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Author

Lemley, Mark

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Rational Ignorance at the Patent Office

Mark A. Lemley

School of Law
Center for the Study of Law and Society
University of California
Berkeley, California 94720

Rational Ignorance at the Patent Office¹

Mark A. Lemley²

Abstract

It is common to assert that the Patent and Trademark Office does a bad job of examining patents, and that it should spend more time and money weeding out bad patents. In this article, Professor Lemley challenges that conventional wisdom. Using available data regarding the cost and incidence of patent prosecution, litigation, licensing and other uses of patents, he demonstrates that strengthening the examination process is not cost effective. The core insight is that very few patents are actually litigated or licensed; most simply sit on a shelf unused, or are used only for noncontroversial purposes like financing. Because of this, society would be better off spending its resources in a more searching judicial inquiry into validity in those few cases in which it matters than paying for a more protracted examination of all patents ex

¹ © 2001 Mark A. Lemley. Yes, I know it's the Patent and Trademark Office, not the Patent Office. But nothing in this article applies to the PTO's trademark operations, and besides being awkward, using the full title might mislead.

² Professor of Law, Boalt Hall School of Law, University of California at Berkeley; of counsel, Fish & Richardson P.C.

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ante. In economic terms, the patent office is “rationally ignorant” of the objective validity of the patents it issues.

How much time and money should the Patent and Trademark Office spend deciding whether to issue a patent? To judge by recent criticism of the office from academics, industry leaders and the press, the answer is: a lot more than it does now. The PTO has come under attack of late for failing to do a serious job of examining patents, and therefore allowing bad patents to slip through the system.³ The criticism is particularly strong in specific industries, notably software and Internet “business method” patents, in which the PTO has arguably failed to respond quickly enough to changing legal circumstances.⁴ A number of solutions have been proposed, but the common thread among them seems intuitively obvious: the PTO should do a more careful job of reviewing patent applications, and should weed out more “bad” patents.

³ Complaints are legion. See, e.g., Greg Ahronian, <http://www.bustpatents.com/index.htm>; Jeff Bezos, *An Open Letter on the Subject of Patents*, <http://www.amazon.com/exec.obidos/subst/misc/patents.html>; Julie E. Cohen, *Reverse Engineering and the Rise of Electornic Vigilantism: Intellectual Property Implications of “Lock-Out” Programs*, 68 **S. Cal. L. Rev.** 1091, 1177-80 (1995); Simson Garfinkel, *Patently Absurd*, **Wired**, July 1994, at 104; Andy Johnson-Laird, *Looking Forward, Legislating Backward?*, 4 **J. Sm. & Emerging Bus. L.** 95, 120-24 (2000); Lawrence Lessig, *The Problem With Patents*, <http://www.thestandard.com/article/display/0,1151,4296,00.html> (April 23, 1999); 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 (1999); John R. Thomas, *Collusion and Collective Action in the Patent System: A Proposal for Patent Bounties* (working paper 2000); Jay P. Kesan & Marc Banik, *Patents as Incomplete Contracts: Aligning Incentives for R&D Investment With Incentives to Disclose Prior Art*, 2 **Wash. U. J. L. & Pol’y** 23 (2000); James Gleick, *Patently Absurd*, **N.Y. Times**, Mar. 12, 2000, S 6 (Magazine), at 44.

⁴ This criticism has a great deal of force with respect to software patents, where the PTO clearly missed the ball for over a decade, failing to hire Examiners skilled in the software arts or to allow software engineers to practice before it, and failing to classify software prior art well. See, e.g., **Mark A. Lemley et al., Software and Internet Law** 333-34 (2000); Cohen, *supra* note __, at 1177-80; Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 **Calif. L. Rev.** 1, 42-45 (2001). By contrast, the PTO has reacted much more quickly to the change in legal rules in 1998 that permitted the patenting of business methods. It developed new guidelines and started training Examiners in 1999, and by 2000 had instituted special review procedures for business method patents. See, e.g., John Schwartz, *Online Patents to Face Tighter Review*, **Wash. Post**, March 30, 2000, at E1.

Much of the criticism of the PTO is well-founded, and I have no intention either of defending all of its policies⁵ or of suggesting that all or even most of the patents it issues are indeed worthwhile.⁶ But the situation is more complicated than this criticism would suggest. Conducting a more thorough examination of patent applications requires society to spend both more time and more money. Whether these increased resources would be spent wisely depends on the return we get for that money. It is that return on investment that I explore in a general way in this paper.⁷

⁵ For example, there are strong structural and psychological pressures on Examiners to issue patents rather than rejecting applications, no matter how weak the alleged invention seems. Examiners have astonishingly little time to spend on each application -- on average, a total of 18 hours, including the time spent reading the application, reading the submitted prior art, searching for and reading prior art in databases accessible to the PTO, comparing that prior art to the application, writing an office action, reading and responding to the response to office action, iterating the last two steps at least one and often more times, conducting an interview with the applicant, and ensuring that the diagrams and claims are in form for allowance. Because so many applications arrive at the PTO each year, Examiners are rewarded for getting applications out the door. *See Merges, supra* note __, at 609. And because of a bizarre set of prosecution rules, it is impossible to reject a patent once and for all. *See generally* 37 C.F.R. § 1.60(b)(4), 1.62 (after "final rejection," applicant can abandon and refile the same application -- called a "continuation" -- an unlimited number of times). Further, Examiners must write up reasons for rejection, but not reasons for allowance, giving them more incentives to allow rather than reject an application. *See, e.g.,* Thomas, *supra* note __, at [draft at 21]. Finally, the Examiner has the burden of proof in rejecting a patent application. *See, e.g., In re Oetiker*, 977 F.2d 1443 (Fed. Cir. 1992); Thomas, *supra* note __, at [draft at 21]. Thus, the only way for an examiner to guarantee that an application is finally disposed of is to issue a patent. Examiners who want credit for dispositions therefore have a strong incentive to issue patents to persistent applicants, rather than to continue rejecting the applications. *See Merges, supra* note __, at 590 (describing this process).

There are other, less tangible incentives for Examiners to issue patents in doubtful cases. The PTO during the 1990s "reengineered" itself, declaring its mission to be "helping our customers get patents." This is an indefensible position for a quasi-judicial administrative agency that is trusted with representing the public interest in deciding whether to issue patents. While the job of the PTO is certainly to issue good patents, it is also to reject bad ones. The idea that applicants, rather than the public at large, are the intended beneficiaries of the patent system cannot help but contribute to the push to issue patents regardless of quality.

⁶ Recent evidence suggests that a large percentage -- perhaps as many as half -- of the patents that are eventually litigated to judgment are held invalid. *See* John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 *AIPLA Q.J.* 185 (1998).

⁷ While I have collected hard numbers for as many of the variables as possible, I wish to make clear that my goal is to work out some back-of-the-envelope numbers that can be used to set general policy.

The essential insight of this paper stems from the little-acknowledged fact that the overwhelming majority of patents are never litigated or even licensed. Because so few patents are ever actually asserted against a competitor, it is much cheaper for society to make a detailed validity determination in those few cases where it turns out to matter than to invest additional resources in examining patents that will in most cases never be heard from again. In short, it is true that the PTO doesn't do a very detailed job of examining patents. But we probably don't want it to. They are "rationally ignorant" of the objective validity of patents, in economics lingo,⁸ because it is too costly for them to discover those facts.

In Part I, I set out the salient facts about patent prosecution and its costs. In Part II, I do the same with patent litigation and licensing, and explore what happens to the vast majority of patents that are never litigated or licensed. In Part III, I explore what these numbers mean for patent system reform. In Part IV, I respond to some likely objections to the argument I've presented. Finally, in Part V, I offer some policy proposals that stem from these ideas.

I. The Cost of Obtaining Patents

The number of patents issued per year in the U.S. has been increasing. It gradually pushed past 100,000 per year during the 1980s and 1990s, and skyrocketed to about 150,000 per year beginning in 1998. In 2001, patents in force are those issued after

⁸ The basic idea of rational ignorance is that any person will spend only a certain amount of time or money to obtain a piece of information. If obtaining that information costs more than the information is worth, they will (or should) rationally choose to remain ignorant of it. On rational ignorance, see **Ralph T. Byrns & Gerald W. Stone, *Economics* 433** (4th ed. 1989); Mancur Olson, *Rational Ignorance, Professional Research, and Politicians' Dilemmas*, in **Knowledge, Power and the Congress** 130 (William H. Robinson & Clay H. Wellborn eds., 1991).

the same date in 1984, with the exception of a small number that had "terminal disclaimers" reducing their term,⁹ and a small number that had patent term extensions lengthening their term.¹⁰

Table 2
Utility Patents Issued Per Year¹¹

<u>Year of Issue</u>	<u>Number of Patents Issued</u>
1999	153,493
1998	147,521
1997	111,983
1996	109,646
1995	101,419
1994	101,676

The data from the years before 1989 are substantially lower, but the estimated patents for the immediate future are even higher. Greg Aharonian predicts that the PTO will issue as many as 200,000 patents in 2000.¹² The total number of patents in force as of this writing is approaching 2 million.

Not all patent applications result in issued patents. Historically, about 60-65% of patent applications have resulted in issued patents according to PTO data.¹³ Table 3 shows the number of patent applications filed during the same period of years.

⁹ See 37 C.F.R. § 1.321 (rules regarding terminal disclaimers).

¹⁰ See 35 U.S.C. §§ 155, 155A, 156.

¹¹ U.S. Patent & Trademark Office, U.S. Patent Statistics, <http://www.uspto.gov/web/offices/ac/ido/oeip/taf/reports.htm#PSR>

¹² Gregory Aharonian, Patnews: Patent quality: uncertain enough to drop Validity Presumption?, email to author, Sept. 15, 2000. See also Barrett J. Riordan, *What's Driving Patent and Trade Mark Application Filings?*, 2000 **Eur. Intell. Prop. Rev.** 349 ("the current rate of growth in the United States not only is high, but also appears to be accelerating").

¹³ As Quillen and Webster point out in their astonishing paper, however, these numbers are misleading because they include a significant number of "continuation" applications and related refilings of previously-filed patent applications. See Cecil D. Quillen, Jr. & Ogden H. Webster, *Continuing Patent*

Table 3
Utility Patent Applications Filed Per Year¹⁴

<u>Year of Application</u>	<u>Number of Applications Filed</u>
1999	270,187
1998	243,062
1997	215,257
1996	195,187
1995	212,377
1994	189,857

Given the rate of increase, it is reasonable to project in future years a minimum of 275,000 applications and 150,000 issued patents per year.

Prosecuting patents is expensive. There seems to be some disagreement on precisely how expensive it is, but the general range of costs for prosecuting a patent start to finish (including application and various filing fees paid to the PTO, and attorney's fees not only to prepare and file the application, but to respond to office actions and continue prosecution through to issuance) appears to be \$10,000 - 30,000 per patent.¹⁵ I

Applications and Performance of the U.S. Patent Office (working paper 2000). I discuss their paper and its implications below.

¹⁴ Data from U.S. Patent & Trademark Office, U.S. Patent Statistics, <http://www.uspto.gov/web/offices/ac/ido/oeip/taf/reports.htm#PSR>. Note that because the average patent application takes over 2 ½ years to mature into an issued patent, see John R. Allison & Mark A. Lemley, *Who's Patenting What? An Empirical Exploration of Patent Prosecution*, 53 **Vand. L. Rev.** 2099 (2000), it is impossible to compare applications and issued patents year for year. One can get a sense for the likely number of patents to issue in the next few years, however, by applying the 60-65% rule of thumb to the number of applications filed in the last few years.

¹⁵ There is a great deal of variance in estimates of these numbers, and very little hard statistical data. Part of the variance can be explained by the different degrees of complexity in different applications. Short applications with few claims that are allowed almost immediately obviously cost less than long applications with multiple claims that spend a great deal of time in prosecution. Some estimates follow: Jon D. Grossman & Eric Oliver, *A Step-by-Step Guide to Prosecuting Business Method Patents*, 17:3 **Comp. L.** 6, 9 (March 2000) (citing 1997 AIPLA Economic Survey of patent lawyers) ("The median cost of preparing and prosecuting a utility patent application approaches \$15,000 in legal fees alone."); Erwin F. Berrier, Jr., *Global Patent Costs Must Be Reduced*, 36 **Idea: J. L. & Tech.** 473, 476-77 (1996) (describing "cradle to grave" costs of prosecution as \$14,370 for a typical application); Wayne M. Kennard, *Obtaining and Litigating Software Patents*, 430 **PLI/Pat** 193, 208 (1996) (the average cost for preparing patent applications in the software field is \$10-30,000, and the average cost of prosecuting them is another \$10-20,000).

have chosen a conservative average estimate of \$20,000 per initial application taken through prosecution. Much of this cost is front-loaded: it covers an attorney's time in meeting with the inventor, writing the application, and writing patent claims, as well as a substantial filing fee to the PTO. Other costs are incurred on a piecemeal basis as prosecution progresses, and include both attorney's fees and PTO fees to file each new piece of paper, up to and including the issuance of the patent itself. These cost averages include both patents that are ultimately issued and patent applications that are ultimately rejected by the PTO without being revived.

A significant percentage of the total applications filed in the PTO, however, are not initial applications but continuing prosecution applications.¹⁶ Quillen and Webster collect data from the PTO showing that in the 1990s 28.4% of all applications filed were continuing prosecution applications. Continuing prosecution applications are much less expensive than initial applications, because in many cases the specification has already been written and much of the prior art has already been researched. I will use a conservative cost estimate of \$5,000 per continuation application.

With these numbers, we are in a position to calculate some approximate annual costs of patent prosecution.¹⁷ Of the 275,000 applications filed per year, 28.4% or 78,100 are continuation applications. 196,900 regular applications prosecuted through to issuance or rejection x \$20,000 per patent = \$3.94 billion. An additional 78,000

Note that none of these estimates include either appeals or interferences, which obviously raise the cost a great deal.

¹⁶ By the use of this term here, I mean to include divisionals, continuations, and continuation-in-part applications.

¹⁷ I should emphasize that these are costs in the U.S. alone. Patent applicants that want protection outside the U.S. must pay radically more, as they must replicate the prosecution process in many different countries.

continuing patent applications x \$5,000 per patent = \$390 million. This gives us a total annual cost of \$4.33 billion for domestic patent prosecution.

What does this money buy? The answer is, surprisingly little actual assessment of whether a patent should issue. The patent prosecution process is *ex parte* – the only participants are the applicant seeking a patent and the Examiner, who is both judge and devil’s advocate.¹⁸ While patent applicants must submit to the PTO relevant prior art of which they are aware,¹⁹ they are under no obligation to *search* for prior art, and most do not. The Examiner, then, has the burden of reading the application, searching for and identifying the relevant prior art, reading the relevant prior art, deciding whether the application should be allowed by comparing the claims to the prior art, and writing an “Office Action” explaining the reasons why any claims are rejected. After the applicant writes a response, this process will normally happen again, and may happen several more times. The Examiner may also conduct an “interview” with the applicant in which they discuss allowability in person or over the phone. Finally, there are technical matters that the Examiner must identify and attend to before the patent application is in condition for allowance. The *total* time the Examiner spends on all these tasks over the 2-3 year prosecution of the patent is 18 hours on average.²⁰ It is not surprising, therefore, that the

¹⁸ The patent law was recently amended to provide for third-party participation in the reexamination of patents that the PTO has already issued. 35 U.S.C. §§311-318. However, virtually no one is expected to use this system, because doing so precludes you from challenging the validity of a patent in later litigation. 35 U.S.C. § 315(c). See Mark D. Janis, *Inter Partes Patent Reexamination*, 10 **Fordham Intell. Prop., Med. & Ent. L.J.** 481 (2000).

¹⁹ 37 C.F.R. §1.56.

²⁰ See, e.g., Brenda Sandburg, *Speed Over Substance?*, **Intell. Prop. Mag.** (March 1999) (18 hours on average; Examiners may spend more time on complex technologies); Thomas, *Collusion*, *supra* note __, at [draft at 10] (16 to 17 hours); author’s conversation with Q. Todd Dickinson, Director of the U.S. PTO, April 2000. Cf. *Patent Nonsense: The Knowledge Monopolies*, **The Economist**, April 8, 2000 (“patent Examiners spend only eight hours on a patent, on average.”).

PTO issues many patents that with perfect knowledge would have been rejected. This is particularly true since much of the most relevant prior art isn't easy to find – it consists of sales or uses by third parties that don't show up in any searchable database, and will not be found by examiners in a hurry. Indeed, in litigated cases that actually result in a final judgment on validity, issued patents are held invalid 46% of the time.²¹

II. What Patentees Do With Their Patents

The next piece of information we need is an idea of what patentees actually do with their patents. Surprisingly, hard data on this question are hard to come by. The traditional incentive story relied upon by intellectual property scholars assumes that people patent in order to obtain exclusive rights to a technology, and that they use those patents either to exclude competitors from the market or to obtain licensing revenue in exchange for permitting the use of the patented technology.²² But this story is not only incomplete, but dramatically so.²³ What data we have suggests that the overwhelming majority of patents are neither litigated nor licensed.

A. Litigation

I should make it clear that this is an average across all industries, and that there may be substantial variation in the hours spent from one industry to another. *See Dickinson, supra* (hours spent range from 8 per patent in some art units to 32 in other art units).

²¹ Allison & Lemley, *Empirical Evidence*, *supra* note __, at 205-06.

²² *See, e.g.*, Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 **Tex. L. Rev.** 989 (1997) (recounting the traditional story and citing sources).

²³ *See* Mark A. Lemley, *Reconceiving Patents in the Age of Venture Capital*, 4 **J. Sm. & Emerging Bus. L.** 137 (2000).

Of the roughly 2 million patents currently in force,²⁴ only a tiny number are the basis for lawsuits each year. About 1,600 patent lawsuits are filed each year,²⁵ involving at most perhaps 2,000 different patents.²⁶ The overwhelming majority of these lawsuits settle or are abandoned before trial. Only about 100 cases per year (and 125 patents) actually make it to trial.²⁷ Based on these numbers, in recent years it is reasonable to estimate that at most only about 2% of all patents are ever litigated, and less than two-tenths of one percent of all issued patents actually go to court.²⁸

When patent litigation does occur, it is expensive. The American Intellectual Property Law Association reports, based on a survey of its members, that the *median* cost of patent litigation to each side is \$799,000 through the end of discovery, and \$1,503,000

²⁴ See *supra* notes ___-___ and accompanying text.

²⁵ The exact data for the years 1995-1999 can be found in the Derwent Litalert database. The data that follow were compiled as of June 1, 2000, and involve cases labeled “patent.”

<u>Year</u>	<u>Number of Cases Filed</u>
1999	1652
1998	1730
1997	1731
1996	1514
1995	1258

²⁶ Some patent lawsuits involve more than one patent. Two recent studies found about 1.25 patents were involved per lawsuit. See, e.g., John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 *AIPLA Q.J.* 185 (1998) (data for all cases actually resolved by opinion between 1989 and 1996 show 299 patents in 239 cases, or 1.25 patents per cases); Kimberly Pace Moore, *Judges, Juries and Patent Cases – Empirical Evidence to Peek Inside the Black Box*, ___ *Mich. L. Rev.* ___ (forthcoming 2001) (data for all cases that went to trial between 1983 and 1999 show 1733 patents in 1355 cases, or 1.28 patents per case). If about 1,600 different cases are filed per year, these data suggest that those cases would involve approximately 2,000 patents, unless there is some reason to believe cases that actually get resolved are likely to involve systematically more (or fewer) patents than those cases that settle. But some patents are doubtless included in more than one case, so the actual number of patents litigated from each cohort should be somewhat less than 2,000.

²⁷ See Moore, *supra* note ___, at [draft at 24 Table] (number of trials per year from 1988 to 1998 ranged from a low of 86 to a high of 108).

²⁸ If anything, these numbers are on the high side, because many patents that do go to court are litigated in more than one case. Thus, the total number of *different* patents litigated may actually be somewhat smaller.

through trial and appeal.²⁹ Estimating a total annual cost requires us to compute the cost of cases that go to trial (\$1,503,000 x 100 cases x 2 parties = \$301 million) and the cost of cases that are filed but settle before trial.³⁰ In the latter case, multiplying \$799,000 x 1,500 cases filed but not taken to trial annually x 2 parties gives us an estimate of these costs: \$2.4 billion. In practice, however, some cases will settle early and therefore not incur this cost³¹ (though based on my anecdotal experience, cases are more likely to settle late in the litigation process, when the cost and uncertainty of trial is looming). To account for this, let us assume that the cost of cases settled before trial is only 3/4 of \$2.4 billion, or \$1.8 billion. \$1.8 billion plus \$301 million gives us a total annual amount spent on patent litigation of \$2.1 billion.³² It is well worth noting that this number is only the cost of legal fees. It does not include the cost of judgments paid, which would raise defendant's costs but lower plaintiff's correspondingly. It also does not include indirect social costs such as judicial resources or the value of the time lost by corporate employees involved in the case.

Not all of this cost, of course, is attributable to litigating the validity or enforceability of the patent. Virtually every patent infringement lawsuit includes a claim

²⁹ AIPLA Report of Economic Survey (1999), cited in Craig P. Opperman, *Computer Technology Patents (with an Emphasis on Internet & E-Commerce Related Patents)*, 590 **PLI/Pat** 1039, 1047 (2000). The average cost of patent litigation is likely higher, because some extremely expensive cases will raise the average above the median. The study does report that the 75th percentile of patent cases cost \$1,500,000 to take through discovery, and \$2,510,000 through the end of the case.

³⁰ This is only an estimate, because I have access only to the median cost and not the cost distribution. It is likely that these numbers therefore understate the costs of patent litigation somewhat, because extremely expensive cases aren't fully accounted for by the median number.

³¹ Recall that the \$799,000 number represents a median only for cases that continue through the end of the discovery period, not for all cases settled short of trial.

³² An earlier and smaller estimate comes from Josh Lerner, who studied cases filed in 1991 and determined that they would cost about \$1 billion. See Josh Lerner, *Patenting in the Shadow of Competitors*, 38 **J. L. & Econ.** 463, 470 (1995).

that the patent is either invalid or unenforceable due to inequitable conduct (or commonly both). But of course these cases also involve infringement allegations that must be litigated, and commonly include ancillary issues as well (damages, license questions, etc.). Validity requires a great deal of attention, however. In contrast to the 18 hours an Examiner will spend on a patent start to finish, lawyers and technical experts will spend hundreds and perhaps even thousands of hours searching for and reading prior art, poring over the specification and prosecution history, and preparing and defending invalidity arguments. A rough estimate may be that half of the cost of patent litigation – \$1.05 billion per year – is in fact attributable to disputes over the validity or enforceability due to inequitable conduct of the patents in suit.³³ This leaves the remaining cost for infringement, license, antitrust, damages, willfulness and the related non-patent issues that are often litigated in patent cases.

B. Unlitigated Patents

What happens to the rest of the patents? A surprisingly large number of issued patents lapse for failure to pay required maintenance fees.³⁴ Payment of these fees, which are relatively low,³⁵ is a prerequisite to bringing a patent lawsuit; failure to pay

³³ It is possible that the amount of money litigants spend in lawsuits relates more to the perceived importance of the case and the litigant's financial condition than to the issues. Thus, if we were to remove validity issues entirely from litigation, it may be that the parties would simply spend more money litigating the other issues.

³⁴ Maintenance fees are due in increasing amounts at periods 3 ½ years, 7 ½ years, and 11 ½ years after the patent issues. 35 U.S.C. § 41(b). For a pioneering study of maintenance fees and patent value, see Jean O. Lanjouw et al., *How to Count Patents and Value Intellectual Property*, 46 *J. Indus. Econ.* 405 (1998).

³⁵ The fees are \$830 at 3 ½ years, \$1,900 at 7 ½ years, and \$2,910 at 11 ½ years. 35 U.S.C. § 41(b).

maintenance fees is effectively an abandonment of the patent.³⁶ The evidence suggests that nearly two-thirds of all issued patents lapse for failure to pay maintenance fees before the end of their term; nearly half of all patents are abandoned in this way before their term is half over.

Table 1
Percentage of Patents for Which Maintenance Fees Were Paid³⁷

<u>Age of Patent</u> ³⁸	<u>Percentage Paid</u>
0-1 year	100%
1-2	100%
2-3	100%
3-4	100%
4-5	82.56%
5-6	81.68%
6-7	80.77%
7-8	78.78%
8-9	57.43%
9-10	56.53%
10-11	56.14%
11-12	56.23%
12-13	37.05%
13-14	36.78%
14-15	36.00%
15-16	35.73%
16-17	36.03%

Most of these patents aren't litigated or licensed during the short time they are in force.³⁹

³⁶ The issue is more complicated, because it is sometimes possible to reinstate patents that have lapsed for failure to pay maintenance fees. *See, e.g., Centigram Comm. Corp. v. Lehman*, 862 F. Supp. 113 (E.D. Va. 1994).

³⁷ *See* Electronic Mail from Paul Harrison, USPTO, to Franklin Goldberg, June 6, 2000. Data made available from Bill Brown, USPTO Maintenance Fee Office. The data are from 1998. *See also* Jean O. Lanjouw et al., *How to Count Patents and Value Intellectual Property: Uses of Patent Renewal and Application Data*, 46 **J. Indus. Econ.** 405 (1998).

³⁸ Maintenance fees are due at 3 ½ years, 7 ½ years, and 11 ½ years after the patent issues. *See* 35 U.S.C. § 41(b). Thus, for the first three years no fees were due, and the percentage will be 100%.

³⁹ Some patents that lapse may nonetheless have been used, and may merely have become irrelevant with the passage of time. But patents that are litigated or licensed are generally not those that expire for failure to pay the fairly modest maintenance fees.

Obviously, though, many patents that do remain in force never get litigated. Some of these patents are licensed for royalties without litigation. Surprisingly, it does not appear that anyone knows precisely how many patents are licensed for royalties.⁴⁰ There is some reason to believe, however, that the number is not that large.

First, many patentees engage in "defensive patenting," obtaining patents to stake their claim to an area of technology in hopes of preventing other companies from suing them. Indeed, there is some anecdotal evidence that at least among high-technology and start-up companies, the primary purpose of patents is defensive.⁴¹ Licensing patents for royalties is correspondingly uncommon in many industries in which all the major players have large patent portfolios. Patent licensing in such an industry has a very different character from the typical model of licensing for royalties. Large companies tend to come to the table with hundreds of patents on each side, relying on volume rather than quality in a sort of "patent arms race."⁴² While some cross-licensing deals in such

⁴⁰ Jim Pooley has proposed that all license agreements be recorded in the PTO. James H.A. Pooley, *The Trouble With Patents*, **Cal. Lawyer** (2000). Cf. Ronald H. Coase, in **Essays on Economics and Economists** (1975) (proposing a national contracts database). In addition to being a good idea for the reasons he suggests, this proposal would have the collateral benefit of improving our knowledge about the patent system dramatically. In the absence of such a rule, this is an area that is ripe for research.

⁴¹ See, e.g., Scott Herhold, *Patents Emerge as Online Battleground*, **S.J. Mercury-News**, July 17, 1999 (quoting a venture capitalist as saying "None of my companies seek patent protection because they actually think it will protect them from competition. . . . Rather, they seek patents to protect themselves from other people who have patents."); John H. Barton, *Reforming the Patent System*, 287 **Sci.** 1933 (March 17, 2000) ("patent portfolios are acquired for defensive purposes."); Lemley, *Reconceiving Patents*, *supra* note __, at 143.

⁴² See, e.g., Bronwyn Hall & Rosemarie Ham Ziedonis, *The Patent Paradox Revisited: Determinants of Patenting in the U.S. Semiconductor Industry*, NBER Working Paper 7062 (1999) (discussing such cross-license patterns in the semiconductor industry); John H. Barton, *Reforming the Patent System*, 287 **Sci.** 1933 (March 17, 2000) (suggesting that this practice is common in other industries as well).

At a conference in November 2000, the former general counsel of a major semiconductor company said that at his company, intellectual property lawyers would index their patents against competitors' products, but wouldn't assert those patents in negotiations unless and until the competitor approached them first. My sense is that this anecdotal evidence is quite representative of the approach in many industries.

industries are royalty-bearing, it is more common for companies to agree to royalty-free cross-licenses, in which each party gets the freedom to make products but does not have to pay the other. Similarly, in many high-technology industries patent rights are waived (or licensed on a royalty-free basis, which amounts to the same thing) because the patented technology is adopted as an industry standard.⁴³

Second, patentees that want to license their patents for royalties parties with asymmetric stakes – they are individuals who don’t sell products, “licensing shops” whose primary output is patents, or older companies who are no longer major players in the marketplace. Parties in these situations have no need to “trade” patents in the patent arms race described above.⁴⁴ These patentees often approach an entire industry at once in an effort to maximize revenue. While some of those patents may be successfully licensed without litigation, it is more likely that at least one company that is approached will opt to fight rather than take a license. If even one company does so, the patent is included in the litigation percentages cited above.⁴⁵ Further, litigation may be a useful settlement strategy, forcing the other side to the bargaining table. Indeed, that appears to be what litigation normally is, since the overwhelming majority of patent lawsuits settle, presumably with some form of licensing deal.

⁴³ See Mark A. Lemley, *Antitrust, Intellectual Property Rights and Standard-Setting Organizations* (working paper 2001) (discussing organization rules that require licensing of intellectual property on favorable or even royalty-free terms).

⁴⁴ Thus, Jerome Lemelson is famous for having licensed his patents aggressively, and Texas Instruments is the most aggressive licensor of patent in the semiconductor industry. Lemelson did not make any products himself, and therefore didn’t need cross-licenses from anyone. TI, while still a player in many markets, litigated primarily in the area of large scale integrated circuits, in which it did not have significant sales by the time of the lawsuits.

⁴⁵ Thus, both Lemelson and Texas Instruments licensed their patents without litigation on many occasions, but both have also been involved in multiple lawsuits over those patents.

Third, many companies obtain patents for reasons totally unrelated to litigation or licensing. Companies may patent broadly to “hedge their bets” if they are uncertain what patents are likely to have value *ex post*. Other companies, especially start-ups, obtain patents as a financing tool.⁴⁶ Venture capitalists use client patents (or more likely, patent applications) as evidence that the company is well-managed, is at a certain stage in development, and has defined and carved out a market niche.⁴⁷ Established companies may patent out of inertia, or to maintain a reputation as a market leader, or simply for the marquis value of selling a product with “patented technology.”⁴⁸ Individuals employed by those companies may pursue a patent for its resume value, or for the cash rewards that many companies pay, or simply because it is a routine and established policy.⁴⁹ Finally, some patents are issued, especially to individuals, not because they have any market value but simply because the applicant really wants a patent on his invention, no matter how little commercial value it is likely to have.⁵⁰

Even if a patent is obtained with an eye towards litigating or licensing it, it may not in fact be used in that way. Some patents get lost in a corporate bureaucracy – by the

⁴⁶ See generally Charlotte H. Copperthite & Michael J. Lerner, *Creative Use of IP Portfolios Helps Secure Financing*, **Nat’l L.J.**, May 24, 1999 (discussing the role of IP rights in biotechnology financing).

⁴⁷ Lemley, *Reconceiving Patents*, *supra* note ___, at 143-44. Cf. Samuel Kortum & Josh Lerner, *Does Venture Capital Spur Innovation?* (NBER working paper W6846, 1998) (venture capital funding positively correlated with patenting).

⁴⁸ See Ann Bartow, *Separating Marketing Innovation from Actual Invention: A Proposal for a New, Improved, Lighter, and Better-Tasting Form of Patent Protection*, 4 **J. Sm. & Emerging Bus. L.** 1 (2000) (describing the widespread use of patents for such purposes and identifying examples).

⁴⁹ At a conference in November 2000, the chief patent counsel for a biotechnology company suggested that the demand in many technology-driven corporations for “metrics” to measure employees and departments drove individuals and groups within those companies to set numerical quotas for patents they would acquire.

⁵⁰ Indeed, there is an entire book devoted to “oddball” patents on things like ear-flattening devices and thumb-wrestling rings that are unlikely ever to be licensed for royalties. See Rick Feinberg, **Peculiar Patents** (1994).

time the patent issues, it may be largely forgotten by the licensing or litigation departments of a large corporation, or ignored by the general counsel of a smaller company with other things on her mind.⁵¹ Other patents, even if filed with an intent to license or sue, may simply turn out not to be useful, either because the claims are too narrow or because by the time the patent issues the industry has moved in an unanticipated direction. There is certainly a strong sense in the patent community that many issued patents, even potentially valuable ones, sit around collecting dust.⁵²

In terms of numbers, there is certainly further work to be done. It is astonishing that we don't have a very good idea of how many patents are actually licensed for revenue. My sense, however, is that in percentage terms relatively few of the 150,000 or so patents issued each year are actually licensed to third parties in exchange for royalties. As we have seen, only about 1.5% of all patents are ever litigated at all; the total number of patents that are licensed for royalties without even a complaint being filed is likely somewhat higher, but I suspect the total number of patents litigated or licensed for a royalty (as opposed to a cross-license) is on the order of 5% of issued patents.⁵³

⁵¹ Sam Oddi reports old data that many patents did not cover products in use at all:

In an industry survey conducted in the early 1950s, it was concluded that: "The overall utilization rate of patents in current use, used in the past, and reported about to be used is 57 to 58%." Barkev S. Sanders et al., *Patent Acquisition by Corporations*, 3 *PAT. TRADEMARK AND COPYRIGHT J.RES. AND EDUC.* 217, 239 (1959). The survey consisted of over 1,000 questionnaires returned by companies concerning their use of patents. The study further concluded that the patent utilization rate is significantly higher for smaller companies (over 75%) compared to larger companies (close to 50%). *Id.* at 218.

A. Samuel Oddi, *An Uneasier Case for Copyright Than for Patent Protection of Computer Programs*, 72 *Neb. L. Rev.* 351, 426 n.310 (1993).

⁵² Thus, Kline and Rivette call their book on patents "Rembrandts in the Attic" because even those who are holding onto a valuable asset often don't know it. Kevin G. Rivette & David Kline, **Rembrandts in the Attic** (2000).

⁵³ This is obviously an important number for this article, and I am troubled that it is only an estimate. In Part IV.A I relax this assumption to see how it affects the results.

The cost of licensing without going to court is also dramatically less than the cost of litigation. Hard data are again difficult to find, but a reasonable estimate per patent of the cost of negotiating a license might be \$50,000.⁵⁴ Again, not all of this amount will be attributable to validity issues – the parties will also debate whether the patent covers the accused product, and what the appropriate royalty rate will be. Let us assume that the validity investigation (normally requiring the accused infringer to obtain a written opinion of counsel) and debate in an average royalty-bearing patent license costs half of the total, or \$25,000. This gives us a total annual licensing cost outside of litigation attributable to validity of 5250 patents⁵⁵ x \$25,000 per patent = \$131 million.

The licensing numbers are much more ballpark figures than the numbers for either prosecution or litigation. Because I don't have hard numbers, in the calculations that follow I will work with a range of possible numbers. In any event, the important lesson to learn is that the overwhelming majority of patents are never used in a way that calls their validity into question.

For what it's worth, while several academics thought the 5% number was too low, some experienced patent prosecutors told me it was too high. One former patent prosecutor for a major technology company said that his company's rule of thumb was that only 1% of their patents were worth licensing.

⁵⁴ Some empirical work in the international technology licensing context, where the costs are likely to be higher, sets a value of about \$100,000 per transaction. See **Farok J. Contractor, International Technology Licensing: Compensation, Costs and Negotiation** 105 (1981). This number is likely to be significantly higher than the cost per patent of domestic licensing, both because international deals tend to be more expensive and because many transactions involve more than one patent.

⁵⁵ 150,000 patents per year times 3.5% (5% licensing rate, less the 1.5% that involve litigation).

III. How to Improve the Patent System

Suppose that we agree with the host of commentators suggesting that there are too many bad patents in the system, and that we want to take steps to weed out some of those patents. How should we go about doing it?

One way to do it – the way suggested by some advocates of patent reform⁵⁶ – would be to have PTO Examiners spend more time examining patents and in particular more time searching the prior art. More time means more money, of course: both money to hire additional Examiners and more legal fees paid by patent applicants to respond to the new rejections these additional Examiners will doubtless issue. Doubling the amount of time Examiners spend reviewing a patent from 18 hours to 36 hours might seem a reasonable place to start. Doing so wouldn't double the cost of prosecution, because much of that cost results from the drafting of the initial application, and that would remain unchanged. But it might mean a 50% increase in the cost of prosecution, from an average of \$20,000 per original applications to \$30,000 (and from \$5,000 to \$7,500 for continuing prosecution applications).⁵⁷ It should also mean that fewer patents issue,

⁵⁶ This argument is particularly common in the popular press. See, e.g., Gleick, *supra* note __, at 44; Marc J. Lane, *Talking Entrepreneurship: Patent Office's Monopoly Game Hurting Innovation*, **Crain's Chi. Bus.**, June 5, 2000; Philip E. Ross, *Patently Absurd: Technology and Gamesmanship Have Overwhelmed the U.S. Patent Office. How to Fix It?*, **Forbes**, May 29, 2000; Members of Congress have also made suggestions along these lines. See Victoria Slind-Flor, *Bar Reacts to Bezos Patent Reform Plan*, **Nat'l L.J.**, Mar. 27, 2000 (quoting Rep. Coble: "If everyone would keep their grubby hands off the PTO's fees, the agency could hire and retain even more examiners to ensure that only quality patents are issued."). Patent Examiners themselves have also taken this position. See Statement of Ronald J. Stern, President of the Patent Office Professional Association, before the Subcommittee on Courts and Intellectual Property of the Committee on the Judiciary of the U.S. House of Representatives, March 25, 1999 ("Patent examination needs to be enhanced by providing more time for examination . . ."). Indeed, Bruce Lehman, then Commissioner of the PTO, himself took that position back in 1994: "We are going to have to re-engineer the Patent and Trademark Office so that we give [Examiners] more time and more resources. That has a price tag." George Leopold, *Congress, PTO Ponder Ways to Streamline Operation*, **Elec. Eng. Times**, Aug. 1, 1994.

⁵⁷ Some of this increase will take the form of increased PTO fees needed to hire more Examiners. PTO fees might be expected to roughly double to account for spending twice as much time per patent. Another component of the cost will be attorneys' fees needed to respond to the additional office actions Examiners

though how many fewer is hard to estimate. The reduction will depend on the quality of the patents that currently issue and how many of the bad patents that currently issue can be smoked out merely by adding a few more hours to an Examiner's evaluation. Let us assume that the number of total issued patents would drop by 10% to 135,000 per year as a result of truly final rejections of more applications by the PTO.⁵⁸ Finally, a more comprehensive examination process might deter some people from filing applications at all, both because of the increased costs and because of the decreased likelihood of actually getting a patent. To account for this, I have assumed that the number of applications would reverse its significant upward trend, and in fact would actually fall by about 10% to 247,500 under such a system. Thus, the total costs of prosecution under the new system would be 177,200 issued patents x \$30,000 per patent (= \$5.32 billion) plus 70,300 continuing prosecution applications⁵⁹ x \$7,500 per patent (= \$530 million), for a total cost under this proposed system of \$5.85 billion. This is an increase of \$1.52 billion in the cost of prosecution.⁶⁰

will generate, the necessity of drafting and explaining more claim amendments, and the additional work that will be generated for lawyers by a more thorough PTO prior art search that will presumably generate more prior art to evaluate and argue over.

⁵⁸ I actually suspect that this estimate, which would mean a proportionately greater drop of over to 20% in the number of *bad* patents, is quite high. Quillen and Webster demonstrate that the PTO in its 18-hour review actually issues 97% of all the applications it receives. See Quillen & Webster, *supra* note __, at [draft at 9 & Table 6]. To think that adding 18 more hours will more than quadruple the effective rejection rate seems implausible. But I will use this number to be conservative.

⁵⁹ 275,000 applications less 10% is 247,500 applications. 125,000 would issue as patents, and the rest would go abandoned.

⁶⁰ There will likely be indirect costs as well. A longer and more involved examination will likely lead to more initial rejections of all patent applications, even those that ultimately issue as patents. Thus, we might reasonably expect total prosecution times to increase under this strengthened examination system, even if many more Examiners are hired to relieve the burden on those presently employed. Longer prosecution times in turn impose costs not only on the patentee, whose right of exclusivity is delayed, but also on others in the industry, who may be proceeding with their own development plans in ignorance of a pending patent application that covers their product.

How much money would this save us on the back end? As we discussed in Part II, the total cost of patent litigation is \$2.1 billion, and the total cost of licensing outside of litigation is \$262 million.⁶¹ Thus, \$2.36 billion is spent every year on licensing and litigation. As noted above, it is reasonable to expect that the enhanced examination system will prevent about 10% of those patents from issuing.⁶² Thus, this cost should drop by 10%, or \$236 million, well less than the \$1.52 billion we are spending to achieve this outcome.

An alternative proposal along the same lines would require patent applicants to conduct a prior art search before filing their application and to disclose the results of that search to the PTO. This approach would have similar effects. Prior art searches cost somewhere between \$5-7,000 each on average, though the actual price will differ with the complexity of the technology and how crowded the field is. But a prior art search also requires the patentee to disclose more art, and therefore to argue about that art with the examiner. Thus, it will increase legal fees as well. A reasonable assumption is that requiring prior art searches would add between \$8,000 and \$10,000 to the cost of patent prosecution in most cases.⁶³ If we assume the same effects as above (that is, a reduction

⁶¹ I have used the full costs here, not the percentage attributable to validity issues, because patent applications that do not issue under the more detailed examination regime can't be litigated or licensed at all, and so none of that cost is incurred.

⁶² It is worth asking whether the patent applications that will not issue under this system would be more or less likely than average to be the patents that would have ended up in litigation. On the one hand, patentees are unlikely to spend money to litigate their weakest patents, so one might expect that the poor-quality patents that could have been knocked out by a slightly better examination process wouldn't be litigated at all, or at least wouldn't make it very far. On the other hand, it is possible that the patents that are invalidated under this stricter examination system are those with the broadest claims, and that those broad claims are more likely to be asserted in litigation. The text makes neither assumption, and instead simply assumes that a 10% reduction in the number of issued patents will translate into a 10% reduction in the number of litigated and licensed patents. Varying this assumption will of course vary the numbers.

⁶³ This is true only if the patentee doesn't conduct a prior art search already. But most don't, and in particular experienced patent prosecutors are less likely to conduct a prior art search than novices. In part

in the number of patents issued and the number applied for, as well as a reduction in the number of patents that survive to litigation), the cost-benefit structure is unchanged.

Another way to look at these numbers would be to say that society was willing to commit \$1.28 billion more than we currently do to weeding out bad patents. How should we spend that money? One way to spend it would be to add 18 hours to the time Examiners spend on each patent application (as noted above, the net cost of such a proposal is \$1.52 billion in increased prosecution costs - \$236 million in litigation and licensing savings = \$1.28 billion). Alternatively, we could more than double the amount of effort put into determining validity in court cases – that is, add over 1,000 more hours of prior art searches, expert analyses, and judicial hearings on each patent that is actually litigated. If we want to get the validity decisions right in the cases that matter, the latter is surely a more efficient use of money than the former.⁶⁴

The strong implication of these numbers is that we as a society ought to resign ourselves to the fact that bad patents will issue, and attempt to deal with the problem ex post, when 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 95% of patents that will either never

this is because the PTO requires that patent applicants disclose information of which they are aware, but does not require a search, see *FMC Corp. v. Hennessy Indus.*, 836 F.2d 521, 526 n.6 (Fed. Cir. 1987), so any search that is done may make it harder to get a patent. In part, too, companies fear that if they find a competitor's patent during a prior art search, they are "on notice" of that patent for purposes of willful infringement if they are later sued.

⁶⁴ For this reason, it seems wrong to suggest that courts should defer to the PTO because of their greater expertise in the technical fields in question. Cf. Arti K. Rai, *Addressing the Patent Gold Rush: The Role of Deference to PTO Patent Denials*, 2 *Wash. U. J. L. & Pol'y* 199, 217 (2000) (suggesting such deference, albeit in the context of appeals from PTO rejections of patent applications). Whatever greater technical

be used, or will be used in circumstances that don't rely crucially on the determination of validity.⁶⁵

The argument becomes more intuitive if we take the position of PTO reformers a bit further. Suppose, for example, that someone suggested that in order to minimize the risk of error we should conduct the equivalent of a full trial on validity (say, 1000 hours of examination) before granting a patent. This would certainly reduce the risk of bad patents getting through the system. But most people would rightly think such a suggestion ludicrous and unworkable. Why? Because they intuitively recognize that we simply can't afford perfect decision-making in each of the hundreds of thousands of cases on which the PTO has to make decisions. We understand rational ignorance on the part of the PTO, in other words – the only question is how much time we *should* spend per patent. From a cost perspective, the answer is, not much.

IV. Objections

Those who doubt this analysis might raise a number of possible objections. Some might question the assumptions that are necessarily built into some of these numbers. Others might question why I believe validity doesn't matter in circumstances in which the patent isn't litigated or licensed. Still others might argue that the focus on legal costs ignores issues of deterrence, issues of delay and uncertainty, or issues of fairness and distribution. I consider each of these arguments in turn.

expertise does exist (and note that it is patent lawyers as well as judges who contribute information to the litigation system) is counterbalanced by the greater time devoted to validity in the litigation process.-

⁶⁵ Jay Thomas is one of the few to have recognized this point. He notes in passing that “although Patent Office shortcomings are apparent, it is equally obvious that an exhaustive prior art search for each application would be inefficient. Many patented inventions are never commercialized.” Thomas, *Collusion*, *supra* note __, at [draft at 11]. He does not pursue the implications of this idea, however.

A. Varying My Assumptions

Perhaps you think I've played fast and loose with my statistics: that my assumptions are unrealistic, and that a more realistic assessment of the world would paint a very different picture. For that reason, in this section explore how some possible alternative numbers would affect my analysis.

I should start by noting that many of the numbers in this study reflect pretty "hard" data. We know to the exact number how many patent applications are filed, and how many patents issue every year. We know how many cases are filed, and how many of them proceed to trial. We know how much patent litigation costs, because we have survey data from the largest association of intellectual property lawyers in the country. Those numbers are what they are. Other numbers, such as the costs of patent prosecution, are estimates, but they seem to me to be reliable estimates. Not only do many different sources concur, but they also seem to fit with both my personal experience and the experience of those with whom I've talked.

Where the numbers are less solid, notably in the cost and frequency of licensing, I've tried to give PTO reformers the benefit of the doubt by estimating conservatively (in this case, by estimating on the high side both the amount of money spent on validity research in an average licensing transaction and the number of patents that are actually licensed for a royalty). Nonetheless, you may not believe me. So let's change some numbers. Suppose you think that 15% of all patents are licensed for a royalty: that's

22,500 different *new* patents licensed each year.⁶⁶ Further, let's say you think that the average cost of a validity investigation for a single patent in each of these 22,500 licensing transactions is even higher than \$25,000 – say \$40,000 out of a total cost per licensed patent of \$65,000. Both of these numbers strike me as way too high, but never mind. Let's explore.

If 15% of patents are licensed every year, that's 20,500 patents (once we subtract the 2000 that go to litigation and that we've already accounted for). 20,500 licensed patents x \$40,000 validity cost per licensed patent = \$820 million per year spent on validity, and 20,500 licensed patents x \$65,000 total licensing cost per patent = \$1.33 billion total spent on licensing per year. If we revise the calculations in part III, adding \$1.33 billion to the \$2.1 billion spent on litigation, that gives a total cost of \$3.43 billion. If we divide this by 10 as we did in Part III, reflecting the reduced number of patents that will be litigated and licensed, an enhanced examination program would save us \$343 million – still far less than the \$1.52 billion cost of adding just a few hours to the examination of each application. In fact, even at this unrealistic cost estimate of \$65,000 per licensed patent you'd have to believe that more than 100,000 new patents are licensed for royalties every year – over 2/3 of the patents issued each year, and more than pay their maintenance fees – in order to believe that doubling the examination time would save as much money as it would cost. There may be uncertainty about how much licensing occurs, but there isn't *that much* uncertainty.

The model is more sensitive to my assumptions about the number of patents that would be weeded out by adding 18 hours more examination time to each patent. Again,

⁶⁶ This represents far more than 22,500 new licensing *agreements* per year. A single revenue-producing patent may be (and often is) licensed to multiple entities over its lifetime.

it seems to me that my assumptions (that patent applications will actually go down as a result of this examination, despite their current trend; and that the new examination procedures will allow the PTO to weed out more than four times as many bad patents than they currently do without affecting any of the good ones) bend over backwards to be fair to PTO reformers. But let's relax those assumptions anyway. If you believe that 18 hours of additional examination time would allow the PTO to weed out *all* the patents that turn out to be invalid in litigation (46% in recent years),⁶⁷ and that it would weed out a similar number of bad patents in licensing, the total savings from the corresponding reduction in litigation and licensing would be 46% of the \$2.36 billion currently spent on litigation and licensing, or \$1.09 billion. That is, even if the number of litigated and licensed patents were cut almost in half by this simple change in the PTO, it *still* wouldn't be cost-effective.

We could achieve a greater cost savings in litigation if we were to eliminate validity litigation altogether, for example by *conclusively* presuming that a patent once issued was valid.⁶⁸ This would save us another \$625 million spent on validity investigations and litigation in cases in which the patent really is objectively valid. With this new savings, the reform proposal might in fact turn out to be cost-effective.⁶⁹

⁶⁷ See *supra* note ____.

⁶⁸ Cf. Kesan, *supra* note ____, at 26 (making a similar proposal contingent upon full disclosure of prior art by the patentee). Kesan's proposal is not for a conclusive presumption of validity, however, but merely for an extremely high presumption. This more moderate proposal will actually save less money than the proposal discussed in text.

⁶⁹ Even this is not a sure thing, however. The patent laws were amended in 1999 to add a third-party reexamination process that competitors can use. At the moment, no one uses this system, because anyone who does so is foreclosed from making validity arguments in litigation. 35 U.S.C. §§311-318. If validity litigation were abolished, competitors would rush to use this system as a second-best alternative. The costs of the system would have to be factored into the analysis in the text.

Think for a moment about what this would mean, however. In order to cost-justify doubling the examination time for all patents, we would have to believe that the PTO would use the extra 18 hours to make its examinations perfect – ie. no bad patents would issue. And we'd have to be so sure of this judgment that we would abolish an accused infringer's right to even try to persuade a court of the contrary, despite the fact that they have no right to participate in patent prosecution. Doing so would require substituting a very brief review (36 hours) of a patent for the thousands of hours and considered judgment of trial and appellate courts. We should be willing to do this only if we truly believe that even brief consideration by a patent Examiner is more likely to discern the truth than the trial process. I suspect that no one really believes this is possible. And if you do in fact believe 36 hours is enough for a perfect examination, it's worth asking why litigants spend thousands of hours on validity issues whenever a patent goes to court today, when they could presumably have an objectively correct answer for a much lower price.⁷⁰

In short, the central insight of this paper is not an artifact of the assumptions I've made. Even if we relax those assumptions beyond all reasonable bounds, the fundamental fact remains that litigation of a few patents is a far more efficient way of determining validity than giving a detailed *ex ante* examination to all patents.

B. Does Validity Matter for Unasserted Patents?

⁷⁰ Indeed, some evidence of how the patent bar views the PTO examination system is the fact that essentially no one has opted for the new inter partes reexamination system over court litigation. *See supra* note __. The inter partes system allows competitors to participate in reexamination and bring their prior art to the attention of patent examiners. If it were reasonable to believe that the PTO would do a better job of examining patents than the court system, one would expect that many competitors would use this system to reevaluate the validity of patents in lieu of litigation. So it is striking that competitors have not only voted with their feet for litigation over PTO examination, but have done so unanimously.

There is one assumption I have made that we have not yet considered. That is the assumption that the objective validity of a patent – the “right” answer, if you will, to the question of whether the patent should ever have issued – should matter only in cases in which the patent is asserted against an accused infringer, either in litigation or in licensing. This too might strike some people as counterintuitive. Surely venture capitalists, competitors, and the company itself must care whether the patent is a “good” one or a “bad” one, even if they don’t themselves intend to pay money for it?

In fact, though, I’m not sure that’s true. To start with the easy case, it seems that significantly over half of all issued patents are never used for any purpose whatsoever, except maybe to make their owners or inventors feel good about themselves.⁷¹ Surely it doesn’t matter much whether these patents are “really” valid in any objective sense. These patents don’t impose any direct cost on anyone, though there might be some indirect “clutter” cost associated with issuing so many patents.⁷²

Patents which are put to some use other than licensing – impressing investors, adding to asset counts, helping to define a market strategy, advertising one’s “patented technology” or marking products, and so on – also don’t seem to me to require objective validity. It is true that the existence of the patent itself is being used for some purpose – here, generally a communicative one. But the harm caused by letting even “bad” patents be used for such a purpose seems to be minimal. Sophisticated parties like venture capitalists or a potential merger partner generally understand what patents are, and what it

⁷¹ This percentage includes not only those patents for which maintenance fees aren’t paid, but also some patents for which fees are paid, but which are still never used.

⁷² This cost is likely to be minimal, if indeed it exists at all. The only reason competitors search the patent database is if they are or are likely to be involved in litigation.

means to have one. They are capable of discounting for the risk that the patent would be held invalid if it were ever enforced.⁷³ While those parties might benefit from *knowing* that the patents in question were objectively valid, there is no proposed system that will provide that information. The question is whether there is a significant benefit to society from increasing the *probability* that those communicative patents are valid; that would be true only if those who rely on information about these patents couldn't assess the probabilities easily.

Cross-licensing of multiple patents without royalty payments presents the strongest intuitive case for caring about the validity of a patent. Why should a party want to take a license to a patent that isn't really valid anyway? One answer is the one just given: parties in cross-licensing transactions tend to be sophisticated entities with patents of their own who understand and can discount for the possibility that the patent might be objectively invalid. Further, these licenses tend to involve multiple patents on each side, and (in the circumstances I have postulated) the parties essentially trade patent rights, rather than one party paying anything to the other. In these circumstances, it hardly seems likely that the objective invalidity of one patent in this group would kill the deal, though it conceivably could affect the decision to make the cross-license royalty-free in marginal cases.

C. The Social Cost of Bad Patents

Probably the most common objection to the claims made in Part III will be that they ignore the social cost of issuing bad patents. This is not entirely true. The social

⁷³ Indeed, VCs often evaluate companies on the basis of patent *applications*, where the determination necessarily involves uncertainty even as to whether the patent will issue at all.

costs of bad patents comes in several forms. First, bad patents that are litigated impose litigation costs on society; those costs have already been considered.⁷⁴ Second, bad patents that are licensed impose legal fees on licensees; those costs too have already been considered. Third, some licensees may pay a royalty rather than fight even a bad patent in court. Those royalty payments are a social cost to bad patents that I have not yet considered. Finally, it is possible that the mere existence of bad patents that aren't litigated or licensed may nonetheless deter some lawful competitive conduct. In this section, I consider these latter two forms of social cost to see if they change my analysis.

I should emphasize that the social cost of issuing bad patents is different than the social cost of the patent system itself. The patent system intentionally restricts competition in certain technologies in order to encourage innovation. Doing so imposes a social cost, though the judgment of the patent system is that that cost is outweighed by the benefit to innovation.⁷⁵ That social cost is not at issue here; rather, it is only the cost of issuing marginal bad patents that matters for my analysis.

⁷⁴ I have not included patent damages granted at trial as a social cost of bad patents. We don't have a perfect measure of which patents are objectively valid and which objectively invalid, but it seems unreasonable to assume both that the courts will erroneously validate bad patents, and that some marginal improvements in the patent system would have weeded out those same patents. So if a patent is held valid and infringed in court, the damages that ensue are a cost to the patent system as a whole, but they aren't attributable to bad patents.

⁷⁵ There is a great deal of literature attempting to assess whether that judgment is accurate or not, usually without success. George Priest complained years ago that there was virtually no useful economic evidence addressing the impact of intellectual property. George Priest, *What Economists Can Tell Lawyers About Intellectual Property*, 8 RES. L. & ECON. 19 (1986). Fritz Machlup told Congress that economists had essentially no useful conclusions to draw on the nature of the patent system. See SENATE SUBCOMM. ON PATENTS, TRADEMARKS, AND COPYRIGHTS, SENATE COMM. ON THE JUDICIARY, 85TH CONG., AN ECONOMIC REVIEW OF THE PATENT SYSTEM 55 (Comm. Print 1958) (prepared by Fritz Machlup). For some of the disagreements among historians over the impact of the patent system on innovation, see ROBERT P. MERGES ET AL, *INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE* 126-27 (2d ed. 2000). That broader analysis is beyond the scope of this article; suffice it to say that if the patent system as a whole is a bad idea, as some claim, neither the proposed reforms I discuss nor my objections to them matter very much.

1. In Terrorem Effects

A more serious concern is that potential competitors or follow-on innovators in a field might be deterred from entering the field by the existence of patents owned by their competitors. On this view, when a patentee obtains a patent, the existence of the patent itself sends a powerful signal to competitors: “stay away.” If patents do indeed have such an inherent “in terrorem” effect, then issuing bad patents has a real cost to society. The mere fact that those bad patents issue will deter some socially optimal behavior by competitors, imposing a cost on society that I have not so far taken into account.

I think there is something to this objection. Certainly it is the case that the issuance of bad patents has the *potential* to deter competition that should be lawful in some marginal cases. But I think this concern can be overstated. First, it is important to recognize that by hypothesis we are talking only about the subset of patents that are never litigated or licensed. The vast majority of these patents simply exist; the *in terrorem* concern requires us to believe that competitors are regularly searching patent databases to make sure they are not infringing a patent that no one has brought to their attention. In my experience, this is simply not the way businesses operate. If they think about the problem at all, most sophisticated companies strenuously avoid reading other companies’ patents, because they don’t want to be charged with knowledge of the patent’s existence. But far more companies simply don’t consider their potential patent liability unless or until a patent is brought to their attention.

So the patents with the most likely *in terrorem* effect must be ones that the patentee has tried and failed to license. In those cases, competitors or potential

competitors may have received a letter alerting them to the existence of the patent, though that letter will likely have been couched in extremely bland terms, purporting merely to make the competitor aware of the patent in case it should want to take a license.⁷⁶ The recipient may ignore the letter,⁷⁷ or it may react. The most common reaction is to obtain an opinion letter from counsel advising whether or not the patent is valid, and whether or not the recipient infringes.⁷⁸ Based on the advice of counsel, the company might conceivably change its business plans, but it will be the rare case in which the patent is objectively invalid and yet the recipient's counsel do not advise them accordingly. Another possible reaction is to give in without a fight. Some companies, especially small ones unsophisticated in patent law, may simply drop their plans to sell a product once a patent is brought to their attention, without even entering into a license negotiation. Again, though, this is an unusual reaction.

I don't mean by the preceding discussion to dismiss the *in terrorem* effect altogether. But I do think it is generally strongest in cases in which the patent is litigated or licensed at some point in its life, and in cases in which the patent is objectively valid. Once we exclude those cases, as we must do in measuring the merits of my thesis, the

⁷⁶ The letters are written in this circumlocutious way because if the patentee actually comes out and suggests that the recipient infringes the patent, the recipient has standing to file suit for declaratory judgment of noninfringement, see *Amana Refrigeration v. Quadlux, Inc.*, 172 F.3d 852 (Fed. Cir. 1999), an act which confers significant procedural advantages. See Kimberly Moore, *Forum Shopping in Patent Cases: Does Geographic Choice Affect Innovation?* [draft at 31] (working paper 2000). As a result, patent lawyers invariably advise their clients to write neutral letters that *don't* give the recipient a reasonable apprehension of being sued.

⁷⁷ One general counsel told me that his company never does anything about such a letter unless it gets a follow-up letter or call from the patentee.

⁷⁸ As a result, one could get a sense of the dimensions of this problem by collecting data on how often companies get opinions from patent counsel involving patents that never end up being litigated or licensed to anyone. I suspect this is a relatively infrequent occurrence, but I have no data to support or refute that hunch.

effect is likely to be a small one. Nonetheless, in part because it is hard to quantify any chill to innovation that might result, I have taken this concern into account in my suggestions for reform.⁷⁹

2. Holdup Licensing

Patent owners might try to game the system by seeking to license even clearly bad patents for royalty payments small enough that it's not worth it to licensees to go to court. This sort of "nuisance value" claim occurs in all sorts of contexts, notably securities litigation.⁸⁰ When it occurs in the patent system, as it doubtless does in some cases, the result is an inefficiency in society's allocation of resources. Innocent competitors that are not in fact infringing a valid patent have to pay money to the owners of invalid patents; that transfer encourages patenting and discourages competition to a greater extent than is socially optimal.

It is hard to know how much money is transferred from licensees to patentees through such holdup claims, and (more important for my purposes) how much less money would be transferred under a more robust examination system. But with some plausible assumptions, we can generate some ballpark figures. To calculate an upper bound on the avoidable social costs from holdup licensing, I begin with the recognition that the possible number of holdup situations is limited by the total number of patents licensed for revenue but not litigated. I earlier calculated that number to be 5,250 patents per year. Next, the *avoidable* holdup situations are a function of how many of those

⁷⁹ See *infra* notes ___-___ and accompanying text.

⁸⁰ Cf. Janet Cooper Alexander, *Do the Merits Matter? A Study of Settlements in Securities Class Actions*, 43 *Stan. L. Rev.* 497 (1991) (securities cases settled for nuisance value regardless of merit).

patents will be weeded out through 18 hours more examination. I earlier determined a high estimate for that number to be around 10% of total patents. This means that at most, 525 new patents per year are involved in avoidable holdups. This number is no doubt a gross exaggeration because it assumes that *every* instance of licensing is in fact a holdup attributable to a bad patent, not to a legitimate business deal. A more plausible (but still extremely high) number would be that half of those deals are legitimate, and the other half are holdups. If so, we are talking about 263 holdups.

What is the cost of such holdups? Presumably a licensee being held up would not be willing to pay more than the cost of litigating the patent. If the patentee demands more, the licensee ought to be willing to go to trial instead.⁸¹ The weighted cost of litigation is \$656,000.⁸² Thus, even under the assumptions made here the maximum likely social cost of licensing holdups is \$173 million. This is certainly a cost to take into account, but it doesn't outweigh the increased social cost of strengthening the prosecution system.

3. Treating Patents in Isolation

A final limitation on the social cost of *in terrorem* and holdup effects has to do with the practical context in which most patents are actually asserted or licensed. While

⁸¹ To be sure, this assumes the licensee can determine relatively easily that the patent is invalid. If that is not true, perhaps because of some information asymmetry, the licensee should pay the expected cost of litigation plus the expected payout (the likely damages times the probability of losing the case). But in this particular context, it seems reasonable to assume that the licensee will figure out pretty easily that it is dealing with a bad patent. After all, the only cases we are considering here are cases that patent examiners will determine to be invalid based merely on 18 hours more examination. These are presumably not the close cases that might ordinarily create uncertainty about trial outcomes.

some patents are licensed in a standalone transaction, most patents are licensed either as part of a group of related patents, or as part of a “hybrid” transaction that bundles patents with trade secrets and know-how.⁸³ In these cases, it may be difficult to separate out a licensee’s motivation for entering into a license agreement. Some of the social costs estimated in this section may be overstated, therefore, because a license transaction would have occurred whether or not a patent that was only one part of a larger deal was objectively invalid.

4. Facilitating Collusion

Licensees might agree to pay royalties on patents they know are invalid as part of a scheme to cartelize an industry. Thus, one potential cost of bad patents could be a cost to competition in highly concentrated industries. This is a real risk, though it is one easy to overstate. In most industries in which cartels are feasible, they will form around any of a variety of mechanisms. It seems a stretch to say that the grant of a bad patent will enable a successful cartel to exist that otherwise would never have come into being.

Nonetheless, the law should be vigilant to prevent such abuses of patent rights. Antitrust law forbids the use of patent licenses as a tool to cover a cartel.⁸⁴ The Court’s decision in *Lear, Inc. v. Adkins*⁸⁵ may also provide incentives for licensees to challenge

⁸² This is based on the calculations *supra* notes ___-___ and accompanying text. In brief, 1 case in 16 costs \$1.503 million to litigate, while under the assumptions made there the remaining 15 cases cost \$599,000 on average to litigate.

⁸³ See James H.A. Pooley, *Trade Secrets/Know-How and Hybrid Licenses* 1, available at <http://www.fr.com/publis/> (“the trend is towards license packages that include a mix of rights”).

⁸⁴ 15 U.S.C. §1; see generally **Herbert Hovenkamp et al., Intellectual Property and Antitrust Law** ch. 34(B) (forthcoming 2001).

⁸⁵ 395 U.S. 653 (1969).

the validity of patents used to facilitate a cartel. *Lear* has come under sustained attack of late by both courts and commentators,⁸⁶ but the fear of collusive licensing may actually be a good reason to retain *Lear* and permit licensees to challenge a patent's validity at any time.

D. The Costs of Delay and Uncertainty

A more serious objection to my model is that it considers only the costs of prosecution and litigation, and does not consider the costs imposed by a delayed resolution of the validity question. Having to go through litigation to determine validity not only costs a great deal of money, but it takes quite a bit of time. Indeed, the average time between the issuance of a patent that would later be litigated and a final decision on its validity in litigation was 8.6 years. For many patents, the validity decision was not made until 13 or 14 years after the patent issued.⁸⁷ During this period, both the patentee and potential infringers (accused and unaccused) are uncertain about their legal rights. Surely we would be better off knowing sooner rather than later whether a patent is valid.⁸⁸

This is a valid objection. All other things being equal, we would certainly like to resolve the validity of patents at as early a point in time as possible. But all other things

⁸⁶ See, e.g., *Studiengesellschaft Kohle v. Shell Oil Co.*, 112 F.3d 1561 (Fed. Cir. 1997); Rochelle Cooper Dreyfuss, *Dethroning Lear: Licensee Estoppel and the Incentive to Innovate*, 72 **Va. L. Rev.** 677 (1986).

⁸⁷ See Allison & Lemley, *supra* note ___, at 236 Table 12.

⁸⁸ Thus, Craig Nard argues in favor of a pre-issuance opposition system on the grounds that it will increase certainty ex ante. See Craig Allen Nard, *Certainty, Fence Building and the Useful Arts*, 74 **Ind. L.J.** 759, 795-800 (1999). For a contrary view, arguing in favor of uncertainty as to the validity of a patent, see Ian Ayres & Paul Klemperer, *Limiting Patentees' Market Power Without Reducing Innovation*

are not equal. For one thing, unless we are willing to give up validity litigation altogether and rely only on the judgment of the PTO as to validity, issued patents will still be subject to validity challenges, and thus the validity of litigated patents will continue to be uncertain *ex ante* even under an enhanced examination system. The only increase in certainty that such a system would achieve would come in those cases in which an enhanced examination system would reject a patent application that is allowed under the current system. For this subset of patents, generously estimated at 10% of the total in Part III, there would be no patent under the new system, hence no litigation at all and therefore no uncertainty. But we are talking at most about only a couple hundred patents a year in this situation.⁸⁹

Further, delay and uncertainty are not factors only in litigation. They affect patent prosecution too. An enhanced examination system will necessarily increase the delay in issuing patents, and therefore the uncertainty associated with the ownership of legal rights in an invention. This delay will affect primarily patent applicants, who will have to wait longer to learn whether they will get a patent and, if so, must wait longer to assert it.⁹⁰ This delay won't be as long in any individual case as the delay caused by litigation. But it will affect all 275,000 applications every year.

Incentives: The Perverse Benefits of Uncertainty and Non-Injunctive Remedies, 97 *Mich. L. Rev.* 985 (1999).

⁸⁹ Weeding out bad patents should increase the probability that those patents that do make it through are valid. This in turn might affect decisions to litigate. But it would do so in unpredictable ways. For example, an increased probability of validity might induce more defendants to settle without litigation or at least before trial. On the other hand, the same increased probability might induce more patentees to litigate or license their patents. The net effect of these effects is unclear.

⁹⁰ Prosecution uncertainty may also affect potential infringers, since under the 1999 changes to the U.S. patent system most patent applications will be published 18 months after they are filed. 35 U.S.C. § 122(b). Potential infringers who are aware of those published applications will have to wait longer to see whether a patent issues on the application.

Increasing the examination scrutiny imposed on patents will also likely result in some objectively valid patents being rejected. In the discussion in Part III, I assumed that more examination time would enable the PTO to weed out more bad patents without weeding out any good patents. But that is unrealistic. Systems that operate under uncertainty always balance type I and type II errors – false positives (here issuing bad patents) and false negatives (here failing to issue good patents). If we fail to issue good patents, we may reduce innovation incentives and interfere with the other socially valuable uses of patents, such as their financing function.

In short, delay and uncertainty impose costs on both sides of the equation. Balancing these effects is difficult, and I don't propose to do it here. Rather, I merely suggest that the costs of delay and uncertainty resulting from any given policy be taken into account in deciding what to do. I return to this issue in Part V.

E. Distributional Effects

There is one fundamental difference between the social costs of patent prosecution and the social costs of licensing and litigation. The former costs are internalized by patent applicants, who not only pay their own lawyers but also pay (through PTO fees) the costs of examination.⁹¹ By contrast, the costs of licensing and litigation are imposed not just on patent owners, but on accused infringers and, indirectly,

⁹¹ Indeed, they currently pay more than this, because of Congress's unconscionable decisions over the last several years to take money from the PTO user fees accounts and use them for the general federal revenue. See, e.g., Lisa Seachrist, *House Committee Proposes Taking \$295M of Patent Fees*, **BioWorld Today**, June 22, 2000 (discussing fee diversion).

on the public.⁹² Thus, relying more heavily on litigation rather than prosecution to determine patent validity has distributional as well as efficiency consequences.

This too is a fair concern. It is subject to some of the same caveats as the prior objection, however. First, enhanced examination will not eliminate validity disputes in litigation or licensing in the overwhelming majority of cases. These activities by their very nature impose costs on third parties; it is only in the relatively small set of cases that would never be brought (because the patents that are their subjects would never have issued) that any savings in cost will occur.

Second, it seems to me a contestable proposition that all the costs of determining validity should be borne by the patent applicant. It is true that the applicant is the one who would benefit from the issuance of the patent, so it might seem fair that the applicant should bear all the cost. But our society issues patents not because it desires private monopolies, but because granting patents in appropriate circumstances serves the public interest. It is equally plausible to argue that accused infringers – who have the most direct interest in the outcome of the validity proceeding – and taxpayers should help shoulder the burden of determining who is right in this area, just as they do in any other sort of lawsuit.

Finally, this sort of cost-sharing serves instrumental goals as well. One problem with resting the validity decision entirely on Examiners is that no matter how well qualified they are, they have no direct interest in the outcome. This is a good attribute in a decision-maker, but not such a good thing in a party advocate. Our system of litigation

⁹² I should make it clear that I have not considered as a “cost” of the patent system any royalty fees or damages paid by defendants as a result of infringing objectively valid patents. Not only are these costs a pure transfer from one party to another, but they are a transfer explicitly intended by the patent statute.

is founded on the idea that those with the most interest in an outcome will do the best research and make the best arguments for their position, and the truth will out. On this view, the fact that accused infringers have to pay some of the cost of determining validity is not a bug in the system, but a feature. They'll do a better job of proving a patent invalid than an examiner ever could.

Having said all this, I acknowledge that one factor to consider in deciding how to allocate costs is that determining validity *ex ante* imposes fewer costs on third parties than waiting to determine validity *ex post*. I discuss some implications of this in Part V.

V. **Implications for Other Reform Proposals**

So far I have focused attention on suggestions that the PTO spend more time examining patents in order to weed out bad ones. But there are a number of other proposals for PTO reform that have been floated. In this section, I consider the implications of my analysis for those proposals.

A. **Improving PTO Processes**

There is nothing at all in my analysis that suggests the PTO should not spend the money it is allocated as efficiently as possible. Some recent reforms within the organization have been aimed at enabling the PTO to operate more efficiently;⁹³ I see no problem with this. Similarly, Merges makes a series of suggestions for how to improve the incentives for Examiners. For example, Merges suggests changing the existing

⁹³ The American Inventor Protection Act of 1999 established the PTO as a quasi-independent “government corporation” within the Department of Commerce, giving it more administrative autonomy. *See generally* 35 U.S.C. § 1(a).

examiner incentive system so that it doesn't reward only those who grant patents, but also those who reject applications in appropriate circumstances.⁹⁴ He also suggests better training of Examiners.⁹⁵ These suggestions too are perfectly consistent with my analysis, though one should be leery of changes that involve a significant increase in total PTO costs.⁹⁶

Similarly, my analysis does not militate against increasing the budget of the patent office for reasons other than enhancing the examination each patent receives. For example, some people have suggested that the PTO needs to hire more Examiners in order that it may make decisions more quickly, holding the level of examination constant.⁹⁷ This may or may not be true, but it's irrelevant for my analysis. Reducing the time patents spend in prosecution would presumably benefit patent holders in general, not just the subset who litigate their patents.

Finally, reform at the PTO might take the form not of changing its level of effort, but of changing the legal standard it is bound to apply. The current legal standard assumes that an application is patentable; the burden is on the Examiner to present a *prima facie* case of invalidity.⁹⁸ There is a plausible legal argument for reversing this

⁹⁴ Merges, *Impossible Patents*, *supra* note __, at 606-09. The Quillen-Webster study demonstrates the need for such a reform dramatically. *See* Quillen & Webster, *supra* note __.

⁹⁵ Merges, *supra* note __, at 607.

⁹⁶ Thus, Merges also suggests paying Examiners salaries competitive with what engineers earn in the private sector, which might involve doubling the PTO's labor budget. *See id.* at 607 (noting representative figures for salaries).

⁹⁷ I confess that I've argued this myself. *See* Lemley, *Reconceiving Patents*, *supra* note __, at 147. Congress was sufficiently concerned about the possibility of delay caused by the PTO that it amended the patent statute in 1999 to insulate patent applicants from loss occasioned by Examiner delay. *See* 35 U.S.C. § 154(b).

⁹⁸ *See, e.g., In re Kotzab*, 217 F.3d 1365, 1371 (Fed. Cir. 2000).

presumption, and requiring patent applicants to shoulder the burden of proving that their invention is patentable. Whether reform along these lines would increase the cost of the system much is a complex question. While applying the new standard in the first instance probably wouldn't be any more costly, the unique nature of the U.S. patent prosecution system, in which it is virtually impossible for an examiner to reject a patent application for good,⁹⁹ may mean that a more stringent examination standard will simply result in a more protracted prosecution process.

B. Third-Party Oppositions

A number of commentators have suggested that the United States should adopt a pre-grant opposition system like those in Europe and Japan, under which interested third parties could challenge patent applications before they issue.¹⁰⁰ By contrast, the U.S. historically has not allowed third parties to participate at all in examining patents, and has given them only a limited role in calling for an *ex parte* "reexamination" of a patent after it has issued. Recent changes to the law would permit third party participation in reexamination, but still don't permit third parties to oppose an application before it issues.¹⁰¹ Further, the new third-party reexamination system is unlikely to be used much,

⁹⁹ For discussion of the process of abandonment and refiling, see, e.g., Cecil D. Quillen Jr. & Ogden H. Webster, *Continuing Patent Applications and Performance of the U.S. Patent Office* (working paper 2000).

¹⁰⁰ See, e.g., Rochelle Cooper Dreyfuss, *Dethroning Lear: Licensee Estoppel and the Incentive to Innovate*, 72 *Va. L. Rev.* 677, 765 (1986); Mark D. Janis, *Rethinking Reexamination: Toward a Viable Administrative Revocation System for U.S. Patent Law*, 11 *Harv. J. L. & Tech.* 1 (1997); Merges, *Impossible Patents*, *supra* note __, at 610-15; Craig Allen Nard, *Certainty, Fence Building and the Useful Arts*, 74 *Ind. L.J.* 759 (1999); J.H. Reichman, *From Free Riders to Fair Followers: Global Competition Under the TRIPs Agreement*, 29 *N.Y.U. J. Int'l L. & Pol.* 11, 31 (1997). Jay Thomas has proposed an interesting variant on pre-grant opposition, in which parties who submit patent-defeating prior art are paid a bonus or finder's fee. See John R. Thomas, *Collusion and Collective Action in the Patent System: A Proposal for Patent Bounties* (working paper 2000).

¹⁰¹ See 35 U.S.C. § 122(c) (precluding pre-grant opposition to published patent applications).

because anyone who participates in this system must forego their right to challenge validity in court if they are ever sued for infringement on the patent.¹⁰²

Whether an opposition system is consistent with my analysis is a difficult question. On the one hand, there is no question that a pre-grant opposition proceeding would significantly increase the cost of prosecution in cases in which it is used.¹⁰³ Thus, one might class it as merely a variant of the enhanced prosecution system. But there is a significant difference between enhanced prosecution and third-party opposition. Oppositions will only be filed in certain cases, and presumably a minority of cases. Merges reports that in Europe between 1994 and 1997, only about 6.5% of issued patents were opposed.¹⁰⁴ If the patent applications that are opposed are also the ones most likely to be licensed or litigated, then the opposition proceeding begins to look more like an earlier and cheaper type of litigation proceeding. F.M. Scherer has offered some evidence that this is in fact the case.¹⁰⁵

¹⁰² 35 U.S.C. § 315(c). Thus, commentators (and everyone in the patent bar I've talked to on the subject) think the third-party examination system as currently written is essentially worthless. See, e.g., Mark D. Janis, *Inter Partes Patent Reexamination*, 10 **Fordham Intell. Prop., Media & Ent. L.J.** 481 (2000). See also Thomas, *Collusion*, *supra* note ___, at [draft at 26] (describing reexamination as "one of the greatest failures of the modern patent system.").

¹⁰³ An opposition system would also introduce some of the elements of the litigation system into prosecution: delay, uncertainty, and the imposition of costs on third parties (though in this case only third parties that had voluntarily taken on the obligation). The amount of cost and delay would of course depend on the nature of the system. But one probable parallel is interference proceedings, a feature of existing patent law under which two applicants for a patent on the same invention dispute priority. Despite the fact that only priority of invention is at stake, this *inter partes* proceeding is notoriously protracted – some cases have taken close to 30 years to resolve. See, e.g., *Standard Oil (Indiana) v. Montedison*, 664 F.2d 356 (3d Cir. 1981) (1981 decision resolving interference proceeding based on 1953 patent applications).

¹⁰⁴ Merges, *Impossible Patents*, *supra* note ___, at 613 Table 2.

¹⁰⁵ See Dietmar Harhoff et al., *Citations, Family Size, Opposition and the Value of Patent Rights* (working paper 1999) (a study of German oppositions as a predictor of patent value, finding that an opposition proceeding is the single best predictor of the ultimate value of a patent).

Thus, an opposition system might be consistent with the insight of this article, if in fact one believes that applications that are opposed tend to be the ones that are later litigated (or at least licensed). But if this is not true – if there is a substantial disconnect between applications that would be opposed and patents that are ultimately litigated – an opposition system could turn out to be a waste of time and money on everyone’s part.¹⁰⁶

C. A Registration System

Some commentators have taken the opposite tack to the one criticized here, suggesting that the examination system should be thrown out altogether, and replaced with some sort of a registration or “petty-patent” system. Most of these suggestions are variants on a registration system, rather than a pure registration system, because the registration process would coexist with the existing patent structure.¹⁰⁷ But the basic argument is an extreme form of the one I have made here: not only shouldn’t we increase the time in prosecution, we should reduce or eliminate examination entirely, and rely on the litigation process to sort good patents from bad.

This argument is not as radical as it sounds. Patents are the only part of intellectual property law that actually require government examination and approval as a

¹⁰⁶ The metric used to analyze Thomas’ proposal for “bounties” paid to those who submit invalidating prior art should be similar. If there is reason to believe that the bounties would incent prior art submissions primarily about patents that are likely candidates for future litigation, it may serve a useful purpose. However, if the bounties encourage prior art submitters to pick “low-hanging fruit” by submitting art to invalidate obviously worthless patents, they may increase the cost of the system with little corresponding benefit. Unless great care is taken in designing the system, I fear the latter is the more likely result.

¹⁰⁷ Thus, Ann Bartow calls for an “origination patent” system to provide a lesser form of protection to those who mostly want patent protection as a marketing device. *See* Bartow, *supra* note __, at 16-24. Richard Stern promotes a “petty-patent” system as a hybrid between patent and copyright protection that might be appropriate for software. *See* Richard H. Stern, *On Defining the Concept of Infringement of Intellectual Property Rights in Algorithms and Other Abstract Computer-Related Ideas*, 23 *AIPLA Q.J.* 401 (1995). Mark Janis is more critical of such “second-tier” patent systems. *See* Mark D. Janis, *Second-Tier Patent Protection*, 40 *Harv. Int’l L.J.* 151 (1999).

prerequisite to filing a lawsuit. In copyright and trade secret law, the government doesn't need to "issue" a copyright or trade secret in order for the owner to go to court.¹⁰⁸ While there is an examination system in trademark law, trademark owners can file suit even if they don't register their marks.¹⁰⁹

My analysis may give some comfort to proponents of a registration system. After all, if it would cost much more to expand prosecution than just to litigate the issue of validity after the fact, maybe the contrapositive is also true: it may be more cost effective to reduce the time and money spent on examination below its current level, even at the cost of increasing the number of lawsuits and licensing deals.

Nonetheless, I do not endorse a pure registration system, for several reasons. First, a true registration system would mean more than merely reducing the number of hours devoted to examination – it would mean eliminating examination altogether. Even if a reduction in prosecution expenditures would be cost-effective, it does not follow that eliminating them would be. At the very least, we would want more concrete estimates than we currently have of how many people would register and enforce patents under such a system, and how many of the additional applications would be spurious. Second, while I am not fully persuaded by the arguments noted in the previous sections regarding

¹⁰⁸ There is a copyright registration system, and applying for registration is a prerequisite for a U.S. copyright owner to file a lawsuit. Tellingly, however, even in those rare cases in which copyright registration is refused, the refusal itself is sufficient for the copyright owner to go ahead with the infringement lawsuit. 17 U.S.C. § 411(a).

¹⁰⁹ See 15 U.S.C. § 1125(a). There are advantages to trademark registration, of course. Registration gives constructive nationwide use and priority, 15 U.S.C. §§ 1057(c), 1072; it permits a mark to achieve "incontestable" status, 15 U.S.C. § 1065; it gives the mark owner the right to invoke the assistance of customs officials in barring importation, 15 U.S.C. § 1124; and it gives the mark owner enhanced remedies, 15 U.S.C. §§ 1116-1120.

in terrorem deterrence, holdup, delay, uncertainty and cost-shifting,¹¹⁰ I do think they have some force. Beyond a certain point, it may be unwise to shift the burden of determining validity so far away from the patent applicant and towards its competitors. Finally, examination may serve a socially useful function by requiring patentees to restrict the scope of their claims, and therefore help prevent some abusive claims that cover entire industries.

A possible compromise solution is a hybrid registration-examination system, somewhat along the lines of the Japanese system.¹¹¹ Under a hybrid system, a patentee would register its invention, but it would not be examined unless the patentee elected examination. A patentee could not enforce the patent against a third party unless it had first had the patent examined.¹¹² The virtue of this system is that it forces the patentee to disclose its private information about the quality and likely use of its patent by deciding whether and when to have the patent examined. Because only a subset of patents would be examined, and that subset is presumably considered valuable by patentees and are likely candidates for litigation, the examiners in a hybrid system could afford to devote substantially more resources to those patents. Such a system therefore has the virtue of more cost-effectively improving the examination process than the proposals I criticize.

¹¹⁰ See *supra* notes ___-___ and accompanying text.

¹¹¹ See **T. Tanabe & Harold Wegner, Japanese Patent Law** (1979) (describing the Japanese patent system).

¹¹² This feature is particularly important, and distinguishes the proposed hybrid system from the sort of “petty-patent” systems that exist in many countries. See Janis, *supra* note ___ (describing such systems).

D. Litigation Reforms

My analysis does have significant implications for the treatment of patent validity in litigation. Patent litigation proceeds on the assumption that issued patents have been subjected to a thorough examination process, and that the PTO is unlikely to have made a mistake. This assumption is both explicit and implicit. The patent statute itself imposes a presumption that issued patents are valid.¹¹³ The courts have read this statute to impose a burden on the accused infringer to demonstrate invalidity of a patent by clear and convincing evidence.¹¹⁴ The Federal Circuit has recently strengthened that burden, by backing away from an earlier rule that applied this presumption only to arguments and prior art actually considered during prosecution.¹¹⁵ The court now says that the presumption exists even with respect to art that the Examiner did not consider at all.¹¹⁶ The Examiners are presumed to know their fields, and to know the scope of the claims they allow.¹¹⁷ These explicit legal rules are strengthened by jury psychology. Jurors in particular are notoriously reluctant to second-guess patent Examiners, not only because

¹¹³ 35 U.S.C. § 282.

¹¹⁴ *See, e.g.*, *Al-Site Corp. v. VSI Int'l*, 174 F.3d 1308 (Fed. Cir. 1999). The court has described this presumption as “strong.” *Id.*

¹¹⁵ *See, e.g.*, *Manufacturing Research Corp. v. Graybar Elec. Co.*, 679 F.2d 1355 (11th Cir. 1982); *NDM Corp. v. Hayes Prod. Inc.*, 641 F.2d 1274 (9th Cir. 1981); *Lee Blacksmith Inc. v. Lindsey Bros., Inc.*, 605 F.2d 341 (7th Cir. 1979) (all adopting the “considered art only” rule).

¹¹⁶ *See, e.g.*, *Kahn v. General Motors*, 135 F.3d 1472 (Fed. Cir. 1998) (“The presentation of evidence that was not before the examiner does not change the presumption of validity . . .”); *Applied Materials, Inc. v. Advanced Semiconductor Materials America*, 98 F.3d 1563 (Fed. Cir. 1996) (same).

¹¹⁷ *See, e.g.*, *Al-Site*, 174 F.3d at 1308 (“a presumption that the Examiner did his duty and knew what claims he was allowing.”); *Western Elec. v. Piezo Technology, Inc.*, 860 F.2d 428 (Fed. Cir. 1988) (presumption stands regardless of the expertise of the particular examiner in the field in question).

they assume Examiners know more than they do but because they believe Examiners spend much more time examining any given patent than in fact they do.¹¹⁸

It should be evident from the data cited above that the presumption of validity has little if any basis in fact. Examiners do not in fact spend long hours poring over a patent application or the prior art. They spend very little time, and far less than either the lawyers or even the triers of fact in an infringement case. They regularly miss the most relevant prior art. And the Quillen-Webster study suggests that they ultimately issue an astonishing 97% of the unique applications filed.¹¹⁹ The law should not ignore the fact that a patent application has been examined, but it seems clear that we give that examination process far too much weight. At a bare minimum, the presumption of validity should be pared back so that it covers only prior art references and arguments actually considered by the examiner. There is simply no reason to defer to the examiner's purported decision on an issue the examiner did not even decide. But I would go further and eliminate the presumption of validity altogether.¹²⁰ My argument in this article is based on the idea that it is more efficient to decide validity after in-depth consideration in those few cases in which it matters than to decide it upon a cursory

¹¹⁸ This argument is based on anecdotal evidence, but in fact there is statistical support for the propositions that juries tend to favor patentees on validity questions and that juries are unlikely to second-guess an examiner who has already considered and rejected a prior art reference. See Allison & Lemley, *supra* note ___, at 212-13, 231-34.

¹¹⁹ Quillen & Webster, *supra* note ___, at 9 & Table 6.

¹²⁰ Needless to say, therefore, I disagree with commentators such as Jay Kesan, who would strengthen the presumption of validity. See Kesan, *supra* note ___, at 26. Kesan's argument is that we don't need validity litigation if we give patent applicants sufficient incentive to disclose the relevant prior art in the first place. However, while such an approach might well encourage applicants to disclose prior art, the PTO could not evaluate all that prior art in a definitive way without spending much more time in prosecution than they currently do. Thus, Kesan's proposed system would likely result in patentees effectively insulating bad patents from judicial review by overwhelming patent examiners with prior art, knowing that the examiners won't be able to do a thorough analysis in the time they have available.

review of all patent applications. My argument is undermined if validity litigation does not in fact involve a searching investigation of validity, but instead defers to the cursory review already conducted. Based on what we know of patent examinations, deference isn't appropriate.¹²¹

Needless to say, if the general statutory presumption of validity is inappropriate, the *conclusive* presumption of validity temporarily afforded a pharmaceutical patent under the Hatch-Waxman Act is indefensible. As that statute has been implemented, a prospective generic manufacturer who wants to make a drug that may be covered by a patent files an abbreviated new drug application (ANDA), at which point the patentee is notified. If the patentee files an infringement lawsuit against the generic manufacturer,¹²² the FDA cannot proceed to consider the ANDA for 30 months, unless the Federal Circuit issues an opinion during that time holding the patent invalid.¹²³ In effect, the FDA acts as

¹²¹ A few scholars have defended deference to the PTO, but mostly in the context of appeals from the rejection of a patent application. *See, e.g.*, Craig Allan Nard, *Deference, Defiance, and the Useful Arts*, 56 **Ohio St. L.J.** 1415 (1995); Arti K. Rai, *Addressing the Patent Gold Rush: The Role of Deference to PTO Patent Denials*, 2 **Wash. U. J. L. & Pol'y** 199, 202 (2000) (deference appropriate to patent denials but not to patent grants, because the system is set up to err on the side of granting patents). These arguments tend to focus on the proper interpretation of the Administrative Procedures Act. *See generally* Dickinson v. Zurko, 527 U.S. 150 (1999) (APA requires deference to PTO factfinding).

There is some evidence that deference by courts in practice is far less than complete. About 46% of all patents litigated to a final judgment on validity issues are held invalid. *See* Allison & Lemley, *supra* note __, at 205-07. This number includes decisions on appeal and at summary judgment. At trial, only 34% of patents are held invalid. *See* Moore, *Black Box*, *supra* note __, at [draft at 31]. Thus, courts are clearly making some inquiry into validity on their own. I should note, however, that the invalidity numbers have declined significantly over the past 25 years, from 65% to 46%. *Id.* at 206 n.53; **Gloria Koenig, Patent Invalidity: A Statistical and Substantive Analysis** 4-19 to 4-23 (rev. ed. 1980). Thus, deference to the PTO by the courts seems to be on the rise.

Finally, it is worth noting some empirical evidence that suggests that the Federal Circuit's moves to strengthen the presumption of validity had the effect of increasing both the number of patent cases filed and the percentage that go to trial. *See* Jean O. Lanjouw & Josh Lerner, *The Enforcement of Intellectual Property Rights: a Survey of the Empirical Literature*, 49/50 **Annales d'Economie et de Statistique** 223 (1998). Thus, the presumption of validity may actually account for some portion of the social cost of litigation over bad patents.

¹²² The lawsuit would presumably proceed under 35 U.S.C. §271(e), as the generic has not yet begun making, using or selling the product and therefore does not violate section 271(a).

¹²³ 21 C.F.R. §314.107(b)(3).

if the patent is conclusively presumed valid unless the Federal Circuit instructs it otherwise. Even a district court determination of invalidity won't enable the generic to proceed with its application, as long as there is an appeal pending.¹²⁴ This presumption of validity has even less basis in fact than the litigation presumption, and its effect is to delay drug price competition for several years even where a patent is clearly invalid. This conclusive presumption of validity imposes significant social costs based on the assertion of bad patents in litigation, and should be abolished.

A second possible implication for litigation concerns the imposition of costs on an accused infringer who must defend against a "bad" patent. Leaving the validity determination until trial does impose significant costs on accused infringers. Where the validity issue wasn't close, and the patent was clearly invalid, it may make sense to shift some of those costs to the patentee. Unfortunately, the patent law makes it very difficult for a prevailing defendant to obtain an award of attorney's fees. The statute requires the case to be "exceptional."¹²⁵ As a practical matter, patentees are far more likely to be awarded attorney's fees than accused infringers, because they can often get fees by proving "willful" infringement.¹²⁶ It may make sense to add some balance to the fee awards. In copyright law, for example, the standards for prevailing parties seeking a fee award are identical whether the party is a plaintiff or a defendant. The Court has identified the important public policy interests not only in enforcing copyrights but also

¹²⁴ *Id.*

¹²⁵ 35 U.S.C. § 285.

¹²⁶ *See* *Great Northern Corp. v. Davis Core & Pad Co.*, 782 F.2d 159 (Fed. Cir. 1986) (willful infringement alone can make a case "exceptional" and therefore justify a fee award).

in defending against unfounded copyright claims.¹²⁷ The result of doing so has been a dramatic growth in fee awards to defendants in copyright cases.¹²⁸ A similar rule might encourage more fee shifting in patent cases, and therefore help to shift some of the burden of determining validity away from accused infringers.

Both of these suggestions would require changes in existing law. Those changes need not be complex, however, and only one of them requires rewriting the statute. The presumption of validity could be eliminated quite simply, by deleting the first two sentences of section 282.¹²⁹ Alternatively, because the statute does not specify that the presumption of validity can only be overcome by clear and convincing evidence, courts could read that section to impose a lesser burden on accused infringers. For example, section 282 might be interpreted only to shift the burden of proof by preponderance of the evidence, and not to impose a higher evidentiary burden on accused infringers.

Section 285 provides that “the court in exceptional cases may award reasonable attorney fees to the prevailing party.”¹³⁰ Standing alone, there is nothing in this statutory provision that suggests its application should favor one side or another. Thus, a court could quite plausibly read it as establishing a neutral standard for fee shifting. Because of the difficulty of proving a case “exceptional” in practice, however, Congress might

¹²⁷ See *Fogerty v. Fantasy, Inc.*, 510 U.S. 517 (1994).

¹²⁸ See Jeffrey Edward Barnes, Comment, *Attorney’s Fee Awards in Federal Copyright Litigation After Fogerty v. Fantasy: Defendants are Winning Fees More Often, but the New Standard Still Favors Prevailing Plaintiffs*, 47 *UCLA L. Rev.* 1381 (2000).

¹²⁹ Those sentences currently read: “A patent shall be presumed valid. Each claim of a patent (whether in independent, dependent, or multiple dependent form) shall be presumed valid independently of the validity of other claims; dependent or multiple dependent claims shall be presumed valid even though dependent upon an invalid claim.” The following sentence would require a conforming amendment to drop the phrase “Notwithstanding the preceding sentence.” 35 U.S.C. § 282.

¹³⁰ 35 U.S.C. § 285.

choose to amend the statute to provide for fee shifting in cases in which a prevailing party on either side “has vindicated an important public interest.”

VI. Conclusion

The PTO is rationally ignorant of the objective validity of the patents it examines. For the PTO to gather all the information it needs to make real validity decisions would take an enormous investment of time and resources. Those decisions can be made much more efficiently in litigation, because only a tiny percentage of patents are ever litigated or even licensed to others. Thus, we should resign ourselves to living with a system in which “bad” patents do slip through the PTO undetected. Recognizing that this is the case, however, should also prompt us to strengthen the validity inquiry made by the trial courts. Courts should not be ignorant of the facts, and they should not presume that a patent is valid merely because the PTO says it is.