

INCENTIVES TO CHALLENGE AND DEFEND PATENTS: WHY LITIGATION WON'T RELIABLY FIX PATENT OFFICE ERRORS AND WHY ADMINISTRATIVE PATENT REVIEW MIGHT HELP

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ABSTRACT

Given the limits on Patent Office scrutiny of patent applications, one might hope that *ex post* litigation can fix at least the important errors. Unfortunately, the often grossly skewed incentives to challenge and to defend issued patents make this view too optimistic. Since litigation cannot fix all errors, we urge better USPTO funding and higher standards of initial review, better incentives (not limited to formal duties) for applicants to find and disclose prior art information, and the creation of a cheap and workable administrative post-issue review. We explain why existing administrative reviews are not a workable system, and recommend some features that a new system should have.

TABLE OF CONTENTS

I.	PATENT OFFICE REVIEW ALONE IS INADEQUATE	2
II.	THE SYSTEM AS A WHOLE.....	4
III.	WILL LITIGATION FIX USPTO ERRORS?	4
IV.	INCENTIVES AND THE RELIABILITY OF LITIGATION	5
	A. Money Affects Legal Outcomes.....	6
	B. Skewed Incentives Affect Outcomes of Litigation.....	7
	C. The Public Good and Pass-Through Problems Create Skewed Incentives in Patent Litigation	9
	1. <i>The Public Good Problem</i>	9
	2. <i>The Pass-Through Problem</i>	10
	3. <i>Incentive to Challenge in the First Place</i>	12

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We thank Mark Lemley, Joseph Scott Miller, and Carl Shapiro for helpful comments. Further comments are solicited, so please e-mail farrell@econ.berkeley.edu and/or rmerges@law.berkeley.edu.

4. <i>A Unified Analysis of Incentives to Litigate</i>	13
V. POSSIBLE SOLUTIONS FOR INADEQUACY OF LITIGATION.....	17
A. Improving USPTO examination.....	17
B. Other Opposition Proceedings.....	21
1. “Old” Reexaminations Under the 1980 Act.....	22
2. “New” Reexaminations: Going Backward.....	24
3. Towards an Effective Post-Grant Revocation System.....	25
VI. CONCLUSION.....	25
APPENDIX.....	28

I. PATENT OFFICE REVIEW ALONE IS INADEQUATE

The U.S. Patent and Trademark Office (USPTO) issues many patents that should not be enforced, either on economic or on legal grounds. Colorful examples of mistakenly, even ludicrously, issued patents are often cited. We have all heard about such “inventions” as the peanut butter sandwich and the toy on a stick.¹ As a result, many authors have explained how imperfectly the USPTO screens applications for novelty, utility, and non-obviousness. The standard litany of concerns about patent quality includes the following:²

- Inadequate resources for the USPTO to review each patent application, resulting in hasty examiner analysis of applications;
- Biased procedures that favor the patent applicant at every turn, permitting a strategy of “wearing down the examiner” to obtain a patent;

1. These examples are recounted in Shubha Ghosh & Jay Kesan, *What Do Patents Purchase? In Search of Optimal Ignorance in the Patent Office*, 40 Hous. L. Rev. 1219, 1220 (2004). The recent National Academies of Science study cited patents such as one for cutting or styling hair using scissors or combs in both hands, U.S. Patent No. 6,257,248 (issued July 10, 2001), and one for initiating forward motion on a child’s swing by pulling the ropes and swinging sideways, U.S. Patent No. 6,368,227 (issued Apr. 9, 2003). NAT’L ACAD. OF SCI., A PATENT SYSTEM FOR THE 21ST CENTURY 39 (Stephen A. Merrill et al. eds., 2004) [hereinafter NAS STUDY], available at <http://www.nap.edu/books/0309089107/html>. Many have criticized Amazon’s one-click patent. See, e.g., Evan Ratliff, *Patent Upending*, WIRED, June 2000, at 208, available at <http://www.wired.com/wired/archive/8.06/patents.html>.

2. For a recent comprehensive survey of these issues based on many statements by many participants in the patent process, see FTC, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY 4-10 (2003) [hereinafter FTC REPORT], at <http://www.ftc.gov/os/2003/10/innovationrpt.pdf>. The National Research Council echoes the FTC Report’s concerns, and makes a similar call for increased USPTO expenditures to improve patent quality. See NAS STUDY, *supra* note 1, at 84-87.

- Skewed incentives that make it easier and more desirable for examiners to grant patents rather than reject them.

Despite widespread and persistent documentation of these points by patent lawyers, industry members, and academics, the USPTO³ and at least some independent observers⁴ doubt that patent quality is really a problem. Those arguments ring hollow, however. Indeed, given the rapid increase in the volume of patent applications in recent years and the relatively slow adaptation by the USPTO, it would be astounding if patent quality had *not* suffered. Recent evidence to this effect comes from an anonymous survey of patent examiners at the European Patent Office (EPO). Like the USPTO, the EPO has experienced massive growth in patent applications in recent years. As one would expect, the examiners polled stated overwhelmingly that they were concerned that the influx of new applications was seriously undermining the quality of the patents that the EPO issues.⁵

Of course, blatantly silly patents may be readily overturned if challenged, but presumably the blatant ones are only the tip of the iceberg. To the extent it is expected to be enforced, a patent enables a patentee to prevent others from using a technology or to charge them royalties for doing so. This limits commercial freedom. It deters, taxes, or worries other innovators, who are often uncertain about what might be patented, especially given the harsh penalties for willful infringement. Because it raises competitors' costs, a patent will normally increase prices to consumers. There is a good public policy reason for enforcing patent rights where a patent reflects a useful, novel, and non-obvious invention that would not have been made or disclosed without the spur of patent rights.

3. USPTO, FY 2002 PERFORMANCE AND ACCOUNTABILITY REPORT 18 (2003), <http://www.uspto.gov/web/offices/com/annual/2002/1-58.pdf> (showing an official "error rate," based on internal quality assurance measures, of 4.2%). In addition to the fact that these official error rate figures are generated by the same agency whose quality is under question, they result from a process that in many ways duplicates the original patent examination—same agency personnel, etc.

4. See John R. Allison & Emerson H. Tiller, *The Business Method Patent Myth*, 18 BERKELEY TECH. L.J. 987 (2003) (arguing, on the basis of statistical proxies such as number of references, claims and inventors, that business method patents have not been of inferior quality since their inception).

5. Alison Abbott, *Pressured Staff 'Lose Faith' in Patent Quality*, 429 NATURE 493 (2004).

However, an improper patent is typically an unwarranted burden on consumers and on other innovation.⁶ A system that enforces a lot of improper patents would be a disgrace. While the legal standards for patentability do not fully reflect all of these economic tradeoffs, at least they bear some relation. As a result, in this Article, we discuss patent validity without stressing the question of what the validity criteria should be.

II. THE SYSTEM AS A WHOLE

We observed that it would be a disgrace for a system to enforce a lot of improper patents. This need not mean that it is bad if the USPTO issues a lot of invalid patents. Rather, the entire system of application, examination, issuance, negotiation, licensing, challenge, and enforcement should be evaluated as a whole.

Commentators have stated repeatedly that the optimal error rate at the USPTO is not zero, for at least two reasons. First, perfect screening would be immensely costly, so we might rationally tolerate a few bad patents. Second, mistakenly issued patents are not necessarily enforced: there are safety valves, notably litigation.⁷ This Article critically evaluates these safety valves. First, we discuss litigation and negotiation in its shadow. Then, we discuss administrative post-issue challenge and review.

III. WILL LITIGATION FIX USPTO ERRORS?

Litigation can invalidate bad patents issued by the USPTO. Not only is Patent invalidity is available as a defense in any infringement suit brought by a patentee, but patent invalidity may also be pleaded affirmatively since a patent challenger with a “reasonable apprehension” of an infringement suit may sue to have a patent declared invalid.⁸ In practice most of the

6. There are some possible arguments, sometimes called “ex post” efficiency arguments, for giving a patent quite aside from incentives to invent the patented material. See MARK A. LEMLEY, EX ANTE VERSUS EX POST JUSTIFICATIONS FOR INTELLECTUAL PROPERTY (U.C. Berkeley Public Law Research Paper No. 144, 2004), at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=494424. The weakness of those arguments can be hinted at by noting that they would argue for giving those patents to a random person.

7. See, e.g., Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1501-02 (2001); Robert P. Merges, *As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform*, 14 BERKELEY TECH. L.J. 577, 599 (1999).

8. See *Vanguard Research, Inc. v. Peat, Inc.*, 304 F.3d 1249, 1254-55 (Fed. Cir. 2002); see also 28 U.S.C. § 2201 (2002) (“In a case of actual controversy within its jurisdiction . . . any court of the United States, upon the filing of an appropriate pleading, may

economic consequences of patents stem from negotiation in the shadow of litigation. Thus, if bad patents can be reliably eliminated through litigation, and especially if this is predictable by informed private parties negotiating in litigation's shadow, then USPTO errors may not matter much.

Championing this line of reasoning, Professor Mark Lemley has argued that "rational ignorance at the Patent Office" may be part of a cost-efficient overall system: a quick-and-dirty review at the USPTO, followed in a few cases by a costly, intense, and reliable review in the courts.⁹ Litigation can fix USPTO errors, Professor Lemley suggests, and since most patents are never asserted or licensed, it is cheaper to fix the few errors that would really matter than it would be to avoid errors in the first place:

[S]ociety ought to resign itself to the fact that bad patents will issue, and attempt to deal with the problem *ex post*, if the patent is asserted in litigation. This result is admittedly counterintuitive. It depends crucially on the fact that very few patents are ever the subject of litigation, or even licensing. Because of this, money spent improving the PTO examination procedures will largely be wasted on examining the ninety-five percent of patents that will either never be used, or will be used in circumstances that don't crucially rely on the determination of validity.¹⁰

We fully agree with Professor Lemley that the system should be evaluated as a whole, and that error rates at the USPTO should be assessed not in isolation but in light of the existence of other mechanisms, notably litigation, that might stop bad patents from having any real effects. Unfortunately, such an evaluation yields a much less reassuring answer than the one Professor Lemley puts forward. As we argue below, society cannot count on litigation to undo USPTO errors.

IV. INCENTIVES AND THE RELIABILITY OF LITIGATION

Professor Lemley's analysis seems to assume that the outcome of litigation is empirically an accurate assessment of patent validity.¹¹ The evi-

declare the rights and other legal relations of any interested party seeking such declaration . . .").

9. Lemley, *supra* note 7, at 1497.

10. *Id.* at 1510-11.

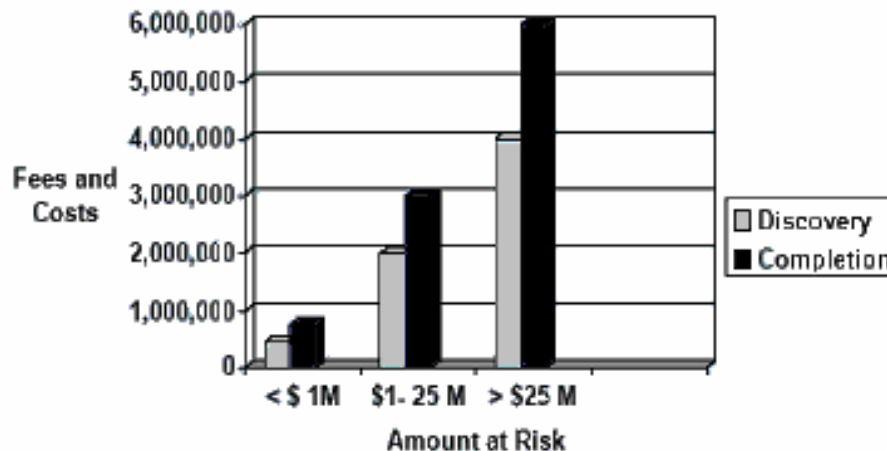
11. We talk here about the truth of whether a patent is valid as conceptually distinct from whether it will be found to be valid. Legal realists might press us on the meaning of this. Its meaning is that a full and balanced enquiry would reach a different conclusion than the somewhat-full but very unbalanced enquiry that arises from litigation with asymmetric stakes.

dence does not favor this view. On the contrary, our analysis of incentives suggests that litigation is an unreliable tool for assessing patent validity.

Litigants choose to spend a lot of money, making litigation costly, because they believe that spending more improves their chances of winning. Skewed incentives (for example, if a patentee cares much more about winning than does an infringer) will on average yield skewed outcomes. And the incentives often are drastically skewed because of the mutually reinforcing public good and pass-through problems.¹²

A. Money Affects Legal Outcomes

The average patent infringement case now costs roughly \$2 million for each party when there is \$1 million to \$25 million at risk.¹³ But the average conceals a much more informative fact, though not one that will surprise practitioners: the cost varies dramatically with the amount of money “at risk” in the litigation.¹⁴ The following graph gives a sense of the magnitudes involved:¹⁵



This data imply that any irreducible expenses of patent litigation are less (probably much less) than \$1 million. In other words, conservatively

12. This will be further discussed in Part IV.C *infra*.

13. AMERICAN INTELLECTUAL PROPERTY LAW ASS'N, REPORT OF THE ECONOMIC SURVEY 22 (2003).

14. Generally, this is the expected loss that will flow from an injunction and/or damages. It also varies according to how far the litigation proceeds, e.g., whether only to the discovery phase or all the way to a full trial.

15. William J. Robinson, Foley & Lardner, from AIPLA 2003 {WHAT IS THE SOURCE OF THIS CHART? Is it from FN 13?}

more than half—probably the vast bulk—of average patent litigation costs, even in the lowest-stakes category, are discretionary. Bare-bones litigation would cost much less, but participants in high-stakes cases choose to spend much more.

That fact strongly indicates that, by spending more, a party can increase its chance of winning. If the plaintiff's chance of winning did not depend on its expenditures, plaintiffs would not spend so much, and the same is true for defendants. Litigation provides many opportunities to spend more in ways that increase one's chance of winning, and the higher the stakes, the more of those spending opportunities will be worthwhile. For instance, one can interview more potential witnesses; retain more (and more distinguished) experts (including multiple consultants as well as potential testifying witnesses); try out more alternative strategies before a mock jury; learn more about predicting jurors' sympathies so as to take better advantage of jury selection opportunities; prepare glitzier exhibits; chase down more case law; assign more associates; and hire advocates with tongues of gold rather than of silver. In patent dispute litigation, one can review more sources for prior art. Any lawyer can think of plenty more examples.

B. Skewed Incentives Affect Outcomes of Litigation

It follows, as has been recognized elsewhere, that skewed incentives will probabilistically affect litigation outcomes.¹⁶ Since a party's probability of prevailing increases with how much it spends, and its expenditures depend on its incentive to win, this makes it highly problematic to rely on litigation where party *A*'s stake is far bigger than *B*'s. Whatever the true relative merits, party *A* will pull out all the stops and present its case in full

16. See, e.g., Keith N. Hylton, *An Asymmetric-Information Model of Litigation*, 22 INT'L REV. L. & ECON. 153, 166 (2002) (summarizing earlier literature concluding that "if defendants have more at stake than plaintiffs, they will spend more on litigation"). Much of this discussion has come in the context of studies describing which legal disputes go to trial, and which settle. Empirical evidence in this vein is consistent with the notion that litigation expenditures can influence trial outcomes.

The different stakes theory may explain low [plaintiff] success in employment discrimination cases. A successful action alleging a pattern or practice of employer misbehavior may spur related actions against the employer. An employer who loses even one discrimination claim is more vulnerable to future discrimination claims. Rational defendants would vigorously defend employment discrimination cases and settle weak cases for the defense before trial.

Theodore Eisenberg, *Litigation Models and Trial Outcomes in Civil Rights and Prisoner Cases*, 77 GEO. L.J. 1567, 1582 (1989).

glory; party *B* will have an incentive to cut corners, make some compromises, and present its case within a more limited budget.

One empirical hurdle for our theory, and for others' theories that skewed incentives matter, is an imbalance of expenditures. If, despite asymmetric incentives, parties actually spend roughly equal amounts developing their cases, then there would be no reason to expect biased outcomes.¹⁷ However, this logical possibility would imply that while expenditures strongly respond to stakes when we compare cases with different stakes, as illustrated above, they do not respond to stakes when we compare parties in a case; we thus think it quite unlikely. Unfortunately, the data described above do not let us test this, and we are not aware of any data that would.

We do not claim that any particular court decided any particular patent challenge wrongly. Nor can our claims be tested in a particular case by reassessment of the evidence actually presented in court. If courts sensibly evaluate the evidence actually presented, the party with stronger incentives to search out and present the most favorable evidence will be apt to win even when that party is objectively in the wrong. Thus, reexamination of the evidence presented will not be a good way to find such errors or to argue for their absence. If indeed expenditures are asymmetric, one could in principle test our claim by taking a sample of litigated cases, rebuilding the parties' cases with equal budgets, and retrying the cases on that basis. We reiterate, however, that if the results were not affected, it would imply that litigants systematically waste money by making voluntary expenditures that do not help win their cases.

One possible solution calls on courts to take a sophisticated Bayesian approach to the evidence presented. Accordingly, when *A* has a much stronger incentive to win than *B*, the court would discount *A*'s case relative to *B*'s. The court should recognize that when the true underlying merits are balanced it can expect *A* to present a significantly better case than *B*. Thus if *A*'s case as presented is only moderately better than *B*'s, the court should find for *B*. If *A* had an objectively strong case, its stronger incentives imply that it could and would have presented a much stronger showing.¹⁸ However, calibrating the appropriate standard of proof would require the court to know a great deal about how parties believe the court

17. Economic logic suggests that it is possible, but unlikely, that expenditures would tend to be equal even when incentives are skewed. It would require that the probability of prevailing be heavily dependent on expenditures up to the level of the opponent's, but unresponsive beyond there. There seems no reason to expect such a pattern.

18. Strictly, this is only part of the correct standard-of-proof analysis, which should also take into account the consequences of false positives and false negatives.

will respond to additional favorable evidence and about the likely costs of bringing forward such evidence.¹⁹

To make the proper adjustment, the court would need to know (1) the overall cost of upholding patents that ought to be invalidated; (2) the cost of invalidating patents that ought to be held valid, which implicates incentives for later inventors; (3) the stakes for each party; and (4) how expenditures affect success rates. All this would be extremely hard to know.

C. The Public Good and Pass-Through Problems Create Skewed Incentives in Patent Litigation

In many cases where each party's respective incentive is expressed by the difference in its profits between winning and losing, a patentee's incentive to defend its patent grossly exceeds an alleged infringer's incentive to challenge it. It is central to understand this point, which contrasts starkly with the simple case of a purely private dispute over, for example, a sum of money, with no impact on third parties. In such cases, the stakes are the same for each party.

There are at least two reasons for this asymmetry of stakes in case where multiple infringers compete with one another (and perhaps with the patentee) in one or more product markets. The first is the public good problem while the second is the pass-through problem.

1. The Public Good Problem

First, the *Blonder-Tongue*²⁰ decision makes successful challenge a "public good" among multiple infringers.²¹ Professor Joseph Scott Miller asserts,

The Court viewed *Blonder-Tongue* as another step in the line of cases designed to "encourage authoritative testing of patent validity." It was mistaken. *Blonder-Tongue*, considered alone, eliminates a patent attacker's ability to exclude others from ap-

19. One problem at the outset is getting fact-finders to focus on the standard of proof. Another is applying the standard with rigor and consistency. Note that asymmetric stakes explains why patentee win rates exceed 50%, the estimated win rate based on assumptions of equal information and equal stakes between the parties. See Kimberly A. Moore, *Judges, Juries and Patent Cases: An Empirical Peek Inside the Black Box*, 99 MICH. L. REV. 365, 385 (2000) (demonstrating that patentees won 58% of cases in a statistical sample).

20. *Blonder-Tongue Labs., Inc. v. Univ. of Ill. Found.*, 402 U.S. 313, 350 (1971) (holding that if one challenger prevails on patent invalidity, the result applies to all).

21. Joseph Scott Miller, *Building a Better Bounty: Litigation-Stage Rewards for Defeating Patents*, 19 Berkeley Tech. L.J. 667, 687 (2004) (quoting *Blonder-Tongue*, 402 U.S. at 344).

propriating the benefit of its successful patent attack. It thus turns patent invalidity judgments into public goods. And the resulting free rider problem, which discourages patent challenges, is at least as stark as the one that justifies providing a patent system in the first place.²²

Thus, for instance, if there are five infringers of equal size, each gets only a fifth of the gains from a successful challenge because each is paying only a fifth of the patentee's total royalties. Therefore, the patentee has five times more incentive to prevail in litigation than any one challenger has. Professor Miller and others have noted this problem and suggested policies to address it such as permitting infringers who compete with one another to coordinate a legal challenge to a patent,²³ offering a bounty to a successful challenger,²⁴ and relying on fee-shifting.²⁵

2. *The Pass-Through Problem*

Second, when multiple infringers compete in a product market, royalties are often passed through, at least in part, to consumers downstream. The key point here is not that downstream consumers pay more, as they

22. *Id.* at 687-88.

23. Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, 19 J. ECON. PERSP. (forthcoming 2005) (manuscript at 17, on file with authors), available at <http://faculty.haas.berkeley.edu/shapiro/patents.pdf>.

24. For a description of how such a system would work, see John R. Thomas, *Collusion and Cooperation in the Patent System: A Proposal for Patent Bounties*, 2001 U. Ill. L. Rev. 305, 340-52 (2001). See also Miller, *supra* note 21, at 704-30 (proposing an improved litigation-stage bounty that would adequately reward the one who defeats a patent in litigation). But it would be very difficult to calibrate the bounty properly, giving enough incentive to challenge a patent but not so much as to create an industry of overzealous bounty hunters. It is not even entirely clear whether the bounty should aim to reflect the losses (from enforcement of an invalid patent) to everyone except the patent holder and the challenger, or to reflect the ex post deadweight losses from its enforcement, which are likely to be far less. In addition, large patent owners would likely fight very hard to prevent such a system from coming into effect, making it unlikely that such a reform would actually be adopted.

25. See Jay P. Kesan, *Toward a Better Informed Patent System* 9 (Apr. 10, 2002), at <http://www.ftc.gov/opp/intellect/020410jaypkesan.pdf> (visited Aug. 7, 2004) ("One-way, pro-defendant fee shifting if patents revoked or invalidated based on prior art categories that could have been reasonably discovered by the patentee."); see also Lemley, *supra* note 7, at 1530-31. Lemley states:

[A]ccused infringers normally won't get attorney's fees unless they can prove that the suit was filed in bad faith. It may make sense to add some balance to the fee awards [as in copyright law] . . . and therefore help shift some of the burden of determining validity away from accused infringers.

Lemley, *supra* note 7, at 1530-31.

would even when an infringer is a monopolist in its product market, but that the competing infringers are substantially immunized from bearing the economic cost of the royalties, unlike a monopolist.²⁶

This pass-through will be stronger the more competitive the product market, the more symmetric the royalties, the more elastic the industry supply curve, and the less elastic the industry demand curve.²⁷ When pass-through is relatively strong, this effect may be bigger than (and reinforcing of) the public good problem. In the Appendix, we describe an economic model quantifying this effect and show that in a symmetric Cournot oligopoly the pass-through problem (at least for small royalties) is always bigger than the public good problem.²⁸ For instance, if five equal-sized infringers compete Cournot-style in a \$1 billion product market with demand elasticity equal to -2 (that is, a 1% increase in market price causes a 2% fall in demand), and the patentee demands a uniform 5% royalty, each infringer has not one fifth but roughly one fortieth (\$1.2 million) as much at stake as has the patentee (\$50 million). The five infringers collectively have only \$6 million at stake, or about an eighth of the patentee's stake: the rest of the patentee's gains from upholding the patent come from downstream buyers.²⁹ Thus even ideal collective action by direct buyer-licensees leaves the bulk of the incentive imbalance untouched. In this illustrative example, the public good issue causes a factor of five imbalance, potentially neutralized by ideal collective action among them. The pass-through effect causes a factor of eight, which collective action among direct buyers cannot help in the least.

26. See generally Joseph Farrell, *Listening to Interested Parties in Antitrust Investigations: Competitors, Customers, Complementors and Relativity*, ANTITRUST, Spring 2004, at 64.

27. In the case of a perfectly competitive industry, the pass-through is related to the ratio of the elasticities of supply and demand. See, e.g., MICHAEL L. KATZ & HARVEY S. ROSEN, MICROECONOMICS ch.11 (3d ed. 1998).

28. See also Farrell, *supra* note 26, at 66 (stressing the role of pass-through in determining incentives to comment on potentially anticompetitive mergers or practices); Sheldon Kimmel, *Effects of Cost Changes on Oligopolists' Profits*, 40 J. INDUS. ECON. 441, 444 (1992) (showing that pass-through can perversely make some, or even all, competing oligopolists better off if they all are charged more for an input such as technology). But see Richard Gilbert, [WHAT IS TITLE?], STAN. L. REV. (forthcoming) (manuscript on file with authors) (arguing that "business-stealing" effects can skew incentives the other way).

29. Direct infringers and downstream buyers pay somewhat more than the \$50 million that this remark would suggest, because the \$50 million is essentially a tax that has a deadweight loss. But the summary in the text is a good approximation.

Because downstream customers bear much of the harm from an invalid patent, they should have standing to sue for invalidity.³⁰ Incentives would often still be diffuse, but our point is that, contrary to intuition, there is no economic reason to expect direct infringers to have appropriate incentives to challenge a patent even if they act collectively.

3. *Incentive to Challenge in the First Place*

The discussion above concerns an infringer's incentives to win a challenge versus quietly pay royalties as its rivals are doing. But losing a challenge can be a very different outcome from uncomplainingly paying non-discriminatory royalties. Challengers often find themselves subject to injunctions or less favorable licensing terms.³¹ Patentees can also charge differential royalties in a way that penalizes holdout firms who do not settle early.³² This hardball behavior by the patentee strengthens the infringer's incentive to win if it brings a challenge, but further weakens the infringer's incentive to challenge in the first place rather than quietly pay up. On the other hand, softball behavior by the patentee (treating unsuccessful challengers just like any other infringers) encourages infringers to bring a

30. In practice, the right to challenge the patent in litigation depends on either the patentee suing the downstream customer (which is relatively unusual but not unheard of), or threatening to sue to such an extent that the accused infringer has standing to file a declaratory judgment suit against the patentee. *See, e.g., Vanguard Research, Inc. v. Peat, Inc.*, 304 F.3d 1249, 1254-55 (Fed. Cir. 2002) (discussing standing requirement for declaratory judgment plaintiffs).

31. *See, e.g., Philips Licenses Hyatt's Microcomputer Patents*, PATENT WORLD, Dec. 1991/Jan. 1992, at 15 (describing a licensing agreement whereby Philips settled early with non-manufacturing plaintiff seeking royalties from several industries for broad patents on liquid crystal displays and microprocessor; settlement was reported as favorable, and licensee Philips agreed to assist the plaintiff Hyatt in extracting royalties from other firms in the industry). *See generally* Michael J. Meurer, *Controlling Opportunistic and Anti-Competitive Intellectual Property Litigation*, 44 B.C. L. REV. 509 (2003).

32. As discussed in the Appendix, even when licensees do not compete with one another, a patentee whose profit-maximizing royalty is, say, 5% to all, may without sacrificing much profit, license at 4% to tame licensees and 6% to those who insist on behaving in a feisty manner. When licensees compete with one another, the patentee may even refuse to deal with the latter without sacrificing much profit, because the subsequent increase in business to the tame licensees will substitute for the revenues sacrificed by the other licensee's refusal to deal. Differential royalty rates do not by themselves raise anti-trust problems for a licensor. *See USM Corp. v. SPS Techs., Inc.*, 694 F.2d 505 (7th Cir. 1982), *cert. denied*, 462 U.S. 1107 (1983). Nor does a refusal to deal. *See In re Indep. Serv. Orgs. Antitrust Litig. (CSU, L.L.C. v. Xerox Corp.)*, 203 F.3d 1322, 1327 (Fed. Cir. 2000) ("In the absence of any indication of illegal tying, fraud in the Patent and Trademark Office or sham litigation, the patent holder may enforce the statutory right to exclude others from making, using, or selling the claimed invention free from liability under the antitrust laws.").

challenge but saps their incentive to prosecute with vigor. Thus, although the analysis differs as between hardball and softball patentees, in neither case does a potential infringer have a strong incentive to mount a strong challenge.

4. *A Unified Analysis of Incentives to Litigate*

There are three relevant outcomes for the (alleged) infringer. He can take a license, as do his competitors, and pay for the running royalty demanded by the patentee³³ or refuse to take a license and expect to be sued for infringement, raising validity and/or infringement issues as a defense at that point. The infringer may also file suit himself if the patentee threatens enough to trigger “declaratory judgment” standing. If he chooses to litigate, he must then choose how much to spend, and may win or lose in litigation.

Consider the profit levels of these three final outcomes relative to shutting down the allegedly infringing activity. Relative to shutting down, producing with a license may be profitable even in a competitive market, if participation requires substantial sunk costs. That is, even a free-entry competitive market may involve significant quasi-rents once those costs have been sunk. Thus, write the infringer’s profits following successful challenge as U , and its profits from taking a license as $V(r)$. The difference $U - V(r)$ is presumably positive, but may be smaller than one might have thought, both because of the public good problem among infringers and because running royalties under nondiscriminatory licenses may be largely passed through to downstream buyers.³⁴ In particular, as the Appendix shows, $U - V(r)$ is apt to be much smaller than S , the value to the patentee of preserving its patent from successful challenge.

Litigating and losing may be much worse for the infringer than paying the royalty. In some cases a permanent injunction would force it to shut down. Even short of that, a license at higher royalties than are offered to its less feisty rivals will substantially lower profits, because the increment of royalties cannot be passed on in the same way.³⁵ Thus, the payoff from

33. We assume here that the license takes this form, which is common in practice. If a patent were known to be valid, and if all other relevant market factors were known, lump-sum licensing would tend to be more profitable and more economically efficient. But our analysis illustrates an important strategic advantage of running royalties: they sap direct infringers’ incentives to challenge.

34. Sheldon Kimmel, *supra* note 28, has shown that the pass-through effect can counter-intuitively make $U < V(r)$ even in non-pathological cases. Although this strengthens our argument, we do not pursue it here.

35. One must be careful about the meaning of pass-through. In a commodity industry such an increment will not be passed through unless the firm in question is the mar-

losing in litigation, W , may be far below $V(r)$, if the patentee is a hardball type. On the other hand, a softball patentee might be expected to continue to offer nondiscriminatory licenses, so that, aside from direct costs of litigation, W would roughly equal $V(r)$.³⁶

If litigation were to take place, the infringer's stake in winning is $U - W$. With a softball patentee, this is small, so the infringer's stake is well below, and often far below, the patentee's stake in litigation, S . To the extent that outcomes of litigation respond to relative stakes, this asymmetry of stakes makes the litigation highly asymmetric, and the patentee will be much more likely to win than the underlying merits warrant. If p represents the infringer's probability of winning, as a function of the two parties' stakes in litigation, $p(U - W, S)$ is below analogous probabilities such as $p(S, S)$ that would arguably measure true merits, in the case of a softball patentee because $U - W \ll S$.

With a hardball patentee, on the other hand, $U - W$ is large. Thus if settlement is not on the table the infringer has an incentive to litigate vigorously. Although nothing tells us that $U - W$ is close to S , one would at least expect $p(U - W, S)$ to be closer to representing the true merits of the case than with a softball patentee.³⁷

Finally, working backward in this decision tree, consider the choice of whether to take a license. Taking a license gives a payoff of $V(r)$. Not doing so leads to litigation costs of $L(U - W, S)$ and then to an uncertain further payoff that is equal to U with probability $p(U - W, S)$ and to W with probability $1 - p(U - W, S)$. A little algebra shows that the expected payoff from not taking a license can be written as:

$$-L(U - W, S) + W + (U - W)p(U - W, S).$$

The infringer will therefore rationally take a license provided that $V(r)$ exceeds this quantity, or equivalently if and only if:

$$(U - W)p(U - W, S) \leq V(r) - W + L(U - W, S).$$

ginal producer. When there is product differentiation, an increase in this firm's marginal cost will normally affect its price (and probably its rivals' prices to a lesser degree), but here the relevant point is that the firm's profits fall by a large fraction of the increment in royalties, in contrast to the profit effect of uniform royalties among competitors.

36. If r is limited by the potential for challenge, it may well be that (if contracts allow) r will increase following an unsuccessful challenge. By the same logic as in the text, however, as long as such an increase is nondiscriminatory (as between the challenger and other licensees), it will have relatively little impact on each licensee's profit. We do not pursue this here.

37. It is unclear to us at this time whether or not $U - W$ can exceed S .

This condition is likely to hold even if r , the royalty demanded, is quite high relative to the underlying merits of the disputable patent. The reasons differ somewhat as between a softball and a hardball patentee.

Facing a softball patentee, recall that U , $V(r)$, and W are all relatively close to one another, and hence $p = p(U - W, S)$ may be small even if the patent is in fact quite dubious: if it comes to litigation, the infringer has little at stake while the patentee cares a great deal about the outcome. Moreover, if litigation costs decline less than proportionately with the stakes, then L will dominate the comparison. Thus, the infringer may well be reluctant to challenge for a mixture of those reasons, and any challenge will tend to be unrepresentatively feeble.

Facing a hardball patentee, recall that U and $V(r)$ are apt to be fairly close and W to be much lower. As a result, p will be reasonably large if the patent is in fact dubious, because the infringer's stakes (like the patentee's) in litigation are high. But the threat of W can intimidate infringers into paying royalties.

Even if L were zero, the infringer would take a license as long as $p \leq [V(r) - W]/[U - W] = 1 - [U - V(r)]/[U - W]$, which is close to 1 when $V(r)$ is much closer to U than is W . For instance, if $U = \$10$ million, $W = 0$ (an unsuccessful challenge will force shut-down), and $V(r) = \$9$ million, then a rational firm will take a license unless $p \geq 0.9$. Because of pass-through, r can capture well over a tenth of industry profits while still leaving the relationship between U and $V(r)$ as described.

Because any litigation would have high stakes on both sides, L is not apt to be small. If $L(U - W, S) > U - V(r)$, no challenge will take place even if the challenger is *guaranteed* to win ($p = 1$). Again, because of pass-through, $U - V(r)$ may be much smaller than the infringer's royalty payments, enabling the patentee to collect much more than L from each infringer even if the patent is certainly invalid. One could equivalently describe the problem by saying that a challenger bears the cost of litigation but its rivals and downstream buyers will capture almost all the benefits of successful challenge, so litigation costs can support royalty payments on an extremely weak patent well in excess of the prospective litigation costs.

Therefore, although for somewhat different reasons, the chance of a successful challenge is low whether the patentee is softball or hardball. For modest values of r , no challenge will be rational for an individual infringer.³⁸

38. Our analysis assumes that the infringer's competitors take a license. This calculation amounts to checking whether there is an equilibrium in which no infringer challenges. The condition for such an equilibrium is that none would choose to challenge if

To be sure, it need not be inefficient for a questionable—as distinct from an evidently absurd—patent to generate some royalties without litigation. The level of royalties, however, should be commensurate with the value of the questionably patented technology and with the probability that the patent would be upheld in a full and fair investigation. Specifically, suppose that if the patent were certainly valid then all would be prepared to pay royalties of r^* , and that the probability of its being upheld in a well argued symmetric trial is $q = 1 - p(S, S)$. A reasonable outcome would be that negotiation in the shadow of litigation would enable the patentee to collect royalties of up to qr^* . In other words, that the threshold value of r above which a challenge would ensue should be in the range of qr^* . In that way the patentee would collect the expected value of its patent, while no litigation costs would actually be incurred.

The threshold value t is given by

$$(U - W)p(U - W, S) = V(t) - W + L(U - W, S),$$

or equivalently

$$U - V(t) = [U - W][1 - p(U - W, S)] + L(U - W, S).$$

In the case of a hardball patentee, $U - W$ may approximate xr^* , where x is the infringer's output. For reasonably small values of t , we can use the linear approximation $U - V(t) = kxt$ for some constant k that is, because of pass-through, well below 1. The Appendix shows that in a symmetric Cournot (capacity-setting) oligopoly, when r is small, $k = (e - 1)/(ne - 1)$, where e is the absolute value of demand elasticity (the percentage by which demand would fall as a result of a 1% price increase) and n is the number of firms. For instance, if $e = 1.5$ and $n = 6$ then $k = [1/16]$. The Appendix also describes a five-firm example with a 5% royalty in which k is roughly an eighth. Then we have:

$$kxt = [1 - p(U - W, S)]xr^* + L(U - W, S),$$

so that

$$t = [1 - p(U - W, S)][r^*/k] + L/[kx].$$

This value of t exceeds the benchmark of qr^* for three reasons. First, $1 - p$ is likely to exceed q . Even though an infringer facing a hardball patentee has relatively strong litigation incentives, the public good problem

all others take a license. When victory by any challenger applies to the whole industry, as in *Blonder-Tongue*, there is no equilibrium in which more than one infringer seriously challenges. Thus there is no challenge.

still applies, so $U - W$ seems likely to be less than S . Second, even if $1 - p = q$, the first term in the expression for t is also inflated by a factor of $[1/k]$. Third, litigation costs per unit of output are also inflated by a factor of k even relative to the normal (not optimal) benchmark in which litigation costs will allow a degree of hold-up. As illustrated above and in the appendix, $[1/k]$ can easily be well over five, so these effects can be big.

Now consider a softball patentee. In the rather extreme case that we consider under that name, litigation costs L are the only downside of a patent challenge. Thus we have:

$$p(U - V(r), S)kxt = L(U - V(r), S),$$

so

$$xt = L/[pk].$$

This is not easily related to the benchmark of $t = qr^*$, but we can compare it to the case of purely private litigation, in which each party has the same amount, Y , at stake. There, a demand will be challenged if $Y > L/[1 - q]$. Thus t can be elevated for two reasons. First, $p < 1 - q$ because of weak incentives in litigation against a softball patentee, as discussed above. Second, the level of t that will call forth a challenge is inflated by the factor $[1/k] > 1$, relative to the private-litigation benchmark.

As foreshadowed earlier, a patentee can demand royalties r up to a threshold level t that is high compared to a natural normative benchmark qr^* for a hardball patentee, and high compared to the ordinary private-litigation benchmark of $L/[(1 - q)x]$ for a softball patentee.

V. POSSIBLE SOLUTIONS FOR INADEQUACY OF LITIGATION

If litigation is often biased (at least for softball patentees) and unappealing (at least for hardball patentees) and hence an unreliable *ex post* fix, what policy conclusions follow? It would make sense to improve USPTO examination, supplement litigation with other *ex post* reexamination mechanisms, or (most likely) both. We examine these in turn.

A. Improving USPTO examination

USPTO examination could be improved in various straightforward ways, but at a cost. Patent examiners could be given more time and more balanced incentives. The USPTO could regularly, rather than exceptionally, have more than one examiner assess an application, and could investigate further when examiners disagree.

Another way to get more information into the process would draw more fully on the applicant's information.³⁹ The applicant has a duty of equitable conduct, arising from the recognition that the applicant has a great deal of information that bears on validity. But current enforcement of that duty falls short of taking full advantage of that source. We recommend moving beyond today's exclusive narrow focus on probably bad behavior, and considering policies that pay broader attention to an applicant's incentives to search and to disclose.

With the growing complexity of technology and the consequent burdens on the USPTO, the courts and the USPTO itself began to formulate rules requiring truthful disclosures by a patent applicant. These rules reflected the understanding that the inventor him or herself is initially the best source of information not only about the invention sought to be patented, but also about the prior art. As one court put it,

Because patent applications are prosecuted *ex parte*, almost always concern complicated matters of technology, and often come on the heels of lengthy preliminary investigation, applicants are under a strict duty to reveal to the PTO all facts material to their applications. . . . In order to set up a disincentive for shirking this duty to disclose, courts have permitted defendants to assert, as defense to a claim of patent infringement, that the patent in suit is unenforceable by reason of the applicant's "inequitable conduct" in dealings with the PTO.⁴⁰

But applicant disclosure rules have been a notorious sore spot in the patent system for some time. The Federal Circuit and the USPTO have each struggled over how to structure such disclosure rules.⁴¹ We see two problems with the current system. First, disclosure is treated as a matter of enforcing a duty rather than as designing incentives. That is, the rules are set up in such a way that the applicant has an incentive to conceal as much as it can get away with concealing. Second, perhaps paradoxically, the penalty for insufficient disclosure is so harsh and inflexible that it has led to substantial nullification.

39. This is the foundation for the Federal Trade Commission's recommendation that patent applicants be required to submit a statement of relevancy with all prior art disclosures during patent prosecution, upon the request of the examiner. *See* FTC REPORT, *supra* note 2, at 31.

40. *Mech. Plastic Corp. v. Rawlplug Co.*, 14 U.S.P.Q.2d (BNA) 1058, 1060-61 (S.D.N.Y. 1989).

41. *See, e.g., Intirtool, Ltd. v. Texar Corp.*, 369 F.3d 1289 (Fed. Cir. 2004) (continuing the long Federal Circuit trend of finding no inequitable conduct during patent prosecution).

The penalty for insufficient disclosure is the complete invalidation of the inventor's patent. This is harsh if a valuable patent is jeopardized by a minor oversight by the applicant, yet no less drastic penalty is available. That makes enforcers loath to enforce the rule outside egregious cases.⁴² No doubt partly as a result, current rules focus tightly on the intent of the applicant.⁴³ Because intent can be difficult to prove, the current rules are often said to evoke less than robust disclosure of prior art on the part of patent applicants.⁴⁴

Just as one cannot enforce traffic laws with nuclear weapons, such a harsh all-or-nothing penalty is unlikely to be used to discipline violations other than the most egregious. If a lesser penalty were available, applicants paradoxically might face stricter enforcement of the duty. For example, a rule that permitted a court to deduct time from the tail end of a patent, in proportion to the gravity of the applicant's misfeasance during prosecution, might encourage courts to apply the threshold test strictly. Then, any adjustments needed in the interests of fairness, such as determining the exact amount of time that should be subtracted, could be made at the penalty stage.⁴⁵ There is no meaningful reform initiative on the table along these lines.

42. In the context of capital punishment, a similar dynamic is called nullification, where juries have been reluctant to convict when the penalty for relatively minor offenses has seemed harsh.

43. *See, e.g.*, *Upjohn Co. v. Mova Pharm. Corp.*, 225 F.3d 1306, 1312 (Fed. Cir. 2000) (holding that false disclosure or withholding of information from the USPTO must be accompanied by intent to deceive or mislead the examiner into granting a patent).

44. This is a frequent lament of those concerned with patent quality. *See, e.g.*, Eugene R. Quinn, *The Proliferation of Electronic Commerce Patents: Don't Blame the PTO*, 28 RUTGERS COMPUTER & TECH. L.J. 121, 150 (2002). Concerns with the subjectivity and inadequacy of the doctrine led the prestigious panel reviewing patent law reform for the National Research Council of the National Academies of Science to recommend scrapping or seriously revising the doctrine:

In view of its cost and limited deterrent value the committee recommends the elimination of the inequitable conduct doctrine or changes in its implementation. The latter might include ending the inference of intent from the materiality of the information that was withheld, de novo review by the Federal Circuit of district court findings of inequitable conduct, award of attorney's fees to a prevailing patentee, or referral to the USPTO for reexamination and disciplinary action. Any of these changes would have the effect of discouraging resort to the inequitable conduct defense and therefore reducing its cost.

NAS STUDY, *supra* note 1, at 100.

45. Interestingly, a move in this direction would mirror the evolution of a similar change in tort law. Courts in a bygone era completely excused wrongful behavior on the part of a tortfeasor if the victim of the tort had also been at fault to any degree (contribu-

Instead, the Federal Circuit relaxed the stringency of the inequitable conduct doctrine. This may partly reflect the reluctance to use the harsh penalty. In addition, the court did not want to give competitors and customers too much incentive to comb through the patent prosecution record and the prior art, looking for clever ways to show that the patentee shaded a disclosure or failed to cite or discuss a piece of prior art.⁴⁶ As a result, the search and disclosure requirements for inventors are in many ways quite lenient. The rule is that if the inventor knows of information material to patentability, he must disclose it. But, the inventor has no affirmative duty to search the prior art, and often little incentive to do so. The default rule is that it is the patent examiner, not the applicant, who must search for prior art. Patent examiners have a variety of resources, but search by the applicant would surely be helpful. Society fails to use available information if the applicant has little incentive to search and can get away with disclosing only favorable or obvious information.⁴⁷

This argues for a different approach, in which the system as a whole is set up in such a way that the applicant has a strong but supple incentive to search for and reveal relevant information.⁴⁸ For instance, Professors Lem-

tory negligence). This all or nothing rule was subject to a powerful critique: in cases where victims are likely to be partially at fault, prospective tortfeasors have little reason to be careful. The solution was to switch to comparative negligence, under which monetary liability is apportioned in accordance with the relative fault of the tortfeasor and the victim.

46. It is not clear that this is a legitimate fear. When a patent is invalid, it is a public service to prove it, so the concern must be that challengers would be able to find evidence that would wrongly convince a court that the patent was invalid. Moreover this possibility must outweigh the positive externality of a diligent search for evidence of invalidity. This strikes us as unlikely.

47. Applicants do have some incentive to search, because if the examiner finds prior art and the application cannot be re-formulated to avoid it, the applicant has lost its application costs. But unless examiners will find all prior art, the applicant's incentive to search (and disclose) ought to include the expected social costs of potential issuance of an invalid patent if the examiner misses prior art that the applicant would have found. As we discuss in the text, contrary to Professor Lemley, those social costs are not limited to actual litigation costs for a small number of wrongly issued patents.

48. An important empirical study found that patents invalidated in litigation for reasons pertaining to prior art were much more likely to involve prior art that was *not cited* by the applicant during patent prosecution. John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185, 231-34 (1998). An optimist might interpret this to suggest that if you expect to litigate your patent, it is wise to cite as much prior art as possible, but the correlation need not imply causation. Moreover, for the reasons established earlier in this Article, and as supported by extensive statistical evidence, there are many reasons to expect that a patent will never be litigated. Thus, this empirical finding falls far short of supporting the notion that patentees already have adequate incentive to make full investigation and disclosure of prior art.

ley and Shapiro have discussed a tiered system in which patent applicants choose the level of review (and concomitantly the strength of a presumption of validity).⁴⁹ One could also give patentees better incentives to find prior art early by penalizing them if their patents are overturned. After all, such a patentee almost caused harm to economic efficiency and more substantial harm to other economic actors.⁵⁰ But setting up a liability-like incentive is difficult because when the patentee actually causes harm, it is through an invalid patent that is not overturned. This situation is almost by definition impossible to diagnose, so there is an inevitable mismatch between actual harm and observed indicia. As a result, a policy of penalizing patentees whose patents are overturned will have drawbacks (making patentees defend invalid patents all the more vigorously) as well as the desirable effect of encouraging search and disclosure to the USPTO.⁵¹

B. Other Opposition Proceedings

Potential infringers and their customers also may have rich information on patent validity. That information could in principle feed into the system through *ex post* litigation. But if, as we argue, litigation's high costs make the asymmetry of stakes matter a lot, litigation may not bring forward such information as reliably and forcefully as one would wish. One response would be to add a lower-cost, post-issuance proceeding in which customers, competitors, and others could adduce evidence of invalidity.⁵² The stakes will still be unbalanced, but if costs are low enough this might not matter so much.

There are currently two statutory routes to patent reexamination that can be used by anyone who wants to challenge an issued patent. The first, instituted in 1980, is seldom used, due largely to the limited participation

49. Lemley & Shapiro, *supra* note 23, at 17.

50. This statement reflects the fact that the harm to others from the patentee's potential ability (but for the overturning of the patent) to collect a tax is largely—though not fully—counterbalanced in terms of *ex post* efficiency by the gain to the patentee. It is not immediately clear whether the difference (the deadweight loss) or the harm to others is the right measure of harm to be deterred.

51. Nevertheless, there is a rule under antitrust law establishing liability for patent applicants who apply for patents they know to be invalid. *See Walker Process Equip., Inc. v. Food Mach. & Chem. Corp.*, 382 U.S. 172, 176 (1965). Perhaps it is time to revisit the *Walker Process* rule, which has been applied in very few cases in recent years.

52. This needs to be post-issuance only because it really needs to be post-disclosure. If, as is now sometimes the case (and as the FTC has recommended should more uniformly be the case) applications become public after 18 months, an opposition procedure could begin then and not wait until issuance. FTC REPORT, *supra* note 2, at 15. Indeed, there might be gains from allowing the examiner to see the opposition's case before he makes his decision.

permitted to those who request a reexamination. The second was designed to remedy this issue, and allows more participation by the requester, but a challenger who raises an issue during this type of reexamination cannot revisit that issue in later infringement litigation.⁵³ This feature makes the new reexamination system even more ineffectual than the old one, as we discuss below. The new system came into effect in 1999, and only a small number of requests have been submitted under it so far—even though over 700,000 patents have issued since 1999.⁵⁴

1. “Old” Reexaminations Under the 1980 Act

In 1980, Congress was apprised that high-cost district court litigation⁵⁵ was the only effective way for third parties to invalidate a patent. Congress was moved by this testimony to create the first reexamination system, which was described as a “relatively inexpensive” way to invalidate patents.⁵⁶

Thus, the 1980 Reexamination Act was born of a concern to allow low-cost validity challenges to patents. But the legislative history of the Act makes it clear that Congress was also worried that reexaminations could run amok, and in particular that multiple patent challenges could be used to harass a patentee. This concern about the strategic abuse of reexaminations led to severe limitations on third parties’ rights to participate in the process once a reexamination was launched. It was also factored into the drafting of the part of the Act that specifies the grounds for reexamination. Collectively, these limitations make reexamination look much more like simply a mere repeat of the original *ex parte* patent examination, albeit with some new information.

53. Until November of 2002, a reexamination requester did not even have the right to appeal a reexamination proceeding that went unfavorably. While that has changed, requesters who lose a reexamination request are still fully estopped from using the same prior art in subsequent patent infringement litigation—that is, if they are later sued by the patent holder.

54. See USPTO, PERFORMANCE AND ACCOUNTABILITY REPORT FISCAL YEAR 2003 tbl.6, http://www.uspto.gov/web/offices/com/annual/2003/060406_table6.html (last modified Feb. 3, 2004).

55. See H.R. REP. NO. 96-1307, pt. 1, at 4 (1980), reprinted in 1980 U.S.C.C.A.N. 6460, 6462-63 (1980) (estimating average cost of defending patent infringement claim at \$250,000). Taking inflation into account, this translates into a cost of \$700,000 today. See Allen M. Leung, *Legal Judo: Strategic Applications of Reexamination Versus An Aggressive Adversary (Part I)*, 84 J. PAT. AND TRADEMARK OFF. SOC’Y 471, 480 (2002).

56. See H.R. REP. NO. 96-1307, pt. 1, at 4, reprinted in 1980 U.S.C.C.A.N. at 6463 (stating that reexamination meets the need for “useful and necessary alternatives for challengers and patent owners to test the validity of [a] patent in an efficient and relatively inexpensive manner”).

Patent examination is in many ways steered by the patent applicant, and tightly constrains the discretion of patent examiners. Thus, even where a patent challenger has introduced evidence that a patent is invalid, the patentee has many opportunities to reframe the issue, rebut the evidence, and otherwise put its own spin on the information. This agenda control is a powerful weapon for patent applicants. It is not enough to permit a patent challenger to send a copy of a technical article or prior patent to the USPTO, though that is all that is currently allowed. Lawyers being lawyers, applicants' counsel will take advantage of wiggle room in the conceptual space between a prior art reference and the claims of a patent. Unable to challenge the patentee's characterization and spin, the challenger is hardly on an equal footing. For these reasons, old-style reexaminations do not create much of a forum for robust challenges to patent validity.

The original reexamination system has been at best a modest success. Although it is an imperfect measure, it is striking that less than 1% of issued U.S. patents are ever challenged by a reexamination request (see Table 2⁵⁷), whereas the opposition rate in Europe is roughly 8%.⁵⁸ Dissatisfaction with this system led to attempts at reform that culminated in the new reexamination system implemented in 1999.

57. USPTO, *supra* note 54, tbl.13A, available at http://www.uspto.gov/web/offices/com/annual/2003/060413a_table13a.html.

58. See STUART J.H. GRAHAM ET AL., POST-ISSUE PATENT "QUALITY CONTROL": A COMPARATIVE STUDY OF U.S. PATENT REEXAMINATIONS AND EUROPEAN PATENT OPPOSITIONS (Nat'l Bureau of Econ. Research, Working Paper No. 8807, Feb. 2002). The Graham et al. study found that the rate of opposition for the subset of patents studied is more than thirty times higher in the European Patent Office compared to reexamination at the USPTO, and that opposition leads to a revocation of the patent in about 41 percent of the cases, and to a restriction of the patent right in another 30 percent of the cases—compared to reexamination which results in a cancellation of the patent right in only 12.2 percent of all cases. Note that opposition rates would also be low if the USPTO reliably issued only valid patents, or if patentees knew that a weak patent would be overturned and refrained from asserting it.

Table 2
***Ex Parte* Reexamination (FY 1999 – FY 2003)**

Activity	1999	2000	2001	2002	2003
Total requests filed	385	318	296	272	392
By patent owner	173	137	144	121	163
By third party	181	172	150	140	239
Commissioner ordered	31	9	2	11	17
Total determinations on re-requests	367	338	342	272	381
Requests granted:					
By examiner	327	320	263	262	360
By petition	1	2	2	1	1
Request known to have related litigation	62	80	80	52	109

2. “New” Reexaminations: Going Backward

In 1999, Congress introduced a new *inter partes* (“among parties”) reexamination system,⁵⁹ designed to fall into the same general category as full-blown litigation, in answer to the criticisms about lack of participation in the old reexamination system. The new system is optional; it co-exists with the old one.

The new system permits greater participation, but this comes at a steep price. Under the 1999 Act, any issue raised by a challenger during reexamination cannot be revisited in a later trial involving that challenger. This creates huge risks for challengers, who must trust that the USPTO will not make any mistakes in handling the reexamination. There is no opportunity to litigate the issue again in court. The broad consensus among patent experts is that these risks are too great.⁶⁰ Since the Act was passed, there have been only twenty-six requests for *inter partes* reexaminations.⁶¹ Legislative changes in 2002 expanded the right of appeal for unsuccessful requesters,⁶² but this has obviously not yet caused a flood of requests. While

59. See generally Kenneth L. Cage & Lawrence T. Cullen, *An Overview of Inter Partes Reexamination*, 85 J. PAT. & TRADEMARK OFF. SOC’Y 931 (2003).

60. See, e.g., Mark D. Janis, *Inter Partes Patent Reexamination*, 10 FORDHAM INTEL. PROP. MEDIA & ENT. L.J. 481, 498 (2000) (criticizing this feature of reexaminations, among others).

61. See USPTO, *supra* note 54, tbl.13b, available at http://www.uspto.gov/web/offices/com/annual/2003/060413b_table13b.html.

62. 21st Century Department of Justice Appropriations Authorization Act, 35 U.S.C. § 315(b) (2002).

some hope that the new-style request will catch on,⁶³ that does not seem likely until Congress changes the statute to reduce the risks of using the current system.

3. *Towards an Effective Post-Grant Revocation System*

We have tried to show the crying need for an effective way to invalidate patents after they are issued without going to court. For all the reasons recited in the preceding paragraphs, the existing reexamination options fall far short of what is needed. While other articles in this issue provide much more detail about what a new system should look like, we do pause here to emphasize one caveat.

There is another side to the patent revocation story, one we have not emphasized. Post-grant patent revocations could be misused by firms who simply want to slow down or injure a patentee-firm. True, the lower cost of a revocation procedure relative to litigation will reduce the prospect of this sort of harm. But because the harm is still possible, safeguards must be built into the revocation system to prevent it from being overused. One response would be to limit patent revocations to some specific time period after the grant of a patent. This is far from ideal, given that the value of some patents will not be known (and hence the gains from invalidating these patents will not become clear) until well after patent issuance. Yet the general policy in the law of property favoring settled title argues for a cutoff to the post-grant challenge period. This will allow expectations regarding the value of the patent to settle, engendering commercial stability and fostering the market for patent licensing.⁶⁴

VI. CONCLUSION

The economics of patents often create a grave imbalance of incentives between a patentee and a potential challenger to the patent. Incentives within litigation itself will be unbalanced, especially when a failed challenge will not penalize an infringer relative to no challenge at all. The fact that litigants in important cases typically choose to spend a lot of money implies that spending raises the probability of a favorable outcome. Hence, unbalanced incentives are apt to create biased outcomes. Meanwhile, incentives to challenge at all are unbalanced when a patentee is expected to

63. See, e.g., Leung, *supra* note 55.

64. See Steven G. Kunin & Anton W. Fetting, *The Metamorphosis of Inter Partes Reexamination*, 19 BERKELEY TECH. L.J. [PAGE NUMBER] (2004).

severely punish an unsuccessful challenger. All this makes litigation an inadequate substitute for adequate patent examination at the USPTO.

This is a serious problem because invalid patents are a costly drain on the economy. If the patent litigation game encourages settlement in cases involving invalid patents—and we believe it is—then that game is costing society a great deal of money. As we have demonstrated, when a patentee is expected to play hardball and severely penalize failed challenges, actual challenges are apt to be prosecuted much more seriously and final adjudications are likely to be more reliable. But hardball tactics can often penalize challengers quite severely at little *ex post* cost to a patentee. In negotiation between a patentee and a single challenger, privately attractive settlements that short-change non-participants, and downstream customers in particular, are a likely result. Thus, although challenges prosecuted to completion would yield relatively fair results, there will be very few such challenges, and patentees will be able to extract royalties disproportionate to their patents' likely strength. Often, in economic terms, indirect purchasers pay this cost rather than direct infringers.

Congress should recognize that if indeed patents are important, it is worth generously funding USPTO review, and that if the alternative is enforcement of bad patents, generous USPTO funding is a bargain. At the same time, policy should push applicants harder to disclose not only what they actually (and probably) know about prior art, but also to investigate it, preferably before filing. Finally, because all these reforms will still let some bad patents issue, we need a workable administrative post-issue or post-disclosure challenge, which should be cheap, so that the skewed incentives (which will exist) will not bias results as much as they likely do in litigation. All these changes should help patents to continue their role of encouraging innovation at a reasonable cost to society.

APPENDIX

This appendix illustrates two points. First, pass-through can be a powerful reason why direct infringers may bear little of the burden of per-unit royalties that are charged uniformly. Second, it can be very cheap for a patentee to discriminate among licensees—for instance, on the basis of whether a licensee challenges the patent. This gives the patentee a threat with which to deter challenges while sacrificing little profit even if the discriminatory scheme must actually be implemented (which, if it achieves its goal, it need not be).

First, consider the incidence of a uniform per-unit *royalty* r in a moderately competitive industry. Specifically, consider a symmetric Cournot (capacity-setting) industry with n firms of equal size, facing an industry demand elasticity of e , and with a constant and symmetric marginal cost of $c + r$. How much does each firm's profit vary with r , relative to the total amount of license revenue generated by r ?

Since the firm-specific demand elasticity is ne , the equilibrium price will satisfy the standard Lerner equation:

$$[p - (c + r)]/p = 1/[ne],$$

so that

$$p = ne(c + r)/[ne - 1].$$

Industry demand is $Q = p^{-e}$, from which we can calculate industry profits $[p - (c + r)]Q$ and total license revenues rQ . The effects of a relatively modest royalty r on industry profits and on license revenues are given by the partial derivatives with respect to r . The key number is the ratio of these derivatives. Calculation shows that the ratio of the marginal effect of r on industry profits, to the marginal effect of r on license revenues, is given by $(e - 1)/(ne - 1)$ times $(c + r)/(c + r - er)$, which for small $[r/c]$ is just $(e - 1)/(ne - 1)$. Note that when $e > 1$ this ratio is always below $[1/n]$, so the pass-through effect saps incentives to challenge even more than the public-good effect. But there is no particular need to compare them: they operate in tandem.

For example, if $n = 5$ and $e = 2$, the ratio of marginal effects is $[1/9]$: a small royalty hurts the direct licensees in aggregate only $[1/9]$ as much as it benefits the patentee. Further calculation shows that in this example, when r is five percent of the equilibrium price, and scaling demand so that total industry revenues pQ are equal to \$1 billion and royalties are \$50 million, total industry profits are \$100 million (\$20 million for each of the five firms) and would increase only by $[1/17]$, to approximately \$106 million, if the royalty were removed. Thus, the industry's collective incentive to overturn the patent (if that were the royalty rate) would be only \$6 million, versus the patentee's \$50 million incentive to defend it. This analysis formalizes a similar insight from a recent book by William Landes and Richard Posner concerning incentives of IP-owning firms in the legislative lobbying context.⁶⁵

65. See WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 407 (2003).

Now consider the profit impact of discriminatory license terms. Here there are two key pieces of economics to keep in mind. First, if all competitors are paying 1% and firm *X* must pay 2%, the first 1% is likely to be largely passed through as discussed above, but the additional 1% paid by firm *X* is borne by firm *X*. It may affect the price *X* charges, but unlike the case discussed above, firm *X* is hurt by it. Second, if the patentee faces multiple licensees whose demand is unrelated (for instance, local monopolists in completely separate geographic or applications markets), it is not very costly for it to charge somewhat less than the profit-maximizing royalty to some licensees and somewhat more to others. This is because, by the standard first-order condition, the profit function is flat near the optimum.