing to pay royalties. The Federal Circuit dismissed the case for lack of subject matter jurisdiction.²⁴ The court found the case nonjusticiable for lack of “actual controversy” because the licensee could not have had “a reasonable apprehension of [an infringement] lawsuit” at the time the action was initiated.²⁵ Under *Gen-Probe*, a licensee faced two options: (1) continue to operate based on the contract and not challenge validity; or (2) terminate its license and challenge validity. The latter option entailed significant risk. If the licensee continued to use the patent, an unsuccessful challenge would consequently require the licensee to shut down its operations and pay damages for patent infringement. While the licensee could avoid this risk by ceasing production for the period of the lawsuit, to do so would be costly for both the licensee and society at large, which could no longer benefit from the licensee’s product.

But in *MedImmune*, the Supreme Court opened a third option for the licensee.²⁶ Rejecting the holding of *Gen-Probe*, the Court held that the Federal Circuit has subject matter jurisdiction to hear a patent challenge brought by a licensee performing contractual duties under protest. The Court’s rationale was that “[p]romising to pay royalties on patents that have not been held invalid does not amount to a promise *not to seek* a holding of their invalidity.”²⁷ In effect, the Court increased the patent holder’s risk that his patent would be found invalid. Importantly, however, the Court emphasized the absence of any provision in the contract that could fairly be construed as prohibiting a challenge to the licensed patents.²⁸

B. Explicit No-Contest Clauses

While *Lear* repudiated the doctrine of licensee estoppel, controversy has arisen over how far its reasoning reaches. One important question involves the enforceability of explicit no-contest clauses. This question arose especially in the context of settlement agreements, which involve an economically significant class of cases since many patent licenses are signed after the patent holder initially brings an infringement claim.²⁹ Different courts have adopted

24. *Gen-Probe, Inc. v. Vysis, Inc.* 359 F.3d 1376 (Fed. Cir. 2004).

25. *Id.* at 1381.

26. *MedImmune*, 549 U.S. 118.

27. *Id.* at 135.

28. *Id.*; see also *SanDisk Corp. v. STMicroelectronics, Inc.*, 480 F.3d 1372 (Fed. Cir. 2007) (extending the right to request declaratory judgments to include situations in which a patentee asserts rights under a patent even if he promises not to sue).

29. See, e.g., *Rates Tech., Inc. v. Speakeasy, Inc.*, 685 F.3d 163, 171 (2d Cir. 2012) (“As the present case demonstrates, it is common for patent licensing agreements to be entered into after a patent owner makes an initial accusation of infringement.”).

different rules.³⁰ Of these courts, the Federal Circuit is the most important since it has exclusive appellate jurisdiction over patent cases.

In *Flex-Foot, Inc. v. CRP, Inc.*, a licensee who had previously challenged the patent—after being accused of infringement—settled the challenge with a licensing agreement that included an explicit no-contest clause.³¹ The licensee then challenged the validity of the patent again. The Federal Circuit found the clause enforceable, holding that an accused infringer is contractually estopped from challenging a patent if the accused infringer (1) had previously challenged the validity of the patent, (2) had an opportunity to conduct discovery on validity issues, and (3) voluntarily dismissed the litigation under a settlement agreement containing a clear and unambiguous no-contest clause. The policy of settling disputes had outweighed the policy of encouraging the free exchange of ideas.³²

In *Baseload Energy, Inc. v. Roberts*,³³ the Federal Circuit expanded its *Flex-Foot* decision by stating that “clear and unambiguous” no-contest clauses in settlement agreements are enforceable even in the absence of prior litigation.³⁴ The court justified its approach by referring to a strong jurisprudential policy in favor of settling litigation. *Lear* was distinguished on the grounds that it did not involve a no-contest clause.

Precedent from other circuits, however, lead in a very different direction. In *Massillon-Cleveland-Akron Sign Co. v. Golden State Advertising Co.*,³⁵ the Ninth Circuit held unenforceable a settlement agreement that restricted the ability to challenge the patent’s validity. The court reasoned that no-contest

30. It is interesting to note that different jurisdictions around the world have also adopted clashing rules. The European Court found a no-contest clause to be invalid as an infringement of European antitrust law, based on the view that “the public interest in ensuring an essentially free system of competition and therefore in the removal of a monopoly perhaps wrongly granted to the licensor must prevail over any other consideration.” Case 193/83 *Windsurfing Int’l v. Comm’n*, 1986 E.C.R. 611, 663-64 (E.C.J.). The European Union Technology Transfer Block Exemption takes a more nuanced approach under which no-contest clauses must undergo a rule of reason analysis. Commission Regulation 772/2004, art. 5(1)(c), 2004 O.J. (L 23) 11, 16. However, the Commission recently proposed changing the Block Exemption so that these termination clauses would not be automatically exempted. Commission Regulation (EU) 316/2014, art. 5(1)(b), 2014 O.J. (L 93) 17, 22. Termination-upon-challenge clauses are exempt from antitrust scrutiny. The Israeli Supreme Court applied the licensee estoppel doctrine to block a challenge by a licensee. CA 4788/08 *Cellopark v. Movidon* [2009] (Isr.). Yet a narrow reading of the case suggests that the ruling may have been affected by the unique benefits derived by the licensee from exclusivity as well as the fact that the decision was part of injunction proceedings. The Israeli Block Exemption for Agreements for the Execution of Research and Development also does not automatically exempt no-contest clauses, while exempting termination clauses. Antitrust Rules (Block Exemption for Agreements for the Execution of Research and Development) – 2006, Section 8(a)(2).

31. *Flex-Foot, Inc. v. CRP, Inc.*, 238 F.3d 1362 (Fed. Cir. 2001).

32. *Id.* at 1367-68.

33. *Baseload Energy, Inc. v. Roberts*, 619 F.3d 1357, 1363 (Fed. Cir. 2010).

34. *Id.* at 1363; *see also* *Diversity Lever, Inc. v. Ecolab, Inc.*, 191 F.3d 1350 (Fed. Cir. 1999).

35. *Massillon-Cleveland-Akron Co. v. Golden State Adver. Co.*, 444 F.2d 425, 427 (9th Cir. 1971).

clauses conflict with the policy articulated in *Lear*.³⁶ It also determined that settlement agreements should not be treated distinctly from licensing agreements, given the ability of parties to “couch licensing agreements in the form of settlement agreements.”³⁷ Finally, the court stated that the policies in favor of “free competition in ideas not meriting patent protection” supersede the policy favoring the settlement of disputes.³⁸

This case may be easy to overlook since it was decided before the creation of the Federal Circuit, which has adopted a different approach. However, the Second Circuit has recently adopted a similar view. *Rates Technology, Inc. v. Speakeasy, Inc.* centered on a clear no-contest clause in which the licensee promised it would not challenge the validity of the patent “anywhere in the world.”³⁹ The Second Circuit found this clause unenforceable, basing its decision on an understanding that *Lear* “establish[ed] a ‘balancing test’ for weighing the ‘public interest in discovering invalid patents’ against other competing interests.”⁴⁰ The court argued that “[i]f no-challenge clauses in pre-litigation agreements were held to be valid and enforceable, *Lear*’s strong policy favoring full and free use of ideas in the public domain could be evaded through the simple expedient of clever draftsmanship.”⁴¹ The court acknowledged the high cost of patent litigation and the risk imposed on the patent holder,⁴² but nonetheless reasoned that these costs were less important than the policy consideration of discovering invalid patents, at least when no-contest agreements are entered into prior to the initiation of any litigation.

What explains the apparent divergence between the rulings of the Federal Circuit and the Ninth and Second Circuits? Theories abound. Perhaps, when deciding *Flex-Foot*, the Federal Circuit made a distinction between pre-litigation and post-litigation settlement agreements.⁴³ The court may have been driven by the fact that the licensee signed a no-contest clause after performing

36. *Id.* at 427. For additional cases holding that no-contest clauses are unenforceable under *Lear*, see Alfred C. Server & Peter Singleton, *Licensee Patent Validity Challenges Following MedImmune: Implications for Patent Licensing*, 3 HASTINGS SCI. & TECH. L.J. 243, 399 (2011).

37. *Massillon-Cleveland-Akron*, 444 F.2d at 427.

38. *Id.*; see also *Callaway Golf Co. v. Kappos*, 802 F. Supp. 2d 678, 687 (E.D. Va. 2011) (“[The plaintiff has not] demonstrated that the public interest in enforcement of settlement agreements outweighs the public interest in patent validity.”).

39. *Rates Tech., Inc. v. Speakeasy, Inc.*, 685 F.3d 163, 171 (2d Cir. 2012). The Federal Circuit transferred this case to the Second Circuit because the Federal Circuit did not have jurisdiction. The Second Circuit was careful to distinguish Federal Circuit precedents such as *Flex-Foot*, in particular on the ground that this case deals with a settlement agreement signed before any litigation, while *Flex-Foot* deals with an agreement signed after some litigation had already taken place. The Second Circuit also emphasized that they were, in any event, not directly bound by the Federal Circuit precedent in *Baseload*.

40. *Id.* at 168 (quoting *Idaho Potato Comm’n v. M & M Produce Farm & Sales*, 335 F.3d 130, 135 (2d Cir. 2003)).

41. *Id.* at 171.

42. *Id.* at 172.

43. However, this logic cannot apply to *Baseload Energy*, which involved a pre-litigation settlement agreement. *Baseload Energy, Inc. v. Roberts*, 619 F.3d 1357 (Fed. Cir. 2010).

discovery, on the theory that discovery provides an exhaustive opportunity for the parties to weigh the validity of a patent.⁴⁴ Alternatively, the court may have been motivated by the principle of *res judicata*.⁴⁵ The court may have thought there was no justification to allow the licensee to repeatedly impose high discovery costs on the patent holder. More simply, the court may have thought that the right to challenge was abused without a legitimate justification.

Yet the language of *Baseload Energy* indicates a broader divergence between the circuits, which could be read as implying that the Federal Circuit has adopted the view that, in general, certainty in contracting and avoiding litigation costs will be the prevailing policy considerations.⁴⁶ In principle, this line of reasoning can extend beyond settlements to all licensing agreements with explicit no-contest clauses.

Arguably, this view from the Federal Circuit clashes not only with the Ninth and Second Circuits, but also with the Supreme Court. In *MedImmune*, the Court placed a higher value on patent invalidation than it did on litigation avoidance.⁴⁷ However, some have read *MedImmune* as providing parties with considerable freedom to tailor their relationships to meet business needs, including the freedom to put explicit no-contest clauses in their contracts.⁴⁸ This reading is based on the Court's emphasis on the fact that the parties did not include a clause limiting the licensee's right to challenge the patent and thereby contracting out of the uncertainties created by a patent challenge.⁴⁹ The Federal Circuit's view may also be understood to conflict with the view the Court recently took in *Actavis*, which emphasizes the importance of invalidating unwarranted patents and enabling competition.⁵⁰

44. For a suggestion that courts would find no-challenge clauses in settlement agreements to be enforceable as long as the question of the patent validity arose and was subject to discovery, see Andrew D. Kasnevič & Deboadhonyaa Sengupta, *Licensee Estoppel: The Lear Doctrine, Rates v. Speakeasy, and Other Applications*, AM. INTEL. PROP. L. ASS'N (Feb. 21, 2012), http://www.martindale.com/intellectual-property-law/article_Sughrue-Mion-PLLC_1686518.htm. If decisive weight is given to the fact that discovery was performed, the same logic might apply to bar licensees who carefully checked the patent's validity before entering a contract.

45. See *Flex-Foot*, 238 F.3d at 1368.

46. For this line of argument, see, for example, *In re Tamoxifen Citrate Antitrust Litig.*, 466 F.3d 187, 203 (2d Cir. 2006), *abrogated by* FTC v. Actavis, Inc., 133 S. Ct. 2223 (2013); *Schering-Plough Corp. v. FTC*, 402 F.3d 1056, 1075 (11th Cir. 2005); and *Valley Drug Co. v. Geneva Pharm., Inc.*, 344 F.3d 1294, 1304 (11th Cir. 2003).

47. See Rochelle Cooper Dreyfuss & Lawrence S. Pope, *Dethroning Lear? Incentives to Innovate after MedImmune*, 24 BERKELEY TECH. L.J. 971, 982-83 (2009).

48. *Id.* at 976.

49. *Id.* at 991. The absence of a discussion is read as an invitation to rethink *Lear*'s priorities. *Lear* is distinguished on the basis of information: the specific clauses alert potential licensees to the restriction and thus further the public interest by strengthening incentives to examine the patent prior to the agreement. This argument is problematic if we assume that, before *Lear*, parties assumed that *Automatic Radio* was good law, and that any challenge would be prohibited under the doctrine of licensee estoppel.

50. *FTC v. Actavis, Inc.*, 133 S. Ct. 2223, 2231 (2013). The extent of this clash depends on the breadth one gives to the unique facts of *Actavis*, which involved a reverse payment agreement in the pharmaceutical industry. There, the settlement removed the party with the strongest

C. Challenge-Penalty Clauses

Challenge-penalty provisions can take many forms. They may include termination-upon-challenge clauses that give the patent holder the right to terminate the contract in the event of a challenge, causing the licensee to lose all or most of the rights granted under the agreement. Alternatively, they may relate to royalties. For example, the licensing agreement may specify that the royalty rate will increase when a challenge is brought or when a challenge fails.⁵¹ Challenge penalties may go beyond the specific license, affecting the parties' relationship in other areas. For example, the patent holder might limit the transfer of information about new technologies to the licensee in the event of a challenge. Penalties might also take the form of procedural impediments such as mandatory arbitration or might require that the licensee pay the patent holder's litigation costs.

Challenge penalties can even come in the form of benefits. Instead of punishing the licensee for bringing a challenge, the patent holder could reward him for not challenging. In some cases, a patent holder may agree to return some of the royalties to the licensee at the end of the contract term, under the condition that no challenge be brought.⁵²

But all these challenge-penalty clauses share a common trait: they reduce the licensee's motivation to challenge the patent, thereby reducing the risk that the patent holder will have to undergo litigation. They vary mainly in the strength of this effect.⁵³

The validity of challenge-penalty clauses is not always clear, and remains an important question.⁵⁴ While a limitation on a right to challenge erects a legal barrier, challenge clauses can raise an economic barrier of no less consequence.

Lear shed light on the validity of at least some challenge-penalty clauses. While the agreement in *Lear* did not contain a no-contest clause, it contained a royalty-payment provision that acted as a challenge-penalty clause because it required the licensee to continue paying royalties during the pendency of the patent challenge. The Court noted that this provision, by itself, could frustrate

incentives to challenge, given that the Hatch-Waxman Act grants exclusivity only to the first challenger, and entry into a pharmaceutical market involves additional high barriers, such as approval by the FDA.

51. Dreyfuss & Pope, *supra* note 47, at 1001-03.

52. Stephanie Chu, *Operation Restoration: How Can Patent Holders Protect Themselves from MedImmune?*, 6 DUKE L. & TECH. REV. 1, ¶ 16 (2007).

53. We preclude from the analysis provisions that increase royalties in a post-unsuccessful-challenge period that reflect the enhanced strength of the patent. See *Amado v. Microsoft Corp.*, 517 F.3d 1353 (Fed. Cir. 2008).

54. For example, in both *Lear* and *MedImmune*, termination-upon-challenge clauses were not challenged. See Chu, *supra* note 52, at ¶¶ 7-8; Dreyfuss & Pope, *supra* note 47, at 999-1001, 1003-05; Dmitry Karshedt, *Contracting for a Return to the USPTO: Inter Partes Reexaminations as the Exclusive Outlet for Licensee Challenges to Patent Validity*, 51 INTELL. PROP. L. REV. 309, 340-42, 349-352 (2011); Christian Chadd Taylor, *No-Challenge Termination Clauses: Incorporating Innovation Policy and Risk Allocation into Patent Licensing Law*, 69 IND. L.J. 215, 244-46, 251-53 (1993) (arguing that termination clauses should be legal).

the important goal of eliminating invalid patents, as it would have encouraged the patent holder to postpone a final determination regarding the patent's validity and could have deterred the licensee from bringing the patent challenge in the first place.⁵⁵ The Court held that this provision was not enforceable as it clashed with public interest in the full and free use of ideas in the public domain.⁵⁶ This ruling, and especially its reasoning, provides a guiding light in the search for the answer to the enforceability of these clauses. It prohibited a challenge-penalty provision that limited the probability of a patent challenge, but it did not completely prevent one.

The challenge penalty in *Lear* was relatively weak—at most, the licensee would pay royalties for a longer period. It might be argued that if even a provision that exerts a weak deterrent effect on the licensee's incentives to challenge a patent is prohibited, challenge penalties that create stronger disincentives should be prohibited as well. Indeed, the majority of relevant post-*Lear* circuit and district court opinions prohibited contract provisions that clashed with *Lear*'s public policy.⁵⁷

Crane Co. v. Aeroquip Corp. provides an example.⁵⁸ There, the licensee refused to pay royalties for using a modified version of the patented product. When the patent holder sued for infringement, the licensee defended on the ground that the patent was invalid. The patent holder then terminated the exclusive license, claiming that a provision in the contract allowed him to do so if the licensee stopped paying royalties. The Seventh Circuit interpreted these facts as showing that the patent holder had terminated the contract because the licensee had raised the question of validity. The court prohibited this action, stating that the policy considerations found to be determinative in *Lear* have equal force in this situation, given the “chilling effect on meritorious challenges to patents” that results from the threat of termination.⁵⁹ Some courts have gone even further and allowed licensees to deposit royalties in an escrow account during the time of the challenge.⁶⁰

This policy experienced a significant turnaround when the Federal Circuit was created and given exclusive jurisdiction over appeals in patent cases. According to Server and Singleton, the Federal Circuit seems to take the stance that a licensee who challenges a patent “can be subject to consequences that could constitute a disincentive to make the challenge in the first place, despite the public interest . . . in eliminating invalid patents.”⁶¹ The court emphasized goals that were not addressed in *Lear*, including stimulating innovation through patent protection, settling disputes, stability and contractual freedom. The court

55. *Lear, Inc. v. Adkins*, 395 U.S. 653, 673–74 (1969).

56. *Id.*

57. Server & Singleton, *supra* note 36, at 260–397.

58. *Crane Co. v. Aeroquip Corp.*, 504 F.2d 1086 (7th Cir. 1974).

59. *Id.* at 1092.

60. *E.g., Atlas Chem. Indus., Inc. v. Moraine Prods.*, 509 F.2d 1 (6th Cir. 1974).

61. Server & Singleton, *supra* note 36, at 354.

adopted a challenge-but-face-the-consequences approach, which encompassed almost all contractual challenge clauses.⁶²

Under this approach, the court found that all challenge penalties it scrutinized were categorically legal unless specifically prohibited by the Supreme Court. For example, in *C.R. Bard, Inc. v. Schwartz*, the Federal Circuit effectively held that license provisions giving patent holders the right to terminate licenses when licensees bring validity challenges and stop paying royalties are enforceable.⁶³ In a subsequent case, the court also barred licensees from making payments to an escrow account during litigation, arguing that “until invalidity is proven, the [patent holder] should ordinarily be permitted to enjoy the fruits of his invention.”⁶⁴ Such decisions rely, at heart, on differentiating *Lear*: in seeming contrast to *Lear*’s policy favoring challenges, the Federal Circuit opted not to allow a licensee to “avoid facing the consequences that [raising a challenge] would bring.”⁶⁵ One member of the court even called *Lear* “outmoded” and contrary to the “national interest” in encouraging innovation.⁶⁶

Given this circuit clash, it remains to be seen whether the Supreme Court will adopt the Federal Circuit’s view of challenge-penalty clauses or establish a wider application of the *Lear* policies, similar to what it did in *MedImmune*. Scholars are divided on the validity of different challenge-penalty clauses.⁶⁷

We note that that courts have generally not found that either no-contest or challenge-penalty clauses, by themselves, constitute patent misuse or an antitrust violation.⁶⁸

62. For a good overview of this approach, see *id.* at 354-90.

63. *C.R. Bard, Inc. v. Schwartz*, 716 F.2d 874 (Fed. Cir. 1983); see also *Cordis Corp. v. Medtronic, Inc.*, 780 F.2d 991 (Fed. Cir. 1985) (vacating an order enjoining the appellant from terminating a licensing agreement).

64. *Cordis Corp.*, 780 F.2d at 995 (quoting *Warner-Jenkinson Co. v. Allied Chemical Corp.*, 567 F.2d 184 (2d Cir. 1977)).

65. *Id.*; *Dow Chem. Co. v. United States*, 32 Fed. Cl. 11, 16 (Fed. Cl. 1994), *aff’d in part, rev’d in part*, 226 F.3d 1334 (Fed. Cir. 2000).

66. *Diamond Scientific Co. v. Ambico, Inc.*, 848 F.2d 1220, 1227-28 (Fed. Cir. 1988) (Newman, J., concurring). Interestingly, in 1986, the Department of Justice supported an unsuccessful bill making termination-upon-challenge clauses valid. Taylor, *supra* note 54, at 215.

67. See, e.g., *Dreyfuss & Pope*, *supra* note 47; Taylor, *supra* note 54, at 217-29 (arguing that the validity of such clauses falls within the grey zone); John W. Schlicher, *Patent Licensing, What to Do After MedImmune v. Genentech*, 89 J. PAT. & TRADEMARK OFF. SOC’Y 364, 388 (2007) (asserting that such clauses are valid).

68. E.g., *Panther Pumps & Equip. Co., Inc. v. Hydrocraft, Inc.*, 468 F.2d 225, 231-32 (7th Cir. 1972), (regarding no-challenge clauses); *Congoleum Indus., Inc. v. Armstrong Cork Co.*, 366 F. Supp. 220, 232 (E.D. Pa. 1973), *aff’d*, 510 F.2d 334 (3d Cir. 1975). But see *Bendix Corp. v. Balax, Inc.*, 471 F.2d 149, 155 (7th Cir. 1972) (stating that a no-challenge clause remains in effect after the termination of the agreement).

II. The Competing Interests

A. Relevant Considerations

Which rule regulating no-contest and challenge-penalty clauses best serves social welfare? To answer this question, one must decide what the relevant considerations are and then balance these factors. First, we determine which considerations should be given priority, and under which circumstances. Second, we determine the set of rules courts could adopt that best furthers these considerations, taking into account the expected effects of these rules on market behavior. To our knowledge, neither courts nor scholars have yet performed a thorough economic analysis of this question.

We first note that patent law does not directly enter into the equation. While patent law allows patent holders to license, it does not grant them the right to be free from challenges.⁶⁹ While patents are presumed valid because they are examined by a government agency, the mere existence of the patent does not shield it from a future challenge. On the contrary, patents are understood to be probabilistic in the sense that some uncertainty remains with regard to their validity and scope.⁷⁰ Patent law does not prevent anyone with standing from challenging a patent during its duration, given the social benefit that arises from invalidating unwarranted patents.⁷¹ Patent law thus cannot be construed as expressly or implicitly granting a patent holder the right to protect his patent by preventing challenges to its validity.

The second consideration that we will take off the table is that of good faith in contractual relationships, to which many courts have given much weight.⁷² The theory on which the principle of good faith is invoked in this context is simple: by committing to a no-contest or a challenge-penalty clause, the licensee specifically agreed to erect obstacles to a future validity challenge. As this promise is not without value, the licensee most likely received a reciprocal benefit, such as lower up-front payments.

The theory of good faith in contractual relationships is simple, but incomplete. It is relevant with regard to the enforcement of any contractual commitment that was freely bargained between two parties with comparable bargaining strength and skill, even when such agreements impose negative externalities on third parties. But the policy of honoring contractual obligations

69. See, e.g., *FTC v. Actavis, Inc.*, 133 S. Ct. 2233 (2013).

70. Carl Shapiro, *Antitrust Limits to Patent Settlements*, 34 RAND J. ECON. 391, 395 (2003) (asserting that patents do not confer an absolute right to exclude).

71. This fact is echoed in the Supreme Court's *Actavis* decision, in which the Court stated that an important patent-related policy is to "eliminat[e] unwarranted patent grants so the public will not 'continually be required to pay tribute to would-be monopolists without need or justification.'" *Actavis*, 133 S. Ct. at 2233 (quoting *Lear, Inc. v. Adkins*, 395 U.S. 653, 670 (1969)).

72. We note that the doctrine of licensee estoppel essentially predates that of good faith in American law. For more on the good faith doctrine, see Alan D. Miller & Ronen Perry, *Good Faith Performance*, 98 IOWA L. REV. 689 (2013).

is relevant only when parties assume that no-contest and challenge-penalty clauses will be enforced by the court. Thus, the broader question is whether public policy concerns call for validating, or invalidating, such contractual terms. If public policy demands that these clauses not be honored, or at least indicates the circumstances under which they will not be honored, then the policy of honoring contractual obligations becomes less compelling. Accordingly, we ignore this policy for the purposes of determining the broader effects that no-contest and challenge-penalty clauses have on social welfare.

A third consideration, contractual stability and certainty, is more important. To determine how much weight the concern for contractual stability should receive, we must ask what this policy seeks to protect. One possible answer relates to long-term investments, especially sunk costs. This consideration is mostly relevant to the licensee, who is usually the party that invests in the production and marketing of patent-based products. Yet since the licensee is the one who chooses whether or not to disrupt the status quo by bringing a challenge, the fact that a licensee chooses to challenge indicates that the licensee expects to recover these investments without the contract, if the challenge succeeds.

What about the long-term considerations of the patent holder? For one thing, he does not have any legal guarantees that the patent will not be challenged and invalidated by third parties. Furthermore, as we show below, social welfare is generally increased when unwarranted patents are invalidated. The most challenging aspect of this issue is the contractual stability of other licensees whose investments would also be affected in the event of a challenge. But once again, this consideration does not bear decisive weight, as the contract includes an inherent risk that the patent will be invalidated by third party challenges. Also, prohibiting challenges because they disrupt the contractual status quo would allow market players to artificially keep prices above competitive levels, thereby harming buyers, as elaborated below. Thus while contractual stability is an important consideration, it need not play a major role in our analysis.

A fourth consideration, freedom of contract, is also relevant to our analysis. Yet it is undisputed that freedom of contract is not absolute, and only applies if it serves to further social welfare. Moreover, this consideration is logistically difficult to apply in the case at hand. For example, were it possible to determine, at the time the contract is signed or the patent is challenged, which patents are unimportant to society, then it might make sense not to prohibit any contractual limitations to their validity (such as a *de minimis* rule). We are doubtful whether such a determination can be efficiently and effectively made by the parties or by the courts. So, this consideration can also be put aside. In all other cases, however, freedom of contract must be weighed against competing considerations.

A fifth—and, we conclude, overriding—consideration focuses on ridding the economy of unwarranted patents. How important is it to invalidate

unwarranted patents? Empirical studies of the patent system reveal that mistakes by the PTO have imposed significant costs on society, both in terms of monetary costs and further innovation.⁷³ One well-known example involves the wide patent granted to George Selden, which was alleged “to cover every modern car driven by any form of petroleum vapor.”⁷⁴ The patent led to a significant slowdown in the development of the U.S. automobile industry until it was eventually invalidated one year before its expiration date. Other examples abound.

The probability of these mistakes is not negligible.⁷⁵ The recent Supreme Court decision in *Actavis* also signified the importance of challenging unwarranted patents. The Court states that pay-for-delay agreements—which, like no-contest and challenge-penalty clauses, disincentivize patent challenges—harm social welfare because they potentially delay competition.⁷⁶ The Court emphasized that an anticompetitive harm is created even when limiting a patent challenge prevents a small amount of competition.⁷⁷

73. Excessive patent protection can reduce innovation by precluding subsequent innovations by others. See, e.g., Michele Boldrin & David K. Levine, *A Model of Discovery*, 99 AM. ECON. REV. PAPERS & PROCEEDINGS 337 (2009); Josh Lerner, *The Empirical Impact of Intellectual Property Rights on Innovation: Puzzles and Clues*, 99 AM. ECON. REV. PAPERS & PROCEEDINGS 343 (2009).

74. U.S. Patent No. 549,160 (filed Nov. 5, 1895); see *Electric Vehicle Co. v. C. A. Duerr & Co.*, 172 F. 923, 924 (S.D.N.Y. 1909).

75. See JAFFE & LERNER, *supra* note 6.

76. In pay-for-delay agreements (otherwise known as reverse payment agreements), the patent holder pays a potential patent-challenger of his patent for not challenging the patent, thereby delaying this third party's entry into the market. In *Actavis*, the Supreme Court stated that pay-for-delay agreements can harm social welfare when they delay competition or otherwise limit the risk of competition. Furthermore, the Court emphasized that, by preventing even a small risk of competition, limitations on patent challenges create anticompetitive harm. While recognizing the public value of settling disputes, the Court applied a relatively narrow rule of reason under which a settlement will be found anticompetitive unless justified on grounds other than harming competition, such as payment for services or the avoidance of litigation costs if the patent is challenged. *FTC v. Actavis, Inc.*, 133 S. Ct. 2233 (2013).

Some important differences exist between pay-for-delay agreements and licensing agreements. The latter are ongoing, they may further social welfare (through the efficient diffusion of new products or processes in the market), and they are generally based on the assumption that the patent is valid, at least when the contract is signed. Furthermore, the delay in competition that they cause is somewhat different. Licensees already operate in the market, albeit with restrictions contained in their licenses, so the anticompetitive harm stems from restricting the entry of third parties into the market. By contrast, in pay-for-delay agreements the harm includes the prevention of the entry of the potential patent challenger. These differences manifest themselves in the legal rules that are applied. While pay-for-delay agreements are challenged under antitrust laws, courts have generally rejected the application of antitrust doctrines, as well as patent misuse claims, to no-contest and challenge-penalty clauses. Courts have instead analyzed them under contract law and general doctrines of public policy. See *generally* *Panther Pumps & Equip. Co. v. Hydrocraft, Inc.*, 468 F.2d 225 (7th Cir. 1972). In some circumstances, however, licensing restrictions may restrict competition even more than pay-for-delay agreements. Furthermore, parties can take advantage of these restrictions later in the contract term to limit patent challenges and ensure that they both gain while the public loses. Whether the differences between restrictive licensing agreements and pay-for-delay agreements justify the difference in legal regimes that currently apply to them is beyond the scope of this Article.

77. *Actavis*, 133 S. Ct. at 2236.

B. Best Challengers of Invalid Patents

We therefore must consider who is in the best position to identify and challenge invalid patents. For the reasons described in Part I, the PTO cannot be relied upon to rigorously distinguish between valid and invalid patent applications.⁷⁸ The patent system includes a place for private parties to identify and challenge invalid patents. But who is in the best position to perform this role? If third parties can be relied upon to invalidate unwarranted patents then there may be no need to restrict no-contest or challenge-penalty clauses. However, we suspect that in many contexts, this is unlikely to be the case. Even though some third parties may be in a good position to identify invalid patents, they often lack the incentive to bring challenges. Without a significant comparative advantage over potential competitors, the profit that the third party would make in the competitive marketplace that could result from invalidating the patent might not be enough to compensate for the cost of the suit. This problem can be remedied by giving a prize to parties that successfully challenge invalid patents. The Hatch Waxman Act, for example, gives third parties a prize—a short but lucrative period of exclusivity—when they are the first to successfully challenge an invalid drug patent.⁷⁹ This unique arrangement, however, does not apply to patents in other fields.⁸⁰ In the absence of such an arrangement, the incentives of third parties to challenge patents—either directly, by bringing declaratory judgment actions, or indirectly, by infringing and risking a suit by the patent holder—may be weakened due to the hold-up problem: each would wait for the other to invest in the challenge and then free-ride on the results.

In *Lear*, the Supreme Court assumed that “[l]icensees may often be the only individuals with enough economic incentive to challenge the patentability of an inventor’s discovery.”⁸¹ Indeed, there are several reasons why the licensee’s ability and incentive to challenge the patent may be substantially stronger than a third party’s.

First and foremost, the licensee, unlike third parties, actually produces based on the patent. Furthermore, the licensee may possess prior expertise in dealing with similar technologies or products. This expertise may be the reason that the patent holder chose to grant the license to that particular licensee rather than one of the other potential contenders. For these reasons, the licensee is in a strong position to determine whether the patent is invalid.

78. Should the assumption regarding the PTO’s efficiency change, the rules governing licensing agreements might also need to change accordingly.

79. Drug Price Competition and Patent Term Restoration Act of 1984, 21 U.S.C. § 355 (2012).

80. The Hatch-Waxman Act only applies to the pharmaceutical industry, which is also subject to regulation by the Food and Drug Administration (FDA).

81. *Lear, Inc. v. Adkins*, 395 U.S. 653, 670 (1969).

The licensee's financial incentives to challenge the patent may also be stronger than those of third parties. This will be the case when either of two conditions is met: (1) the royalties paid to the patent holder are so high that the licensee's profits will increase even if the patent is invalidated and the market becomes more competitive,⁸² or (2) the licensee enjoys a significant comparative advantage over his potential competitors (for example, first-mover advantage, lower production costs, or reputation) that would enable him to reap supra-competitive profits even after the invalidation of the patent.

A licensee faces some inherent barriers to bringing a challenge, however. For the challenge to be profitable, the expected benefits of bringing the challenge must exceed expected costs. "Challenge costs" include the direct costs of litigating the patent's validity and the indirect costs resulting from the effect of the challenge on the parties' business relationship. High challenge penalties may add to these costs, thus reducing the licensee's incentive to challenge the validity of the patent. That said, the patent holder may not always wish to impose these costs. For example, a patent holder's motivation to activate a termination clause would be significantly reduced if it would be difficult and costly to locate an equally efficient licensee or if it would take a new licensee a long time to enter the market and generate revenues.

Automatic termination of the license upon challenge presents an additional risk for the licensee. Should the challenge fail, the licensee may be liable for infringement if he continues to use the patent during the litigation period. The licensee might also be prevented from using other types of information, including know-how, that formed part of the licensing contract.

Furthermore, if the parties are repeat players, the challenge may reduce the patent holder's incentives to contract with the licensee in the future. This may be likely if the patent holder continues to invent in the area or holds important knowledge.

The costs of the challenge may also extend beyond the relationship between the patent holder and the licensee. A challenge can affect the general reputation of the licensee and, consequently, the willingness of other patent holders to license their patents to him. The licensee might also be hurt by the market response to the challenge. For example, uncertainty about the patent validity may lead to a decrease in demand for his products during the period of the challenge.⁸³ Third parties may also be able to terminate or revise their

82. For example, suppose that the product can be produced at a cost of \$1 per unit, that the license fee is \$8 per unit, and that when there is a single producer, that producer will maximize his profits by selling one hundred units for \$10 per unit. Further, suppose that if the patent is invalidated, two more firms will enter the market, and that three hundred units will be sold at \$3 per unit. If the license is valid, the single producer makes a profit of \$100. If the license is invalidated, the producer makes \$200.

83. Importantly, a court declaration of invalidity is good not only against the parties to the case but against the whole world. *Blonder-Tongue Labs, Inc. v. Univ. of Ill. Found.*, 402 U.S. 313 (1971).

contracts with the licensee because of their mutual mistake with regard to the validity of the patent. Many of these challenge costs would be incurred regardless of whether the patent is invalidated.

This analysis leads to an important conclusion. A challenge often imposes significant costs on the licensee. Accordingly, it might be preferable for him not to rock the boat. Any no-contest or challenge-penalty terms in the contract, and the extent to which those clauses are enforced by courts, will deter the licensee from challenging the patent. By piling onto licensees' natural disincentives, these clauses can create insurmountable legal and economic barriers for the parties that would otherwise be the most willing and able to challenge invalid patents.

To conclude this analysis, we compare the incentives of the licensees to challenge the patent to those of third parties.⁸⁴ We find that the balance of the costs and benefits makes licensees the most appropriate and likely challengers. As we have noted, the benefits that accrue to third parties from successful patent challenges might not be as high as those that accrue to the licensee, who pays royalties. Without a significant comparative advantage, third parties may not be able to make sufficient profit in a competitive marketplace to justify the expenditure on litigation.

On the other hand, however, it is less costly for third parties to challenge the patent. Of course, they must pay the direct cost of litigating the patent, whether they choose to bring a declaratory judgment action or to infringe and defend themselves in court by challenging the validity of the patent. But the other challenge costs would be lower for third parties. Third party challengers would not be subject to challenge penalties, regardless of whether courts would choose to enforce these contractual clauses. Furthermore, while both third party and licensee challengers can expect to suffer costs from the probable response of the market to the challenge, the licensees face higher costs because they already operate in the market.

Thus, third parties face both lower benefits and lower costs in challenging a patent than do licensees. However, in many cases, it is plausible that the benefits from a successful challenge would remain low (because of the difficulty in profiting in a competitive marketplace) while the costs would actually be substantial. Furthermore, as noted above, each third party might wait for another to challenge the patent in order to free-ride on the outcome of the litigation without bearing its costs. Accordingly, the incentives of licensees

84. The analysis assumes that the third party consciously challenges the patent, either by bringing a challenge or by consciously infringing and risking a suit by the patent holder. Indeed, many patents are challenged as part of infringement suits. We do not analyze the remedies courts grant for infringement or the burden of proof necessary to show infringement. Should such remedies be low, or the burden of proof high, third parties' incentives to infringe would of course increase. But even if many patents are challenged through infringement suits, licensees still play an important role in challenging patents. The current law limits potential challenges by allowing no-contest and challenge-penalty clauses. Thus, enabling licensees to challenge is imperative for increasing challenges overall.

to challenge, as well as their ability to obtain the relevant information, might well be stronger. This analysis therefore supports the Supreme Court's conclusion that licensees are often in the best place to challenge patents.

We have now established that the policy of honoring contractual obligations can be taken off the table for the purposes of this analysis, and that considerations of contractual stability and freedom of contract should be balanced against the goal of invalidating unwarranted patents. The next step is to determine which rules governing the legality and scope of no-contest and challenge penalty clauses best serve social welfare. We will analyze the effects of potential rules on the relevant market players to ensure that the chosen rule indeed harnesses the parties' private incentives to the goal of furthering social welfare. We do so by modeling the decision tree of the patentee and the licensee. The practical difficulty of measuring or approximating all relevant variables requires us to base our analysis on estimates.

III. Formal Analysis

A. The Economic Model

We assume that the patent creates a monopoly in the market. The model contains two time periods. The parties make a series of decisions before the start of the first period and in between the first and second periods. The parties then are paid as a consequence of the decisions.

The model starts with the PTO granting a patent to "P," the patent holder. The patent is valid for two periods. The patent protects a product with a strictly decreasing and continuous demand function.⁸⁵ The parties share a common belief as to the likelihood that the patent would be upheld in court if a challenge were brought.

There is a large set of ex ante identical firms that can produce the product by making a one-time fixed investment and then paying a production cost. To simplify the analysis, we make a standard assumption that the total cost function is sub-additive, meaning that one firm will always be able to produce a given quantity at a lower cost than could a combination of two or more firms. We make no other assumptions about the level of the fixed investment or the nature of the production cost.

Next, P chooses one of the firms and enters contractual negotiations licensing the use of the patent by the firm. We will refer to the firm as L (for licensee). For simplicity, we assume that the contract relates exclusively to the use of the patent by L. At this stage, the parties must decide what contractual terms to include in the contract—in particular, they must decide whether to

85. By "strictly decreasing," we mean that an increase in price will cause a decrease in the quantity demanded. By "continuous," we mean, roughly, that a very small change in the price will not have much effect on the quantity demanded. These are standard assumptions in economic models.

include a no-contest clause or a challenge-penalty clause. If the latter is included, they must decide upon the size of the penalty. We assume that the penalty is a sum of money payable by L to P in the event of a challenge. In practice, of course, contracts may also include non-monetary sanctions such as the termination of the contract. The sum of money represents the cost of these sanctions to L. This assumption ignores the possibility that the cost of the sanction may vary depending on L's actions.⁸⁶

P and L must also determine how L will pay for the right to use the patent. We assume that the parties choose a payment scheme in the form of royalties—a fraction of L's profits that must be paid to P.⁸⁷ Royalties based on actual sales enable the parties to base payments on the success of the patent-based product or service, thereby eliminating the need to estimate the commercial value of the patent before production commences.⁸⁸ We also assume, for simplicity's sake, that the parties have full and symmetric information and that there is no uncertainty except with regard to the validity of the patent.⁸⁹

Next, L decides the amount of the good to produce during the first period. The first period occurs and the parties receive their profits.

At the end of the first period, P and L receive new information in the form of a common signal about the likelihood that the patent would be upheld if challenged.⁹⁰ After receiving this new information, L chooses whether to challenge the patent. L may only challenge the patent if allowed to do so by the contract. If L chooses to challenge and is permitted to challenge, he must pay both a litigation cost (which cannot be recovered)⁹¹ in addition to the challenge penalty (if the contract contains an enforceable challenge-penalty clause). P

86. We assume that general equitable or contractual considerations do not form a legal barrier to bringing a challenge.

87. Payments from L to P take the form of royalties, as is common in licensing contracts. In practice, royalties are based on the level of production, which is easier to verify than the level of profits. However, such royalty schemes are distortionary and would unnecessarily complicate the present model, in which the level of profits is commonly known.

88. In practice, royalties also serve to divide the risk between the parties; however, risk about future revenues is irrelevant in this model, as the demand is known and the parties are risk-neutral. An alternative to royalties might be the outright sale of the patent for an upfront fee (or some combination of an upfront payment and royalties). However, the licensee would have no incentive to challenge a patent after sale, making this analysis uninteresting for our current purposes. We do predict, however, that the prohibition of no-contest clauses should lead to an increase in sales of patents through upfront cash payments rather than to licensing agreements with royalty payments. We shall later relax the assumption that the payment is ongoing.

89. This assumption does not weaken our model. Though it might change the balance between the parties, it will not significantly affect their decision whether or not to include the relevant clauses.

90. To eliminate the possibility of strategic manipulation of the new information, we assume a common signal reaches both parties concurrently. It would not be enough to simply assume that each side receives independent, identical signals because it is possible that one side would hide the new information to affect the behavior of the other side.

91. The model assumes that litigation costs are incurred when L decides to challenge the patent. In a setting where L first infringes and then waits for a reaction, the costs are incurred if and only if P decides to bring an infringement suit.

must then decide whether to defend the patent, and if he does so he must pay an identical litigation cost.⁹² The model disregards non-contractual challenge costs.

If the patent is both challenged by L and defended by P, the decision-maker⁹³ then decides whether the patent is valid.⁹⁴ We will assume that the decision is correct. If the patent is deemed invalid, the patented subject matter returns to the public domain. We also assume that the contract is invalidated, so that no future royalties are owed.⁹⁵ If the patent is found valid, the original contract remains in force.⁹⁶

At this point, L chooses a quantity to produce during the second period. If the patent has been invalidated, other firms in the market may also produce and choose their production levels at this time. The parties then receive their profits for the second period.

Before we analyze the different legal regimes, we wish to highlight two features of the model. First, and again for simplicity, the model assumes that only L may challenge the patent, and that this challenge may come only at the end of the first period. However, our results would not be substantially different if other firms in the market were given the ability to challenge the patent, or if the patent challenge took place at the time that the patent was granted. This conclusion follows from the fact that there are a large number of *ex ante* identical firms. If the patent were invalidated at the beginning, firms would enter the market until none made profits, assuming a perfectly competitive market.⁹⁷ As a consequence, no third party firm would have an incentive to invest in litigation to challenge the patent.

In contrast, suppose that the patent were invalidated at the end of the first period. L would enjoy a comparative advantage from being the first mover and would make a profit. (The comparative advantage comes from the fact that L would have already spent the fixed cost.) Since all the other firms would have free entry to the market, for the reasons stated above none of them would profit. As a result, no firm other than L has an incentive to challenge the patent. The lesson here is that only L would have a sufficient incentive to challenge the patent, as it has a comparative advantage over other firms in the market.⁹⁸

92. L might also incur additional challenge costs, though this model disregards them.

93. The decision-maker may be a court or the PTO depending on the circumstances.

94. We assume the decision-maker chooses to uphold the patent with a probability consistent with the parties' information.

95. Eliminating future royalties may require an additional legal step.

96. Of course, the contract would not be in force if it had been terminated, as might be allowed under certain challenge-penalty clauses. In our model, termination costs are included in the penalty.

97. There may be a negligible profit due to the fact that only an integer number of firms may enter the market.

98. L would also have an incentive to challenge when royalties are so high that his profits are negative. Our model does not allow for such a possibility, however, since it relies on profits and not revenues.

The second feature of the model we will highlight is that the expected strength of the patent does not affect L's willingness to contract with P. Because the patent will not be challenged by anyone other than L, nor at any time other than at the end of the first period, the patent creates a monopoly that is good for at least one period.

B. Comparing the Legal Options

We consider three possible legal regimes. In the first ("Total Restriction"), neither no-contest clauses nor challenge-penalty clauses are allowed. In other words, P is totally restricted from erecting any contractual barriers against challenges to the validity of the patent. In the second regime ("Partial Restriction"), some challenge-penalty clauses are permitted but no-contest clauses are prohibited.⁹⁹ Put differently, P is restricted from erecting legal barriers to patent challenges, but may erect economic barriers. In the third regime ("No Restriction"), both no-contest clauses and challenge-penalty clauses are permitted. P is not restricted from creating legal or economic barriers to challenges. The first and third rules may be thought of as the extreme points on the spectrum of possible rules, with the second rule lying in the middle. Although these are the three main options, intermediate options also exist; we address these intermediate options later in this Article.

1. Does Increasing Patent Challenges Increase Social Welfare?

Before analyzing the possible rules, we address an important question that affects our choice of rule: Does challenging patents necessarily increase social welfare? As a preliminary matter, a challenge will reduce the *joint* profits of P and L for two reasons: (1) the wasteful expenditure on litigation, and (2) if the patent is invalidated, the parties may see a decrease in second-period profits. While L expects to benefit from invalidating the patent, L's gain will usually be less (and will never be greater) than P's loss. After invalidation, other firms may enter the market and take up market share, or L may increase production to make entry unattractive for competitors. Either way, the total amount produced is higher than the monopoly quantity, and L's second-period profits will increase more than his revenues.

While the litigation cost is a clear social loss, the second factor—decrease in P and L's joint second-period profits if the patent is invalidated—may entail a social benefit, since an increase from the monopoly quantity will decrease the deadweight loss. This saving will often be orders of magnitude higher than the litigation costs. Invalidating an unwarranted patent has other positive social

99. We chose not to analyze a rule that allows no-contest clauses and prohibits challenge-penalty clauses because its effects are similar to the third option, given that a no-contest clause is a stricter restriction than a challenge-penalty clause.

benefits, namely in that it limits a firm's incentives to file for a weak or invalid patent.¹⁰⁰

Although a successful challenge will reduce the joint profits of P and L, it will nevertheless increase L's individual profits because L will no longer have to pay royalties.¹⁰¹ The effects of this situation on social welfare are generally positive. In the period following litigation, market-wide production will increase, which will in turn cut deadweight loss. Social welfare will increase, assuming that the decrease in the deadweight loss is higher than the litigation costs.

It is possible, however, that a successful patent challenge will have a negative effect on social welfare. This will happen in one of two situations. First, if L uses his first-mover position to entrench himself and erect insurmountable barriers to entry, there may be no increase in the market-wide level of production. Consequently, there would be no reduction in deadweight loss, and no increase in social welfare. In such a case, the challenge would lower social welfare by the amount of the litigation costs. Admittedly, this case is probably rare: in most industries with which we are familiar, the end of a patent tends to spur more competition, though maybe not at the fully competitive level. Second, even if there is a reduction in the deadweight loss, it may still be outweighed by the parties' litigation costs. In such a case, L would still choose to challenge, because he only internalizes his own litigation costs.

Yet even in this case, invalidating an unwarranted patent will have some benefits, which are not accounted for in our model. First, *ex ante* incentives to file for an invalid patent are reduced because P (and other potential patent holders) will profit less from an invalid patent. Second, the market situation may be more dynamic than our model assumes. If an unanticipated change occurs in the market, other firms will be able to enter and compete. Third, there are some limitations to the barriers that L can erect against other firms entering the market post-invalidation. For example, assume L's advantages are founded on exclusivity contracts with third parties. After L brings a challenge, those third parties could challenge these contracts based on a claim of mutual mistake about the validity of the patent or on other grounds. This challenge, in turn, might introduce more competition into the market. Fourth, suppose that royalties are based on the licensee's revenues or on the level of production. Even if barriers to entry are high enough to allow L to retain a monopoly, invalidating the patent—and thus eliminating the royalty—may lead L to pursue a higher level of production. For these reasons, we generally view challenges positively and look for rules that increase the probability of

100. Assuming symmetric information, an invalid patent can be thought of as a very weak patent.

101. A challenge will lead to an increase in L's profits in those cases when L chooses to challenge and the savings in royalties would be greater than litigation costs.

challenges, thereby increasing social welfare while limiting harms to other important interests.

2. What Is the Best Legal Rule to Achieve this Result?

With the understanding that patent challenges tend to increase social welfare, we now evaluate the three legal rules under the economic model. The results below follow from the calculations included in the Appendix. Our first finding is that if the licensee chooses to bring a challenge, the Total Restriction and the Partial Restriction rules are equivalent in terms of their effects on social welfare. Second, we show that, in practice, there will be no challenges under the No Restriction rule. Third, if the licensee does not challenge, all three rules have equivalent effects on social welfare. These results make intuitive sense. In the event of a challenge, the challenge penalty is simply a transfer payment between the parties, which does not impact social welfare. And if L does not bring a challenge, L will produce the monopoly quantity in both periods of the model.

The difference between the rules, in terms of welfare analysis, thus boils down to the probability of a challenge. The results of the model in this regard are as one might expect: L is most likely to challenge under a Total Restriction rule, less likely under a Partial Restriction rule, and will not challenge under a No Restriction rule. How much less likely is L to challenge under a Partial Restriction rule than under a Total Restriction rule? It depends on the character of challenge penalty. If the penalty is small enough, Partial Restriction becomes very similar to Total Restriction. The two are identical when the challenge penalty is zero. But if the penalty is sufficiently high, Partial Restriction can become identical to No Restriction. Indeed, even under a Total Restriction rule, L does not challenge all patents. The cost of challenging an extremely strong patent is simply too high, given the low probability of success.

Another important consideration involves P's incentives to defend the patent. A social loss occurs not only when an invalid patent goes unchallenged, but also when a valid patent is challenged but not defended. (We assume that the decision-maker does not err, but that an undefended patent is automatically invalidated.) Not surprisingly, the model shows that P's behavior is the same under both the Total Restriction and Partial Restriction rules. P will defend all but the weakest patents: specifically those whose probability-adjusted expected royalties in the second period are less than the cost of defending the patent. Because the social gain from the patent is entirely captured by P, it seems plausible that P's behavior is efficient under both of these rules. P's incentives under a No Restriction regime are irrelevant because L will not bring a challenge under this rule.

In the end, the best rule will be the one that aligns L's incentives to challenge as closely as possible with the socially optimal level. To determine which rule fulfills this goal, we need to compare: (a) the benefit that accrues to

L when the patent is invalidated; with (b) the benefit that accrues to society when the patent is invalidated. The calculations show that L's incentives to challenge are at the socially optimal level when the benefit to L is twice the size of the benefit to society. L will challenge *more* than is socially optimal if L's benefit from the invalidation is more than twice the social benefit, and less than is socially optimal if the social benefit is larger than twice L's benefit. This calculation holds under all three rules.¹⁰²

Because L is most likely to challenge under Total Restriction, this rule is the best of the three when the social benefit is larger than twice L's benefit.¹⁰³ But a Partial Restriction may be optimal. If society's benefit is less than twice L's benefit, Total Restriction will lead L to challenge more than is socially optimal. In this case, welfare can be improved through a penalty, if that penalty is not too large.¹⁰⁴ The Partial Restriction rule will be optimal, if the penalty can be constrained sufficiently.¹⁰⁵ The No Restriction rule will only be optimal if social gains from a patent challenge are so small as to be outweighed by the litigation cost, a condition that seems unlikely to hold in important cases. In short, the No Restriction rule is probably never a good policy, while the Total Restriction and the Partial Restriction rules can make sense in different situations.

In order to sufficiently constrain challenge penalties in the Partial Restriction scenario, a bright-line rule may make sense. In practice, it may be difficult to establish the amount of economic harm that L incurs when the challenge penalties are imposed. A bright-line rule would allow certain types of challenge penalties and not others. While such a solution would not yield the optimum in every situation, it might nonetheless prove better and more consistent than other feasible solutions.

The model also shows that the goal of avoiding costly patent litigation should not be given independent weight, like some courts have suggested.¹⁰⁶ The private expense of such litigation is often outweighed by social benefits.¹⁰⁷

A final conclusion arises from the model: two parties who think the patent is weak may still want to contract with one another in order to use the patent's

102. Calculations can be found in the Appendix.

103. Even under Total Restriction the licensee may challenge too little; it may be optimal to strengthen the licensee's incentives to challenge the patent in this case.

104. Alternatively, the situation can be improved by placing some limitations on the applicability of the Total Restriction rule to ensure that it is not used unless social welfare will increase.

105. One potential way to craft the Partial Restriction rule would be to allow penalties up to a limit, such as the patent holders' litigation costs. Such a limit would only serve as a rough constraint, and courts would still need to determine whether the Partial Restriction rule is superior to the Total Restriction rule.

106. See *FTC v. Actavis, Inc.*, 133 S. Ct. 2223, 2236-37 (2013).

107. The Supreme Court has recognized that litigation costs pose a cost to society regardless of the outcome of the litigation, *e.g.*, *Actavis*, 133 S. Ct. at 2236-37, and has therefore allowed agreements that cover litigation costs. In our model we reach a somewhat different result: while we also assume that litigation costs are a social cost, we conclude that these costs are not directly related to the level of the optimal challenge penalty.

exclusivity for their joint benefit. P will receive royalties on a non-right and L will control the market because of the exclusivity awarded by the license for an unwarranted patent. This situation will most likely arise when third parties do not share the information that the patent is weak or do not have sufficient incentives to sue or to infringe the patent. Such an agreement is anticompetitive. The value of such an agreement is maximized if L assures P that he will not challenge the patent. A Total Restriction rule, and to a lesser extent a Partial Restriction rule, will therefore partly reduce the occurrence of such an agreement. A No Restriction rule would enable them.

C. Discussion: Additional Potential Effects

The model is necessarily a simplified understanding of reality and cannot cover all potential effects of each rule. In this Section, we relax some of the assumptions and discuss additional effects of the different rules that are not captured by the model. Our approach ensures that all parameters are taken into account and that the basic goal of licensing agreements—effective dissemination of new patentable inventions through technology transfer—is not harmed.

We address additional considerations that have been raised by courts and scholars, including maintaining contract stability, promoting innovation, encouraging private parties to efficiently allocate risk, and limiting costly litigation. Such considerations are given primacy by the Federal Circuit, unless they clash with the court's narrow interpretations of *Lear* and *MedImmune*. They are also encouraged by patent law practitioners who argue that *MedImmune* went too far.¹⁰⁸ We show, however, that granting decisive weight to such considerations does not serve social welfare. When analyzing the effects of the different rules on social welfare, most of the literature to date has focused on factors that weaken P's incentives to enter into an otherwise efficient licensing agreement. Courts should also take into account countervailing factors that strengthen P's incentives to enter into such licensing agreements.

1. Effects on Patenting and Choice of Licensee

The model assumes that P will always contract with a licensee. Suppose, instead, that P can produce the product on his own. Why, then, would P want to license the patent at all? P's primary motivation is that L might produce at lower cost than P can, incorporate the patent-based product with other products, or reach the market more quickly or efficiently, leading to a surplus in which P can share. This increase in allocative and productive efficiency creates a social

108. See, e.g., Chu, *supra* note 52.

benefit. Consumers may enjoy the patent-based product more quickly and potentially more cheaply, reducing the deadweight loss to society.

We thus must examine how the different legal rules might affect P's decision to license his patent to an efficient L.¹⁰⁹ Under the Total Restriction rule and, to a lesser extent, under the Partial Restriction rule, P is legally prevented from limiting the risk of L's challenge. In that case, P might decide to produce and distribute the product internally, even at higher cost. This scenario is especially likely to occur if P's potential losses from a challenge are high, relative to the cost differences between the parties. Alternatively, P might decide to license the patent to a less efficient firm that does not have the resources, stamina, or knowledge to challenge the patent.¹¹⁰ In particular, P may choose a firm that lacks a significant comparative advantage over other potential producers, since it is often the comparative advantage that propels a licensee to challenge the patent and capitalize on first-mover status. A third possibility arises if the risk of challenges is high and the product cannot easily be reverse-engineered. In this case, P might decide not to obtain the patent and instead rely on trade secret protection. The patentable innovation thus might never become part of the public domain. All three decisions would negatively impact social welfare, creating an inefficient division of labor that would lead to slower and less cost-efficient diffusion of innovation in the market.

These concerns have been raised in prior commentary.¹¹¹ But to make the analysis complete, we must also consider forces pulling in the other direction. In all three scenarios, the stronger the patent and the larger L's comparative advantage in production, the more likely P will be to license to the most efficient L. L's incentives to enter the contract increase, as does his willingness to pay higher royalties that incorporate his ability to bring a challenge, thereby countering at least part of P's reduced incentives to license. These effects limit the probability that P will forego an otherwise efficient contract, especially if he believes that his patent is strong and L is a more efficient producer than he is.

109. We make several simplifying assumptions. First, we ignore the parties' costs of locating each other and assume that P has perfect information with regard to the existence of potential Ls and their respective comparative advantages. Second, we assume that neither party is obligated to enter into contractual negotiations, such as a compulsory license. Rather, both will enter negotiations only if their expected gain is positive. For similar assumptions, see Lucian Bebchuk & Omri Ben Shahr, *Precontractual Reliance*, 30 J. LEGAL STUD. 423 (2001). That paper also provides a useful framework for the analysis, which we have followed in some parts.

110. Two types of efficiencies are relevant here. One relates to productive or marketing efficiency and the other to the ability to successfully challenge a patent. Firms may differ with regard to both types.

111. Taylor, *supra* note 54, at 233.

2. Multiple Licensees

The Total Restriction rule and, to a lesser extent, the Partial Restriction rule, would also affect P's incentives to license to multiple firms. By granting multiple licenses, P would reduce the comparative advantage that any one firm would enjoy in the event of patent invalidation. The existence of more potential competitors in the post-patent period would reduce the ability of any specific L to enjoy first-mover advantages—and thus the incentive of any L to challenge the patent in the first place. This results from the fact that patent invalidation applies in general and not only with respect to the specific litigants and thus is a public good that all can enjoy.

But P might suffer some losses from such an arrangement. If competition ensues between the multiple Ls, P will receive lower royalties. This possibility will limit P's incentives to grant multiple licenses. However, P's overall profits will not necessarily be reduced, especially if he limits competition among Ls. P can achieve this goal by designating a specific territory to each L.¹¹² In deciding whether to grant multiple licenses, P will balance the lower risk of challenge against any loss of profits from this arrangement, which might result if the Ls' productive efficiency is lower due to inefficient scales of production or reduced incentives to enter into the contract.

In terms of social welfare, P's decision to license the patent to multiple Ls creates mixed effects. On the one hand, it reduces the incentives of each L to challenge the patent, and thus may let invalid patents survive. On the other hand, the fact that there are more Ls implies that there will be more competition once the patent is invalidated or expires.

3. Effect on Contractual Terms

Rules that prevent P from tying L's hands, such as Total Restriction and Partial Restriction, would also affect other contractual terms. For example, the model assumes that L will pay for the right to use the patent with ongoing royalties based on profits. But once P is prevented from including no-contest and challenge-penalty clauses, he might use other contractual solutions, such as different forms of payment, to limit his risk of facing a challenge.

In some instances, P might demand higher upfront payment. This sunk cost reduces the overall benefit L would receive from later invalidating the patent, and consequently reduce the risk of L bringing a challenge.¹¹³ (In the

112. Of course, if the patent is declared invalid, each L would immediately become a potential competitor in all territories.

113. See Dreyfuss & Pope, *supra* note 47, at 974; Sean M. O'Connor, *Using Stock and Stock Options to Minimize Patent Royalty Payment Risks After MedImmune v. Genentech*, 3 N.Y.U. J.L. & BUS. 381, 452-54 (2007). Such payments might include not only the payment for the right to use the patent, but also for the transfer of know-how that is necessary in order to efficiently produce based on the patent.

extreme case, P would sell the patent to L.) This solution would limit the pool of Ls from which P could choose, for two reasons. First, it requires high upfront payments, which may be infeasible for some Ls due to capital constraints.¹¹⁴ Second, it may transfer more risk to L than L will be prepared to take. Three types of risk are particularly important: the patent might not be a commercial success; it might be invalidated by another party; and new information might reveal that the patent is unwarranted, reducing its value or leading to its invalidation. The L who is best able to raise capital and bear the risk may not be the one best positioned to produce and distribute the product.¹¹⁵

Yet, once again, P's incentives to demand upfront payment are reduced by the counter-effects he may suffer from limiting the pool of potential Ls. The stronger his patent and the stronger L's comparative advantage in production, the weaker P's incentives to give up an otherwise efficient licensing agreement.

The literature also raises the possibility that a higher risk of challenge, which would exist under Total Restriction and Partial Restriction rules, might increase royalties. Put differently, L's agreement to contract for a lower risk of challenge, through either a no-contest or challenge-penalty clause, is rewarded with lower royalties.¹¹⁶ Where such clauses cannot be included in the contract, P might compensate for the increased risk by charging higher royalties. Such royalties might, in turn, increase the price to the final consumer, depending on market structure, and also limit the number of potential Ls.¹¹⁷

Yet the real effect of these higher royalties on the parties' conduct might be minimal. L will be compensated for the higher royalties by the freedom to challenge the patent and the reduced risk that he would be contractually bound to an invalid patent. Furthermore, P may even demand lower royalties under a Total Prohibition or Partial Prohibition rule than he would if he were allowed to include no-contest and challenge-penalty clauses in the contract.¹¹⁸ When royalties are low, L has less to gain from moving to a competitive regime by challenging the patent. P might therefore engage in strategic contracting with Ls that would otherwise have strong incentives to challenge the patent.

But while reduced royalties are beneficial for L, it is less clear how they affect social welfare. Reduced royalties limit L's incentives to challenge an invalid patent and can result in reduced prices for consumers.

114. It is also difficult to accurately determine the net present value of an expected royalty stream. O'Connor, *supra* note 113.

115. These effects occur only if L cannot recoup the payments he made to P before the patent was found invalid.

116. Cf. Dreyfuss & Pope, *supra* note 47, at 974.

117. John W. Schlicher, *Patent Licensing, What to Do After MedImmune v. Genentech*, 89 J. PAT. & TRADEMARK OFF. SOC'Y 364, 389-93 (2007).

118. A related option involves aligning the incentives of L and P through stock options. For such a suggestion, see O'Connor, *supra* note 113.

4. Effects on Innovation

Prominent scholars have also suggested that no-contest and challenge-penalty clauses increase the rewards to becoming a patentee, which in turn influences market players' incentives to invest in innovation and diffuse novel ideas. If this is true, prohibiting contractual constraints to patent challenges would retard technological progress.¹¹⁹ Since P might lose revenue either if the challenge is successful (litigation costs and lost royalties) or unsuccessful (litigation costs), P has less incentive to invest in the first place.¹²⁰

Prohibiting no-contest and challenge-penalty clauses, however, does not necessarily limit incentives to innovate. Indeed, it might even increase them. It is important first to reject the assumption that all patents are valid. In the real world, a non-trivial number of patents are improperly granted.¹²¹ Thus, any reduction in the value of becoming a patent holder will be roughly inversely proportional to the strength of any given patent.¹²² L would not choose to challenge, and a court would not invalidate, a strong patent. Therefore, Total and Partial Restriction rules would not negatively affect investment in truly novel and non-obvious innovations.¹²³ Plus, the weaker the patent, the lower the social value of the underlying invention, and the smaller the potential social harm from reduced investment in such patents. In fact, the higher incentives that Ls have to challenge weaker patents would provide additional social value, because it would keep weak patents away from the market. So long as we can assume that courts correctly determine the validity of patents, true innovation should not be significantly harmed by such challenges.

Because this conclusion is important in this larger debate, we offer the following analysis to show that Ps are financially no worse off—and thus face no disincentives to innovate—even under legal regimes that allow patent challenges. First assume the PTO always decides correctly when granting patents. Further, a specific innovator guesses there is a twenty-five percent chance the PTO will reject his application as, for example, non-novel. His investment decisions will be based on such a risk.

But now assume the PTO might be wrong, whereas a reviewing court will always be correct. In this case, the PTO wrongly grants a patent, and P enters a licensing contract with L. At some point, L challenges. The court correctly invalidates the patent—which had a twenty-five percent chance of never being granted in the first place, for which a rational P already accounted. Thus, P is

119. For a discussion of this type of risk, see, for example, Chu, *supra* note 52; Dreyfuss & Pope, *supra* note 47, at 974; and Taylor, *supra* note 54, at 253.

120. Dreyfuss & Pope, *supra* note 47, at 974.

121. See JAFFE & LERNER, *supra* note 6.

122. Of course, there may be uncertainty regarding the strength of the patent, especially since patents are, by nature, supposed to be unique.

123. Incentives to challenge are also affected by the size of the potential market. Yet the larger the market, the larger the potential social benefit from the challenge.

no worse off than he was in the scenario where the PTO performs its job correctly. In fact, P is better off. Until the patent was invalidated, P enjoyed royalty payments that he otherwise would not have enjoyed.

P will only ever be worse off if he made investments based on the presumed validity of the patent (such as additional research and development) that exceed his revenues. Yet even then, P might still be better off than in the first scenario. By licensing to produce on the invalid patent, L assumes at least part of the risk of overinvestment in production facilities and marketing strategies. Thus, licensing an invalid patent will not make P financially worse off, relative to the scenario in which the PTO is always correct, even if L later brings a challenge.

Even if, as this analysis implies, Total and Partial Restriction rules do reduce P's incentive to pursue weak patents, they remain preferable to a No Restriction rule, which actively increases incentives to apply for weak or invalid patents. In fact, no-contest and challenge-penalty clauses enable patent holders to profit *more* from weak or invalid patents than from strong ones.¹²⁴ A strong patent needs less contractual protection since the probability that a court will find it invalid is lower. But contractual safeguards like no-contest and challenge-penalty clauses can equalize the threat of challenge to patents weak and strong. As Elhauge and Kreuger argue, this equalization creates stronger incentives to invest in weak, pseudo-innovation-based patents, which are generally less costly to achieve. Yet their protection is more costly to society. Therefore, a legal regime that produces the least incentive to invest in weak or invalid patents—Total Restriction and, to a lesser extent, Partial Restriction—will tend to increase social welfare.¹²⁵ Furthermore, once the law induces potential patentees of weak patents to refrain from filing, the average strength of patents will be higher, which can lead to more contractual stability in the market.

These innovation-related considerations also strengthen the case for legal regimes that allow challenging invalid patents even in cases where invalidating a patent simply entails a transfer from P to L and does not affect market prices to final consumers. Patents often serve as a basis for other inventions or are used together with other patents. Invalidating patents for supposed inventions that rightfully belong in the public domain may increase follow-on innovation or serve to reduce the anticommons problem.¹²⁶

Another concern that patent scholars raise is P's ability to contract out commercial uncertainties, a goal which is especially important in emerging

124. See Einer Elhauge & Alex Kreuger, *Solving the Patent Settlement Puzzle*, 91 TEX. L. REV. 283, 294 (2012); Murat C. Mungan, *Reverse Payments, Perverse Incentives*, 27 HARV. J.L. & TECH. 1, 25 (2013). This consideration is based on the assumption that firms make conscious decisions about the level of their innovation.

125. Mungan, *supra* note 124.

126. See Heller & Eisenberg, *supra* note 3, at 698.

sectors where the value of the invention is not yet known.¹²⁷ Innovation will appear less attractive, the theory goes, if Ps cannot contract around market uncertainty. It is important, however, to unbundle two types of risk. The first is the risk that the market will not create high demand for the product. This risk is shared between P and L through the royalty mechanism, and can be contracted out to L entirely through the sale of the patent. Thus, no-contest and challenge-penalty clauses do not affect this risk. The second is the risk that the patent will be found invalid, and thus that P will no longer benefit from it. It is only to this second type of risk that no-contest and challenge-penalty clauses relate. Yet enabling P to redistribute this risk reduces public welfare through limiting competition—that is, the competition that would result once the unwarranted patent is deemed invalid. Furthermore, the analysis performed above on innovation incentives applies here as well. Limiting this type of risk sharing will not harm incentives for efficient technology transfer, as it does not make P any worse off.

5. Timing of Challenge

The model also does not consider L's incentives to investigate the validity of the patent before signing a licensing agreement; in the model, new information regarding the strength of the patent appears only after the contract is signed. The timing of the challenge is also not an issue, since it only occurs at the end of the first period. However, in practice timing may be an important issue. The earlier the information arrives, the earlier the challenge. Consequently, the resulting gain to social welfare will be larger.

As Dreyfuss and Pope emphasize, a rule that enables L to challenge the patent at a later date reduces L's incentives to invest in checking the validity of the patent before entering into the licensing contract.¹²⁸ This, in turn, lengthens the period that the public must pay supra-competitive prices for invalid patents. Of course, if L could have obtained the relevant information only after signing the contract, the timing of the challenge does not contribute to the social welfare loss caused by the invalid patent.

But timing only arises as a relevant concern if the information could have been obtained in the pre-contract period. And the need to pay royalties already provides a motivation for such a scrutiny, unless the contract is an anticompetitive venture between P and L to split the benefits of a weak patent. Furthermore, because invalidation would precipitate a move to a competitive market, it is possible that no potential L would be motivated to invest in such a challenge at the pre-contractual stage. Rather, it would be in L's interest to challenge the patent once he establishes some degree of first-mover advantage. Though the market might not immediately move to a competitive structure,

127. Dreyfuss & Pope, *supra* note 47, at 988.

128. *Id.* at 988, 990.

costs to the public might nonetheless be reduced if L plans to bring a challenge soon after signing the contract and establishing first-mover advantage.

Finally, courts already strengthen L's incentives to challenge as early as possible by barring recovery for payments that L made for the right to use the patent before bringing a challenge.¹²⁹ If these royalties cannot be recovered,¹³⁰ L would also have a stronger incentive to verify the validity of the patent before entering into the licensing agreement. If L were able to recover all past royalties, he would wait for the end of the patent term to challenge, which would enable him to both enjoy the patent's exclusivity and recover all royalties already paid. The anticompetitive effects of this arrangement would harm social welfare.

6. Differentiating Between Different Types of Clauses

We have grouped termination-upon-challenge and other penalty clauses together in our analysis. There might be reasons, however, to differentiate between them, and in particular to give special scrutiny to termination-upon-challenge clauses. Most courts have enforced these types of challenge-penalty clauses. Since a challenge may negatively affect the ongoing contractual relationship between the parties, it would reduce the private and social benefits that arise from the contract, such as the efficient production of patent-based products. Thus, courts have considered termination to be warranted.

We argue, however, that courts should not automatically allow P to terminate the contract. If termination results in large costs to L—including potential infringement penalties if L continues production—P should need to prove that the harm to the contractual relationship would necessarily translate into a significantly large harm to society. Otherwise, social welfare will decrease because L will have to cease production or risk infringement suits. For example, consider the case of a simple licensing agreement that involves the use of the patent for pre-specified royalties. Here, there is no complex ongoing relationship, and thus no justification for differentiating termination clauses from other contractual challenge penalties.

7. Ensuring that Social Welfare Is Increased

The final question concerns the overall effect of these various considerations on social welfare. Patents do not necessarily create significant market power. Even the small percentage of patents that are licensed does not generally change market conditions significantly. The model cannot clearly differentiate, at the contract negotiation stage, between patents that will create

129. After *MedImmune* there was a debate over royalties paid in the litigation period. E.g., Dreyfuss & Pope, *supra* note 47, at 983.

130. In *Lear* the Court decided that L does not need to pay royalties during the challenge. *Lear, Inc. v. Adkins*, 395 U.S. 653 (1969).

market power and those that will not. If it could, there would be no need to interfere in the parties' private conduct that does not affect the market. However, the value of many patents is not known before they are put to the market test; thus, such differentiation is not feasible.

Nevertheless, it is important to note that the risk of challenge is only high if the patent creates market power. Otherwise, the high costs of patent litigation will generally not be worth L's effort. Therefore, the no-contest and challenge-penalty clauses will in practice affect only the probability of a challenge against a patent that creates market power. And any degree of market power that L can constrain by challenging an invalid patent can increase social welfare.

Thus, having in this Section contended with many considerations raised by courts and the literature, we conclude that restrictions on no-contest and challenge clauses yield important public benefits with limited offsetting effects. Finally, we should note that, to ensure that the public indeed enjoys the patent's invalidity, no-contest and challenge-penalty clauses should only be found unenforceable where the challenge will result in the patent's invalidity as against the world.¹³¹ Otherwise, the parties might prefer to challenge the patent in arbitration proceedings in which the private benefit does not translate into a public one.

Conclusion

This Article has analyzed the social-welfare effects of different legal regimes governing the validity of no-contest and challenge-penalty clauses, contractual limitations that diminish a licensee's incentives and the ability to challenge the patent underlying his licensing agreement.

Challenges to unwarranted patents serve an important social function and are generally beneficial to society. They rid the economy of unwarranted patents and foster competition, to consumers' benefit. Patent licensees play a vital role in bringing these challenges, as we cannot always rely on the PTO or third parties to perform this role efficiently.

Yet the analysis has shown that such challenges do not always benefit society. Challenges might prove harmful in a subset of cases where the patent is strong enough that the potential social benefits from the challenge are lower than the expected litigation costs. Accordingly, we need legal rules to align private incentives for challenging patents with social welfare. The choice of optimal rules for governing no-contest and challenge-penalty clauses depends on how each rule balances the contracting parties' conduct against social welfare.

131. Third parties can infringe, take the risk that the patent holder will sue, and attempt to raise invalidity as a defense. Yet these actions involve costs to these third parties, such as the litigation and reputation costs of being sued for patent infringement.

This Article has sought to discover the optimal legal rule by answering two basic questions. First, should courts enforce no-contest clauses, which prevent a licensee from challenging the validity of the underlying patent? Second, should courts permit some form of a challenge penalty? While the first question has been the subject of some doctrinal and scholarly attention, the second question has largely been unexplored in the literature.

Our answer to the first of these questions is unambiguously no. This conclusion stands in contrast to the position of the Federal Circuit. Our analysis suggests that no-contest clauses do not serve social welfare. At their worst, no-contest clauses may provide a method for parties to cartelize the market based on a patent that was wrongly granted. Though the court and scholars have been predominantly concerned with contractual stability, we argue that a forward-looking policy focused on social welfare will take these considerations largely off the table. While it conflicts with the Federal Circuit, our analysis is aligned with the “spirit of *Lear*,”¹³² which many courts have adopted. We have more accurately specified the conditions under which this spirit flourishes.

Regarding the second question, we first emphasize the connection between the two answers. A policy that prohibits no-contest clauses should also place some limits on challenge-penalty clauses. If the parties have complete contractual flexibility over the level of challenge penalties, these clauses would become equivalent to no-contest clauses and would thus harm social welfare.

Furthermore, determining the enforceability of challenge-penalty clauses requires carefully comparing the benefits that the licensee would receive from invalidation to the benefits that would accrue to society, as we showed above. While such clauses often limit social welfare, in certain cases, allowing penalties may increase social welfare. For this reason, it is important that challenge penalties be subject to severe limitations, such as maximum caps.

With regard to both types of clauses we would allow challenges only in proceedings in which the invalidation applies as against the world, rather than against the specific litigants. This limitation will ensure that society will in fact realize the welfare benefits that result from restricting no-contest and challenge-penalty clauses.

Our work cannot be concluded without emphasizing that the legal rules explored in this Article are only a second-best solution to the problem of unwarranted patents. A preferred solution may be to ensure that the PTO performs its task rigorously, especially with regard to patents that might have significant market effects. But until this happens, licensees will continue to play an important role in ridding the economy of invalid patents, thereby increasing beneficial competition. This solution is part of the trend of self-

132. See Thomas J. McCarthy, “Unmuzzling” the Patent Licensee: *Chaos in the Wake of Lear v. Adkins*, 45 GEO. WASH. L. REV. 429 (1977).

help—the goal of the law is to ensure that licensees internalize the social benefits and the costs of challenging patents.

Appendix

Let $q(p)$ be the annual demand for the product based on the patent; let $p(q)$ be the inverse function. The probability that a court will uphold the patent if challenged is given by s , and is drawn from a cumulative distribution function F with support over $[0,1]$, and with probability density function f . There is a large set $N=\{1, \dots, n\}$ of ex-ante identical firms that can produce the product by making a one-time fixed investment A and then paying a production cost of $c(q)$. The function $A + c(q)$ is strictly sub-additive.

At $t(0)$, the patent is granted to the patent holder (P) by the PTO. The patent has a life of two periods.

At $t(1)$, P chooses a firm from the set N and enters into contractual negotiations with regard to the use by the firm of the patent. Without loss of generality, we will assume this to be firm 1; for clarity we will refer to the firm as L (for licensee). The contract contains four parts: (1) whether there is a no-contest clause, (2) whether there is a challenge penalties clause, (3) the size of the challenge penalty d , and (4) the level of royalties r , which is assumed to be a fraction of L's profits.

At $t(2)$, L decides the level of the good, q_{11} to produce during the first period.

At $t(3)$, at the end of the first period, L and P learn the patent strength s , which is drawn from the distribution F .

At $t(4)$, L chooses whether to challenge the patent. L may only challenge the patent if allowed to do so by the contract, and if so must pay a litigation cost z as well as the penalty d to P if the contract contains a challenge penalty clause. At $t(5)$, P decides whether to defend the patent, and if so pays an identical litigation cost z .¹³³

At $t(6)$, the decision-maker (be it a court or the PTO) decides whether the patent is valid or not, and chooses to uphold it with probability s . For simplicity, we assume that the decision is the correct one. If the patent is found to be invalid, it then returns to the public domain. We also assume that the contract is invalidated, so that no future royalties are owed.¹³⁴ If the patent is found to be valid, the original contract remains in force.

At $t(7)$, L chooses a quantity to produce during the second period, which will be denoted q_{12} . If the patent has been invalidated, other firms in the market may also produce and choose their production levels at this time. We will denote by q_{i2} the amount produced by firm i in the second period.

133. L might incur additional challenge costs. In this model we disregard them.

134. Note that this might require an additional legal step.

At $t(8)$, the parties receive their payouts.

If the patent is not invalidated, L receives the first period profits minus the royalties $(1 - r)(q_{11}p(q_{11}) - A - c(q_{11}))$ plus the second period profits minus the royalties $(1 - r)(q_{12}p(q_{12}) - c(q_{12}))$, minus the cost of challenging the patent z (if challenged) and the challenge penalty d (if the patent is challenged and such a penalty is applied). P receives the royalties $r(q_{11}p(q_{11}) + q_{12}p(q_{12}) - A - c(q_{11}) - c(q_{12}))$ minus the cost of defending the patent z (if challenged and defended) plus the challenge penalty d (if the patent is challenged by L and the penalty is applied).

If the patent is invalidated, L receives the first period profits minus the royalties $(1 - r)(q_{11}p(q_{11}) - A - c(q_{11}))$, plus the second period profits $(q_{12}p(\sum_{i=1}^n q_{i2}) - c(q_{12}))$, minus the cost of challenging the patent z (if challenged) and the challenge penalty d (if the patent is challenged and such a penalty is applied). P receives the royalties $r(q_{11}p(q_{11}) - A - c(q_{11}))$ minus the cost of defending the patent z (if defended) plus the challenge penalty d (if the patent is challenged by L and the penalty is applied). Other firms receive their second period profits $(q_{12}p(\sum_{i=1}^n q_{i2}) - c(q_{12}))$.

Under Partial Restriction, no-challenge clauses are prohibited but challenge penalties are permitted. Thus P will defend a lawsuit if $z < sr(q_{12}p(q_{12}) - c(q_{12}))$ (1). We can rewrite this inequality as $s > z / (r(q_{12}p(q_{12}) - c(q_{12})))$, that is, if the chance that the patent will be upheld is greater than the cost of defending the lawsuit divided by the expected revenues if successful. Because d is not an element in this inequality, it follows that P's incentives to defend the challenge are the same under both Partial Restriction and Total Restriction.

If condition (1) is not met, L will challenge as long as the cost of the suit z plus the penalty d is less than the expected benefit to the licensee of winning $(q_{12}p(\sum_{i=1}^n q_{i2}) - c(q_{12}) - (1 - r)(q_m p(q_m) - c(q_m)))$. If condition (1) is met, the licensee will challenge if $s(-z - d) + (1 - s)(q_{12}p(\sum_{i=1}^n q_{i2}) - c(q_{12}) - (1 - r)(q_m p(q_m) - c(q_m)) - z - d) > 0$ (2). This inequality can be rewritten as $s < 1 - (z + d) / (q_{12}p(\sum_{i=1}^n q_{i2}) - c(q_{12}) - (1 - r)(q_m p(q_m) - c(q_m)))$. Under Total Restriction, L will challenge as if $d = 0$, that is, if:

$$s < 1 - \frac{z}{q_{12}p(\sum_{i=1}^n q_{i2}) - c(q_{12}) - (1 - r)(q_m p(q_m) - c(q_m))}$$

A challenge reduces total profits because there is an expenditure on the litigation $2z$, and in there is a weak decrease in profits in the event of a suit $(q_{12}p(\sum_{i=1}^n q_{i2}) - c(q_{12}) \leq q_m p(q_m) - c(q_m))$. However, if $\sum_{i=1}^n q_{i2} > q_m$, then there is not necessarily a loss in social welfare, because there is a decrease in the deadweight loss of

$$\int_{q_m}^{\sum_{i=1}^n q_{i2}} p(q) - c'(q) dq$$

which may substantially outweigh the litigation cost.

A challenge is socially optimal if it is brought whenever:

$$2z < (1 - s) \int_{q_m}^{\sum_{i=1}^n q_{i2}} p(q) - c'(q) dq$$

or alternatively, whenever:

$$s < 1 - \frac{2z}{\int_{q_m}^{\sum_{i=1}^n q_{i2}} p(q) - c'(q) dq}$$

Thus the Partial Restriction rule is optimal if:

$$d = z \left(\frac{2(q_{12}p(\sum_{i=1}^n q_{i2}) - c(q_{12}) - (1 - r)(q_m p(q_m) - c(q_m)))}{\int_{q_m}^{\sum_{i=1}^n q_{i2}} p(q) - c'(q) dq} - 1 \right)$$

It is readily verified that d is positive if and only if:

$$q_{12}p(\sum_{i=1}^n q_{i2}) - c(q_{12}) - (1 - r)(q_m p(q_m) - c(q_m)) > \frac{1}{2} \int_{q_m}^{\sum_{i=1}^n q_{i2}} p(q) - c'(q) dq.$$

Otherwise Total Restriction clearly dominates the other two rules.

If condition (2) is not met, there will not be a challenge, and the payoffs to the patent holder are $r(2q_m p(q_m) - A - 2c(q_m))$, and the payoffs to the licensee are $(1 - r)(2q_m p(q_m) - A - 2c(q_m))$. Total profits will equal the monopoly profit, $2q_m p(q_m) - A - 2c(q_m)$. If condition (2) is met, then there will be a challenge, and the patent holder will receive $r((1 + s)q_m p(q_m) - A - (1 + s)c(q_m)) - z + d$, while the licensee will receive $(1 - r)((1 + s)q_m p(q_m) - A - (1 + s)c(q_m)) - z - d + (1 - s)(q_{12}p(\sum_{i=1}^n q_{i2}) - c(q_{12}))$. Total profits will equal $((1 + s)q_m p(q_m) - A - (1 + s)c(q_m)) + (1 - s)(q_{12}p(\sum_{i=1}^n q_{i2}) - c(q_{12})) - 2z$. Because all of the potential licensees are ex ante identical, they cannot profit. Therefore, in both cases, the royalty is set so that the patent holder's payoffs equal the total profits.

Under Total Restriction, neither no-challenge clauses nor challenge penalties are permitted. This is equivalent to Partial Restriction in the case that d is constrained to equal zero. As mentioned above, the patent holder will defend the suit if $s > z / (r(q_{12}p(q_{12}) - c(q_{12})))$, just as under Partial Restriction, and the licensee will challenge if $s < 1 - (z) / (q_{12}p(\sum_{i=1}^n q_{i2}) - c(q_{12}) - (1 - r)(q_m p(q_m) - c(q_m)))$. Note that the right hand side is decreasing in d .

The penalty is simply a transfer payment, but it affects social welfare indirectly by affecting the odds of a suit. If $\sum_{i=1}^n q_{i2}$ is substantially higher than q_m , the expected decrease in the deadweight loss from a suit may be large, and we can expect social welfare to be higher when challenge penalties are not permitted. If $\sum_{i=1}^n q_{i2} = q_m$, on the other hand, there is no decrease in the

deadweight loss, and it is not obvious whether a gain in social welfare from the invalidation of an invalid patent outweighs the social cost of litigation. One might view a challenge in this case as a wasteful contest between two parties.

It can be problematic if the patent holder does not defend a valid patent; this can happen if $s > z / (r (q_{12} p(q_{12}) - c(q_{12})))$. For a significant patent, the expected profits (in the denominator) should be expected to far outweigh the litigation cost, so this should only happen for very weak patents.

Under No Restriction, both no-challenge clauses and challenge penalties are permitted. The patent holder can maximize profits by putting in a no-challenge clause. To the extent that a lawsuit is expected to improve social welfare, No Restriction would be considered the worst possible rule; if a lawsuit is simply a wasteful contest between two parties, it would be the best possible rule.

There is another issue here: the licensee might be viewed as opportunistic. The licensee seeks to invalidate the patent after having gained a first mover advantage from the license. However, this reading is incorrect. In this model the licensee pays the patent holder fully for this benefit.