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Unenforceability

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Abstract

The patent doctrine of inequitable conduct—which allows a patent to be held unenforceable on the basis of misbehavior by the applicant during patent prosecution—has been the subject of intense criticism from the bench and bar alike. And yet to date there has been no systematic attempt to determine whether the doctrine is or is not working as theorized. This study fills that gap. We evaluate the performance of the inequitable conduct doctrine with a novel methodological approach: by empirically characterizing the differences between patents found unenforceable and several other types of patents (unlitigated, litigated, invalid, obvious, and underdisclosed), we use those differences to reveal the real-world impact of the inequitable conduct doctrine. We find that patents held unenforceable have clear hallmarks of risky prosecution behavior, such as longer pendency and fewer disclosures of prior art, as compared to all other types we studied. These results indicate that the doctrine is likely operating better than conventional wisdom would suggest.

Table of Contents

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I. Introduction

Patents are deeply infused with public interest considerations: they are a government grant of power to an individual or company to (potentially) affect the marketplace.[1] As such, most conceptions of the patent system involve a balance between private and public rights, and virtually every aspect of the patent law is directed toward creating or enforcing that balance.[2] By punishing the socially detrimental behavior of patentees before the United States Patent and Trademark Office (USPTO), the doctrine of inequitable conduct is in some sense no different: its conventionally understood purpose is to protect the administrative integrity of the patent system.[3]

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1. *See generally* Ariel Katz, *Making Sense of Nonsense: Intellectual Property, Antitrust, and Market Power*, 49 ARIZ. L. REV. 837 (2007) (discussing and defining market power in the intellectual property context).

2. *See* Yaniv Gal, *Patent Law in the Antitrust Scope: Between Social Advancement and Competitive Impingement*, 11 J. MARSHALL REV. INTELL. PROP. L. 367, 405 (2011) ("The disclosure requirement, joined with the enablement element, aims to enhance welfare by enabling other manufacturers to replicate the patent, once it enters public domain. This preserves an adequate patent-competition balance.").

3. *See* ROBERT P. MERGES & JOHN F. DUFFY, PATENT LAW AND POLICY: CASES AND MATERIALS 1103 (4th ed. 2007) ("The administrative process of the U.S. patent system relies on the applicant and the examiner to determine whether an invention is patentable, and if so, what its proper scope should be.").

At its core, inequitable conduct emanates from the historic equitable doctrine of "unclean hands," generally stated as "he who comes into equity must come with clean hands."[4] In the patent context, the concept is that a patentee may not seek to enforce rights that were obtained by "fraud against the public."[5] For inequitable conduct purposes, fraud against the public is defined as abuses of the patent prosecution process. The doctrinal rubric asks whether a patent applicant either failed to disclose information material to patentability or made misrepresentations to the Patent Office that were material to patentability,[6] and if so, whether the nondisclosures or misrepresentations were made with an intent to deceive the Patent Office into allowing patent claims to issue.[7] Assuming the answers to both the materiality and intent inquiries meet threshold levels, a trial judge has the discretion to remedy an applicant's inequitable[8] behavior by declaring involved patents unenforceable.[9] An unenforceable patent is effectively useless to the patentee (except as a source of

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4. Precision Instrument Mfg. Co. v. Auto. Maint. Mach. Co., 324 U.S. 806, 814 (1945) ("The guiding doctrine in this case is the equitable maxim that 'he who comes into equity must come with clean hands.'").

5. *See id.* at 816 ("The far-reaching social and economic consequences of a patent, therefore, give the public a paramount interest in seeing that patent monopolies spring from backgrounds free from fraud or other inequitable conduct."); 37 C.F.R. § 1.56(a) (2013) ("A patent by its very nature is affected with a public interest. . . . [N]o patent will be granted on an application in connection with which fraud on the Office was practiced or attempted.").

6. *See* Molins PLC v. Textron, Inc., 48 F.3d 1172, 1178 (Fed. Cir. 1995) ("Applicants for patents are required to prosecute patent applications in the PTO with candor, good faith, and honesty. . . . A breach of this duty constitutes inequitable conduct. Inequitable conduct includes affirmative misrepresentation of a material fact, failure to disclose material information, or submission of false material information.").

7. *See* Digital Control Inc. v. Charles Mach. Works, 437 F.3d 1309, 1319 (Fed. Cir. 2006) (discussing the standard for determining if misstatements were intentional and thus made to deceive).

8. *See* Star Scientific, Inc. v. R.J. Reynolds Tobacco Co., 537 F.3d 1357, 1365 (Fed. Cir. 2008) (stating the process and burden of proof for a showing of inequitable conduct).

9. *See* Kingsdown Med. Consultants, Ltd. v. Hollister, Inc., 863 F.2d 867, 877 (Fed. Cir. 1988) (relevant part en banc) ("When a court has finally determined that inequitable conduct occurred in relation to one or more claims during prosecution of the patent application, the entire patent is rendered unenforceable. We, *in banc*, reaffirm that rule.").

"prior art"), and importantly, the unenforceability applies to all claims of that patent and even closely related patents.[10]

In theory, inequitable conduct plays an important role in enforcing the relationship between the patentee and the patent examiner (who is, of course, acting as an agent for the public). The patentee will often be best positioned to know and report information relevant to her invention's patentability, whether related to prior art, dates of invention, and the like. Material nondisclosure of such information (or misrepresentations) would obviously tilt the patent prosecution process unjustifiably in the applicant's favor. And the fact that patent prosecution is generally ex parte only reinforces the need for the inequitable conduct doctrine.

Or at least that's the theory. In recent years, inequitable conduct has come under attack, in large measure because of a widely held view that the doctrine is over-asserted in patent litigation.[11] That it might be over-asserted is not altogether surprising. First, the remedy of unenforceability is a very powerful one—rendering all claims of a patent (and even those in related patents) effectively void.[12] A defendant who wins on inequitable conduct has likely achieved a victory that proving invalidity of claims cannot provide in terms of the scope of the effect.[13] Second, in many cases the information that can be used

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10. *See* Therasense, Inc. v. Becton, Dickinson & Co., 649 F.3d 1276, 1288–89 (Fed. Cir. 2011) ("Moreover, the taint of a finding of inequitable conduct can spread from a single patent to render unenforceable other related patents and applications in the same technology family."); Consol. Aluminum Corp. v. Foseco Int'l Ltd., 910 F.2d 804, 809–12 (Fed. Cir. 1990) (describing how inequitable conduct regarding one patent can affect the validity of others that are closely related).

11. For some examples, see generally Lisa A. Dolak, *The Inequitable Conduct Gyre Widens*, 50 IDEA 215, 215 (2010); Robert J. Goldman, *Evolution of the Inequitable Conduct Defense in Patent Litigation*, 7 HARV. J.L. & TECH. 37, 99 (1993); John F. Lynch, *An Argument for Eliminating the Defense of Patent Unenforceability Based on Inequitable Conduct*, 16 AIPLA Q.J. 7, 8 (1988); Christian E. Mammen, *Controlling the "Plague": Reforming the Doctrine of Inequitable Conduct*, 24 BERKELEY TECH. L.J. 1329, 1332 (2009); Melissa F. Wasserman, *Limiting the Inequitable Conduct Defense*, 13 VA. J.L. & TECH. 7, at 3 (2008).

12. *See Therasense*, 649 F.3d at 1288 ("[T]he remedy for inequitable conduct is the 'atomic bomb' of patent law. . . . [I]nequitable conduct regarding any single claim renders the entire patent unenforceable.").

13. *See, e.g.*, Aventis Pharma S.A. v. Amphastar Pharm., Inc., 525 F.3d

to develop a claim of inequitable conduct (typically the nondisclosure of prior art) overlaps with the type of information that would be used to show invalidity, and yet inequitable conduct does not require proof that the invention was actually unpatentable.[14] Thus, allegations of inequitable conduct have been described as a "plague"[15] by judges, and the U.S. Court of Appeals for the Federal Circuit has gradually attempted to tighten up the standards for finding inequitable conduct—presumably out of a hope to reduce the incidence of assertions of the doctrine.[16] The patent bar has also pressed Congress for protection from the workings of the doctrine. Congress has responded with a supplemental examination provision,[17] which can be used to cure all but the most extreme forms of inequitable conduct.[18]

Thus, there is a substantial question of whether the doctrine of inequitable conduct is working to advance its theoretical goals or is instead an ineffective and costly component of an already-complex patent enforcement regime. And although a few scholars have analyzed the inequitable conduct doctrine empirically,

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1334, 1349 (Fed. Cir. 2008) (Rader, J., dissenting) (describing inequitable conduct as an "atomic bomb" and the wide reaching effects it has on litigation).

14. Courts decide issues of patent validity and enforceability separately. *See, e.g.*, Ulead Sys., Inc. v. Lex Computer & Mgmt. Corp., 351 F.3d 1139, 1150 (Fed. Cir. 2003) (reversing summary judgment of invalidity based solely on finding of inequitable conduct).

15. *See* Burlington Indus. Inc. v. Dayco Corp., 849 F.2d 1418, 1422 (Fed. Cir. 1988) ("We add one final word: the habit of charging inequitable conduct in almost every major patent case has become an absolute plague. . . . [Lawyers] destroy the respect for one another's integrity, . . . that used to make the bar a valuable help to the courts in making sound disposition of their cases.").

16. *See* Therasense, Inc. v. Becton, Dickinson & Co., 649 F.3d 1276, 1291–93 (Fed. Cir. 2011) (describing the efforts of courts to make the standards for finding inequitable conduct more stringent); Jason Rantanen & Lee Petherbridge, *Therasense v. Becton Dickinson: A First Impression,* 14 YALE J.L. & TECH 226, 245–50 (2011–12) (describing the effect of *Therasense* on patent litigation and the inequitable conduct doctrine).

17. *See* Leahy–Smith America Invents Act, Pub. L. No. 112-29, § 12(a), 125 Stat. 284, 325 (2011) (codified at 35 U.S.C. § 257 (2012)) ("A patent owner may request supplemental examination of a patent in the Office to consider, reconsider, or correct information believed to be relevant to the patent . . . .").

18. *See* Jason Rantanen & Lee Petherbridge, *Toward a System of Invention Registration: The Leahy–Smith America Invents Act*, 110 MICH. L. REV. FIRST IMPRESSIONS 24, 24–27 (2011) (describing and analyzing the supplemental examination provision).

nearly all prior work has been directed at the incidence of inequitable conduct claims and the end results in litigation and thus shines very little light on the relationship between the inequitable conduct doctrine and its theoretical role in the patent system.[19] A prior study by two of us analyzed the doctrine in more systematic depth, revealing that determinations of unenforceability are typically based on acts that could cause patent claims to issue that should not, cause claims to issue that are of inappropriate scope, and cause claims to issue in a manner or sequence that could unfairly advantage one competitor over another.[20] Taken together, the prior work can be read to suggest a nexus between the doctrine of inequitable conduct and its theoretical role in the patent system, but results are more suggestive than conclusive. This project seeks to fill that gap.

Although our research question is the performance of a legal doctrine—inequitable conduct—our experimental design is novel in approach and does not depend on an analysis of case law. Instead, we build several datasets that allow us to compare the characteristics of the patents involved in inequitable conduct (and

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19. *See, e.g.*, Mammen, *supra* note 11, at 1348–61 (analyzing the prevalence of inequitable conduct); Kimberly A. Moore, *Judges, Juries, and Patent Cases—An Empirical Peek Inside the Black Box,* 11 FED. CIR. B.J. 209, 211–13 (2001) (addressing inequitable conduct among other doctrines when comparing patentee win rates and recoveries in cases tried before juries and judges); Benjamin Brown, Comment, *Inequitable Conduct: A Standard in Motion*, 19 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 593, 607–15 (2009) (analyzing court findings of inequitable conduct using statistics); Kevin Mack, Note, *Reforming Inequitable Conduct to Improve Patent Quality: Cleansing Unclean Hands*, 21 BERKELEY TECH. L.J. 147, 155 (2006) (discussing the frequency with which inequitable conduct is pled); Katherine Nolan-Stevaux, Note, *Inequitable Conduct in the 21st Century: Combating the Plague*, 20 BERKELEY TECH. L.J. 147, 160–64 (2005) (evaluating the number and success of frivolous inequitable conduct allegations); *see also* Donald R. Dunner, J. Michael Jakes & Jeffrey D. Karceski, *A Statistical Look at the Federal Circuit Patent Decisions: 1982–1994*, 5 FED. CIR. B.J. 151, 156, 173 tbl.4 (1995) (examining inequitable conduct as part of a study into whether the Federal Circuit is pro-patentee).

20. *See* Lee Petherbridge, Jason Rantanen, & Ali Mojibi, *The Federal Circuit and Inequitable Conduct: An Empirical Assessment*, 84 S. CAL. L. REV. 1293, 1324–29 (2011) (reporting acts such as failing to disclose prior art patents and publications, failing to disclose experimental data, relying on false data, filing false affidavits, excluding inventors from an application, mischaracterizing art or other information, inappropriately paying a small entity fee, or inequitably seeking a petition to make special).

most especially those patents found to be unenforceable after years of litigation) with other patents, both similarly situated and not. That is, we exploit the commonality among reported patent litigations—that they all involve patents—to isolate the characteristics of patents that are most likely to be held unenforceable due to inequitable conduct. By examining those characteristics and comparing them to characteristics of other sets of patents (unlitigated, litigated, invalid, obvious, and insufficiently described), we are able to draw some conclusions about the way inequitable conduct is working in the real world, and the role the doctrine plays in the patent system.

What follows moves in three parts. In Part II we describe our analytical techniques in more detail, discussing the research design and the data we used for the study. In Part III we present our results, and provide our interpretation and analysis. Finally, in Part IV, we discuss the implications of our findings on the role of inequitable conduct as well as some future applications of the techniques we use in this project.

II. Research Design and Data

A. Research Design

Our research question is whether the legal doctrine of inequitable conduct is (or is not) operating according to its theoretical basis in the patent law. That is, we want to explore whether inequitable conduct polices socially undesirable applicant behavior before the USPTO and thus helps to prevent fraud on the public.[21] As we noted briefly above, we have chosen a research strategy that uses the patents involved in inequitable conduct cases as an instrument of measurement—rather than more conventional techniques related to case law analysis.[22]

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21. *See* Michael Buschbach, *An Improved Framework for Analyzing "Substantially Similar" Patent Claims with Respect to the Inequitable Conduct Defense*, 10 MINN. J.L. SCI. & TECH. 325, 332–33 (2009) (describing the way inequitable conduct provides a check on undesirable patent application behavior).

22. *See supra* Part I.

The impetus for this approach is threefold. First, although each patent granted is distinct, a large number of those distinctions (for example, subject matter, complexity, and prosecution history) are amenable to empirical characterization, and that data is readily available. Second, although patent litigations vary widely in terms of scope, complexity, jurisdictions, and so forth, there is at least one measurable commonality among them all: they must involve at least one patent (and that patent will itself be measurable, as noted above). And third, there is an increasing awareness among patent researchers that patents that are litigated are systematically different than patents that are not.[23] Thus, it stands to reason that patents that are litigated with different intensities or based on different legal claims should also have systematically different characteristics.[24] If the third point above is true (and we show it is, below),[25] then the patents which are—after years of high-cost litigation—held unenforceable should be different from other patents, even other highly litigated patents. And those differences in patent characteristics should reflect something about the legal standards applied.

Therefore our basic research design is to identify and characterize any measurable differences between patents that are held to be unenforceable due to inequitable conduct and other types of patents, and use those differences to evaluate the performance of the inequitable conduct doctrine.

Of course, there is an initial question: how, hypothetically, might unenforceable patents differ from other patents? As discussed above, the theory of the doctrine of inequitable conduct is that it polices the relationship between patent applicants and the USPTO, and provides incentives to fully disclose known information and avoid misrepresentations.[26] If this legal theory is

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23. *See*, *e.g.*, John R. Allison et al., *Valuable Patents*, 92 GEO. L.J. 435, 465–76 (2004) (comparing litigated patents and unlitigated patents).

24. Because patent litigation is a private enterprise, the differences among patents involved in litigation reflect choices made by patentees, accused infringers, and courts, which obviously are strongly affected by the legal standards applied.

25. *See infra* Part III.

26. *See* Therasense, Inc. v. Becton, Dickinson & Co., 649 F.3d 1276, 1287–89 (Fed. Cir. 2011) ("This court embraced these reduced standards for intent and materiality to foster full disclosure to the PTO.").

correct—if inequitable conduct performs this policing function—then how would unenforceable patents differ from others? Our initial answer is that unenforceable patents should have characteristics that reveal forms of risk taking in prosecution.

The answer follows readily from the policing theory of inequitable conduct. If inequitable conduct punishes those in patent prosecution who fail to disclose known information or intentionally fail to take due care to avoid material misrepresentations, then the prosecution of the patents (and thus eventually the issued patents) the doctrine identifies should reflect a greater risk of such behaviors. In addition, because the penalty for inequitable conduct is substantial—the involved patent as well as closely related patents may be held unenforceable, and attorneys involved may experience adverse professional consequences[27]—an applicant is most likely to risk inequitable conduct only when (at least in the applicant's calculus) the reward of a patent grant is greater than the product of the probability of detection and the consequences of detection. This suggests that not all patent applications will be tainted by inequitable conduct. But if one assumes that applicants will risk deceptive behavior in some fraction of applications so that there will be some patents that are granted where the prosecution was tainted by inequitable conduct, then theory suggests those patents should be characterized by risky prosecution behavior. It follows that if the legal doctrine is working as theorized—so that patents tainted by inequitable conduct are systematically more likely to be held unenforceable—such patents should, we think, have characteristics that reveal risky prosecution behavior. Those characteristics may include:

More parent applications and/or a longer pendency in prosecution. As other studies have shown, more parents and longer prosecution pendency are related to a higher likelihood of

27. *See* Christopher A. Cotropia, *Modernizing Patent Law's Inequitable Conduct Doctrine*, 24 BERKELEY TECH. L.J. 723, 766 (2009) (describing this); *see also* Brief for 43 Patent Practitioners Employed by Eli Lilly and Company as Amici Curiae in Support of No Party at 2, Therasense, Inc. v. Becton, Dickinson & Co., 649 F.3d 1276 (Fed. Cir. 2010) (Nos. 04-CV-2123, 04-CV-3327, 04-CV-3732, 04-CV-3117), http://www.patentlyo.com/ts.enbanc.elililly.pdf (discussing the personal impact of inequitable conduct claims on patent prosecutors at Eli Lilly).

litigation.[28] But beyond that, applicants who use the continuation process are likely more confident in the value of the invention if patented (longer and more complex prosecutions cost more money), and are more willing to exploit the rules of patent prosecution for an advantage.[29] Also consider that each filing with the USPTO represents an opportunity for inequitable conduct to occur, whether by failing to fully disclose or by misrepresentation. Thus, patents with longer and more complex prosecution histories should have a higher likelihood of being found unenforceable.

Fewer disclosed prior art references. We think a paradigmatic example of risky prosecution behavior is less disclosure of prior art references. Of course, because there is no search requirement, the absence of disclosure of prior art is not itself a signal of illicit behavior,[30] but we think that applicants who take higher risks in prosecution are extremely likely to disclose less than those who take lower risks—whether because of less searching for prior art (a form of willful blindness,[31] perhaps) or simple nondisclosure of known art. Thus, patents showing fewer references should have a higher likelihood of unenforceability.[32]

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28. *See* Allison et al., *supra* note 23, at 438 (adducing characteristics of patent value including small-entity status of the filer, number of claims, length of time in prosecution, number of patent-family members, number of forward citations, and patent age at the time of litigation).

29. *See* Kingsdown Med. Consultants, Ltd. v. Hollister, Inc., 863 F.2d. 867, 874–76 (Fed. Cir. 1988) (en banc) (discussing the propriety of this strategy).

30. *See* Am. Hoist & Derrick Co. v. Sowa & Sons, Inc., 725 F.2d 1350, 1362 (Fed. Cir. 1984) ("Nor does an applicant for patent, who has no duty to conduct a prior art search, have an obligation to disclose any art of which, in the [district] court's words, he 'reasonably should be aware.'").

31. Willful blindness has two basic requirements: "First, the defendant must subjectively believe that there is a high probability that a fact exists. Second, the defendant must take deliberate actions to avoid learning of that fact." Global-Tech Appliances, Inc. v. SEB S.A., 131 S. Ct. 2060, 2070 (2011).

32. Disclosure seems to be ambivalent to value. On the one hand, it is commonly believed that a patent can be marginally strengthened by the citation to more prior art references. Thus, if there is a perception that a patent will be valuable, it makes sense to take on the cost of strengthening it by adding art to the file. On the other hand, failing to disclose art—especially art that is material to patentability—might facilitate issuance and help the patentee realize value. In addition, anxiety concerning what the examiner might do with submitted art could discourage citation to art in some cases. Although recent work presents results suggesting that to the extent applicants experienced this anxiety, it may not have been well founded. *See* Christopher A. Cotropia, Mark A. Lemley &

More patent claims. More claims can often result in greater subject matter coverage and a greater ability to use a patent to affect competition. However, drafting and prosecuting larger numbers of claims is expensive.[33] Additional claims take more time to draft and present more opportunities for the Patent Office to issue a rejection. Applicants may therefore be more likely to take on the cost of more claims when they have a stronger belief that the patent has value in the marketplace. Again, an expectation of higher value should correspond with additional risky behavior.

Of course, we did not limit our data gathering to only characteristics that had support as indicators of patent value. We expect that the characteristics noted above will be the most distinct if the doctrine of inequitable conduct is operating as theorized. We discuss our data in more detail below.

B. Data

Five separate datasets of patents were created to supply the data necessary for this study. Except as otherwise described below, all patent data was obtained from that made public by the USPTO[34] or the National Bureau of Economic Research (NBER)

Bhaven N. Sampat, *Do Applicant Patent Citations Matter? Implications for Presumption of Validity* 32 (Stan. L. & Econ., Olin Working Paper No. 401, 2010), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1656568## (studying the use of applicant-submitted prior art).

It has also been argued that inequitable conduct doctrine encourages the overdisclosure of information to the Patent Office. *See* Cotropia, *supra*, note 27, at 770–72 ("[T]he doctrine incentivizes the patent applicant to err on the side of quantity."); Thomas F. Cotter, *An Economic Analysis of Patent Law's Inequitable Conduct Doctrine*, 53 ARIZ. L. REV. 735, 770–75 (2011) (describing when patent applicants would choose disclosure over nondisclosure). These claims have yet to make contact with observations but suggest the possibility that applicants with an expectation of value for a nascent patent will take on the cost of searching for and disclosing more information to the Patent Office. *See id.* (offering predictions).

33. *See* Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625, 639 n.44 (2002) (estimating the current administrative costs of obtaining a U.S. patent).

34. *See Electronic Data Products*, U.S. PATENT & TRADEMARK OFFICE, http://www.uspto.gov/products/catalog/index.jsp (last visited Aug. 19, 2013) (providing public patent and trademark data) (on file with the Washington and Lee Law Review). Bulk USPTO data is also made available by a partnership between the USPTO and Google, and is hosted by Google. *See USPTO Bulk*

Patent Data Project.[35] Official USPTO data in bulk form is readily available for all U.S. patents granted after January 1, 1976.[36] Patents issued before 1976, therefore, are not part of our datasets.

Unenforceable patents. The data collection technique used for unenforceable patents has been discussed in detail elsewhere.[37] Briefly, a dataset of unenforceable patents was established by collecting every decision involving inequitable conduct made by the Federal Circuit, beginning with the creation of the court and ending May 27, 2010. The decisions were collected by searching the term "inequitable conduct" in the LEXIS "Federal Circuit, U.S. Court of Appeals" database, but the data was supplemented by a similar search of the Westlaw "U.S. Court of Appeals for the Federal Circuit (Cases)" database. The decisions returned were coded for whether the court issued a mandate of inequitable conduct. Multiple human coders were used and intercoder agreement was assessed by calculating Cohen's Kappa.[38] The value calculated was 0.944, which indicates nearly perfect agreement.[39] Intercoder disagreements were identified and corrected. The patent numbers of unenforceable patents were collected based on information in the decisions. Given the limitation that patents had to be issued at least as recently as 1976, our unenforceable patents dataset includes 95 patents.

Invalid 112 patents. This dataset was constructed by collecting every decision involving enablement, written

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Downloads: Patents, GOOGLE, http://www.google.com/googlebooks/uspto-patents.html (last visited July 5, 2013) [hereinafter GOOGLE] (providing data) (on file with the Washington and Lee Law Review).

35. *See Patent Data Project*, NAT'L BUREAU OF ECON. RESEARCH, https://sites.google.com/site/patentdataproject/ (last visited July 5, 2013) (providing data) (on file with the Washington and Lee Law Review).

36. *See* GOOGLE, *supra* note 34 (deriving a dataset).

37. *See supra* Part I (discussing data collection for unenforceable patents); *see also* Petherbridge et. al., *supra* note 20, at 1303–08 (describing data collection).

38. *See* Jacob Cohen, *A Coefficient of Agreement for Nominal Scales*, 20 EDUC. & PSYCHOL. MEASUREMENT 37, 39–46 (1960) (describing the method of determining the coefficient of agreement between two judges).

39. *See* J. Richard Landis & Gary G. Koch, *The Measurement of Observer Agreement for Categorical Data*, 33 BIOMETRICS 159, 165 (1977) (discussing kappa values); *see also* JOSEPH L. FLEISS, STATISTICAL METHODS FOR RATES AND PROPORTIONS 218 (2d ed. 1981) (same).

description, or best mode. These are all requirements for patentability that have a statutory basis in 35 U.S.C § 112, ¶ 1 ("112 patents"),[40] made by the Federal Circuit, beginning with the creation of the court and ending June 11, 2012. The decisions were collected by querying the LEXIS "Federal Circuit, U.S. Court of Appeals" database, with the search terms: 35 U.S.C. /2 112 and ("written description" or "enable" or "enablement" or "best mode") and valid! or invalid!. The decisions returned were coded for whether the court issued a mandate of invalidity on a theory of lack of adequate disclosure. Multiple human coders were used and intercoder agreement was assessed. Cohen's Kappa was calculated as 1.000. The patent numbers of invalid 112 patents were collected based on information in the decisions. Given the limitation that patents had to be issued at least as recently as 1976, our invalid 112 patents dataset includes 80 patents.

Obvious patents. This dataset was constructed by collecting every decision involving obviousness (a requirement for patentability that has its statutory basis in 35 U.S.C § 103)[41] made by the Federal Circuit, beginning January 1, 1990, and ending June 15, 2012. Decisions issued between January 1, 1990, and May 25, 2005, were collected as reported in Petherbridge & Wagner.[42] Briefly, the LEXIS Federal Circuit database was searched with the terms "patent and obvious." Decisions issued between May 25, 2005, and June 15, 2012, were collected by querying the LEXIS "Federal Circuit, U.S. Court of Appeals" database, with the search terms: "patent and atl4(obvious!) or atl3(nonobvious!)." Multiple human coders were used and intercoder agreement assessed. Cohen's Kappa was calculated as 0.98. The patent numbers of obvious patents were collected based on information in the decisions. Given the limitation that patents had to be issued at least as recently as 1976, our obvious patents dataset includes 235 patents.

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40. 35 U.S.C. § 112 (2012).

41. 35 U.S.C. § 103 (2011).

42. *See* Lee Petherbridge & R. Polk Wagner, *The Federal Circuit and Patentability: An Empirical Assessment of the Law of Obviousness*, 85 TEX. L. REV. 2051, 2071–74 (2007) (describing research methods and listing 480 total records between January 1, 1990, and June 1, 2005, from which to collect data).

Litigated patents. Research about the patent system, and particularly patent litigation, has long been hampered by a lack of good data about litigated patents. To address this limitation, we attempted to discover all patents litigated from January 1, 1976, through August 23, 2011. We used the relevant LEXIS database, which includes Patent Office litigation notices, as well as Westlaw-Litalert, which includes information from Derwent about which patents have been litigated. Approximately 4,075,707 patents issued during the thirty-five-year period studied, and we discovered 36,594 distinct patents litigated during the period. That results in a litigation rate across the period of 0.90%. While the historical rate of patent litigation is unknown, it is commonly estimated to be about 1%.[43] Assuming that estimate is correct, we believe we have collected at minimum a very substantial proportion of all patents litigated between 1976 and 2011. From the 36,594 litigated patents, we randomly selected 1,000 for use as our dataset of litigated patents. In analyzing the data, we made no effort to remove unenforceable patents from the dataset of litigated patents. The reason is that unenforceable patents are so rare that it is unlikely they will appear in large enough numbers to be concerning in a randomly selected set of litigated patents.[44]

Unlitigated patents. From a set of all patents issued between January 1, 1976, and August 23, 2011, we collected a random sample of 1,000 patents. Because of the very low rate of patent litigation, we made no effort to remove litigated or unenforceable patents from these data.

Variables. For each patent in the datasets, we collected bibliographic data concerning the parameters along which our design hypothesizes that litigated patents might differ from unenforceable patents. Variables were collected using custom-made Perl scripts, or custom-made python scripts operating on the original data sources; Table 1 lists these.

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43. *See* Adam B. Jaffe, *The U.S. Patent System in Transition: Policy Innovation and the Innovation Process*, 29 RES. POL'Y 531, 548 (2000) (estimating litigation rates).

44. We checked anyway, and discovered two unenforceable patents in the litigated patents dataset.

Table 1: Data Variables

Variable (name)	Type	Brief Description	Source
Overall Pendency (overallpend)	count	Number of days pending before issue	USPTO
Number of Parents (parents)	count	Number of parent (related) applications	USPTO
Number of Claims (numclaims)	count	Number of claims in the patent	USPTO
Total References (totalref)	count	Number of references cited by the patent	USPTO
US Patent References (uspatref)	count	Number of US patent references cited by the patent	USPTO
Foreign Patent References (foreignpatref)	count	Number of foreign patent references cited by the patent	USPTO
Other References (otherref)	count	Number of nonpatent references cited by the patent	USPTO
US Inventor (usinventor)	indicator	First listed US inventor = 1	USPTO
Chemical (chemicalpatents)	indicator	NBER classification = Chemical. Derived from first-listed USPTO subject matter class.	NBER
Computers and Communication (computercommpatents)	indicator	NBER classification = Computers and Communication.	NBER
Drugs and Medical (drugsmedicalpatents)	indicator	NBER classification = Drugs and Medical	NBER
Electrical and Electronic (electricalelectronicpatents)	indicator	NBER classification = Electrical	NBER
Mechanical (mechanicalpatents)	indicator	NBER classification = Mechanical	NBER
Other Subjects (other)	indicator	NBER classification = Other subjects.	NBER

Explanatory variables used in the study.

III. Results and Discussion

The basic statistics for the variables in our datasets are shown in Table 2, below.

Table 2: Summary Statistics, All Datasets

	Dataset					
variable name	unlitigated n = 986	litigated n = 1000	invalid n = 315	obvious n = 235	invalid112 n = 80	unenforceable n = 95
overallpend						
mean	1046.499	1323.163	1938.429	1811.557	2311.113	2503.168
sd	764.2492	1069.974	1495.02	1438.005	1603.175	2068.919
med	809.5	953	1484	1400	2011.5	1772
min	193	179	313	319	313	313
max	10325	8247	9542	9542	6761	9079
numclaims						
mean	13.71501	18.714	29.58095	28.18723	33.675	27.18947
sd	11.70001	16.59191	37.05757	37.28842	36.29129	33.08606
med	10	15	19	18	23	20
min	1	1	1	1	2	1
max	90	198	341	341	203	244
parents						
mean	0.3884381	0.844	1.561905	1.395745	2.05	2.221053
sd	0.8199469	1.393415	1.82999	1.747031	1.986664	2.634384
med	0	0	1	1	2	1
min	0	0	0	0	0	0
max	7	13	9	9	9	11
totalref						
mean	13.86308	22.293	52.19683	36.81277	97.3875	22.87368
sd	24.49582	39.11643	140.4641	60.69398	254.4361	45.85552
med	9	12	19	19	19.5	11
min	0	0	0	0	0	0
max	446	470	1556	472	1556	376
uspatref						
mean	9.503043	16.034	26.73333	20.76596	44.2625	10.53684
sd	14.40193	26.76638	59.51229	30.84342	104.1262	9.631299
med	6	9	11	12	11	8
min	0	0	0	0	0	0
max	300	359	439	314	439	47
foreignpatref						
mean	1.837728	2.172	5.425397	3.47234	11.1625	2.389474
sd	3.847873	4.847671	16.32561	9.590899	27.2436	5.344105
med	0	0	1	1	1	0
min	0	0	0	0	0	0
max	53	54	162	94	162	28
otherref						
mean	2.522312	4.087	20.0381	12.57447	41.9625	9.947368
sd	15.93228	17.32321	75.68022	31.56877	138.4218	39.0696
med	0	0	1	1	2	0
min	0	0	0	0	0	0
max	436	336	998	244	998	337
%usinventor	52.64	83.20	86.35	84.68	91.25	83.16
%chemical	18.86	11.9	11.11	10.21	13.75	16.84
%computers&comm	16.84	16.5	23.17	26.38	13.75	7.37
%drugsmedical	8.72	14.2	26.67	22.13	40	20
%electrical&electronic	19.07	11.5	8.89	6.81	15	20
%mechanical	20.08	16.4	10.48	11.91	6.25	13.68
%other	16.43	29.5	19.68	22.55	11.25	22.11

As Table 2 indicates, there are differences in the measurements for many of the variables across datasets. For example, unenforceable patents have significantly longer pendencies (*overallpend*) than litigated patents, and both unenforceable and litigated patents have longer pendencies than unlitigated patents. In addition, unenforceable patents have more claims (*numclaims*) and more parent applications (*parents*) than litigated patents, which in turn surpass unlitigated patents on both measures. Note that prior art citations (*totalref*) differ interestingly across datasets: unenforceable patents have far fewer citations to prior art than invalid, obvious, or invalid 112 patents (though more than unlitigated patents). This will turn out to be important, and we return to this point later.

Next, we developed a regression model to compare the differences between litigated and unlitigated patents. As noted in our discussion of the research design, there is increasing awareness among scholars about these differences, so this exercise is presented as both a check on our methods and a proof of the developing wisdom. Table 3 reports these results.

Table 3: Litigated vs. Unlitigated Patents

VARIABLES	(1)
overallpend	1.072***
	(0.0200)
numclaims	1.119***
	(0.0206)
totalref	1.032*
	(0.0194)
chemicalpatents	0.457***
	(0.0906)
computercommpatents	0.571***
	(0.110)
electricalelectronicpatents	0.421***
	(0.0848)
mechanicalpatents	0.630**
	(0.120)
otherpatents	1.179
	(0.219)
usinventor	3.599***
	(0.394)
constant	0.209***
	(0.0451)
Observations	1,986
r2	0.131
df_m	9
ll	-1198

Regression model comparing *unlitigated* patents with *litigated* patents; the response variable is *litigated* patents. The count variables (*overallpend*, *numclaims*, *totalref*) are normalized by subject matter. The subject matter variables are indicators that classify patents depending on the technological subject matter to which they are directed; the reference category is *drugsmedicalpatents*. The table reports odds ratios and (robust standard errors). Levels of significance are indicated, * p≤ .1, **p≤ .05, ***p≤ .01.

Our findings in Table 3 are broadly consistent with other studies. Litigated patents differ quite substantially from unlitigated patents: Litigated patents have longer pendencies, more claims, cite more references, and are more likely to have a U.S. inventor. Drug and medical patents are also much more likely to be litigated than other types. Again, these findings are consistent with our methodological theory: patents that are the subject of litigation are measurably (and statistically significantly) different from those that are not.

The next step in our analysis was to assess whether what we call "intensely litigated patents"—those litigated to final judgment at the Federal Circuit—are likewise significantly different from litigated patents, and in turn unlitigated patents. Table 4 reports these results.

Table 4: Intensely Litigated Patents vs. Unlitigated Patents, vs. Litigated Patents

VARIABLES	(1) unlitigated	(2) litigated
overallpend	1.229***	1.160***
	(0.0335)	(0.0270)
numclaims	1.187***	1.078***
	(0.0298)	(0.0238)
totalref	1.046*	0.994
	(0.0242)	(0.0216)
chemicalpatents	0.313***	0.701
	(0.0779)	(0.157)
computercommpatents	0.327***	0.604***
	(0.0750)	(0.117)
electricalelectronicpatents	0.238***	0.601**
	(0.0613)	(0.135)
mechanicalpatents	0.312***	0.498***
	(0.0801)	(0.109)
otherpatents	0.620**	0.494***
	(0.148)	(0.0926)
usinventor	3.954***	1.249
	(0.632)	(0.214)
constant	0.0261***	0.144***
	(0.00853)	(0.0395)
Observations	1,396	1,410
r2	.226	0.061
df_m	9	9
ll	-654.1	-798.9

Regression models comparing intensely litigated patents to sets of *unlitigated* patents and *litigated* patents. The response variable is *intensely_litigated* patents for both columns. The subject matter variables, e.g., *chemicalpatents* are indicator variables that classify patents depending on the technological subject matter to which they are directed. The reference category is *drugsmedicalpatents*. Count variables were normalized for subject matter. The table reports odds ratios and (robust standard errors). Levels of significance are indicated, * p≤ .1, **p≤ .05, ***p≤ .01.

As with the model comparing litigated and unlitigated patents, we find statistically significant differences between intensely litigated patents and both litigated and unlitigated

patents along several dimensions. Perhaps not surprisingly, the risk-associated explanatory variables more strongly distinguish intensely litigated patents from unlitigated patents than they do from litigated patents. Nevertheless, differences between intensely litigated patents and litigated patents are strongly significant. Intensely litigated patents (compared to litigated patents) are longer pending, have more claims, and are (again) overrepresented by drug and medical patents. Interestingly, although intensely litigated patents have, statistically, significantly more prior art references than unlitigated patents, this relationship does not hold for litigated patents. The reason for this is revealed by subsequent models, below.[45]

In addition, the finding that intensely litigated patents are significantly different from patents that are merely the subject of litigation reveals that not all litigated patents are necessarily alike. This novel finding is encouraging in that it is consistent with our methodological expectations. It should, moreover, have implications for future work concerning litigated patents. Depending on the research question, it may be appropriate to account for the extent to which a patent is litigated in research design.[46]

Table 5 reports how unenforceable patents compare to unlitigated patents, litigated patents, and invalid patents. Invalid patents, as we noted in Part III, are those patents that have been declared invalid by the Federal Circuit on the basis of obviousness (under 35 U.S.C. § 103), or lack of enabling disclosure, adequate description, or disclosure of best mode (under 35 U.S.C. § 112).

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45. *See* tables *infra* Part III.

46. *See* John R. Allison, Mark A. Lemley & Joshua Walker, *Extreme Value or Trolls on Top? The Characteristics of the Most-Litigated Patents*, 158 U. PA. L. REV. 1, 11–12 (2009) (examining frequently litigated patents and describing a statistical analysis approach).

Table 5: Unenforceable Patents vs. Unlitigated, vs. Litigated, vs. Invalid

VARIABLES	(1) unlitigated	(2) litigated	(3) invalid
overallpend	1.473***	1.423***	1.204***
	(0.0930)	(0.0739)	(0.0601)
numclaims	1.253***	1.175***	1.082*
	(0.0585)	(0.051)	(0.0483)
totalref	0.937	0.838***	0.856***
	(0.0380)	(0.0348)	(0.0367)
chemicalpatents	0.441**	1.163	2.805**
	(0.177)	(0.446)	(1.176)
computercommpatents	0.184***	0.295***	0.384*
	(0.0885)	(0.138)	(0.197)
electricalelectronicpatents	0.296***	0.873	2.422**
	(0.108)	(0.296)	(0.915)
mechanicalpatents	0.327**	0.695	2.362*
	(0.144)	(0.275)	(1.036)
otherpatents	0.679	0.529*	1.797
	(0.257)	(0.183)	(0.691)
usinventor	3.035***	1.048	0.758
	(0.876)	(0.321)	(0.264)
constant	0.00402***	0.0160***	0.151***
	(0.00218)	(0.00772)	(0.0712)
Observations	1,081	1,095	410
r2	0.239	0.16	0.107
df_m	9	9	9
ll	-245.2	-271.3	-198.2

Regression models comparing unenforceable patents with other sets of patents, e.g., *litigated* patents. The different sets are exclusive in that, for example, *invalid* patents are not added to the *litigated* patents set. For columns 1-3 the response variable is unenforceability. The subject matter variables, e.g., *chemicalpatents* are indicator variables that classify patents depending on the technological subject matter to which they are directed. The reference category is *drugsmedicalpatents*. Count variables were normalized for subject matter. The table reports odds ratios and (robust standard errors). Levels of significance are indicated, * p≤ .1, **p≤ .05, ***p≤ .01.

Table 5 indicates that unenforceable patents have different characteristics from invalid patents. Although invalid patents and unenforceable patents are both litigated to a decision on appeal, unenforceable patents have a longer pendency and a greater number of claims (though the difference with the invalid patents is only marginally significant) than both litigated and invalid patents. There are two additional important observations in

Table 5. First, and most strikingly, the number of prior art references (*totalref*) shows clearly as a differentiating characteristic in the litigated and invalid models—meaning that unenforceable patents cite statistically significantly fewer prior art references than do litigated or invalid patents. In fact, unenforceable patents appear to cite prior art references at a level similar to that of unlitigated patents.[47] Second, unenforceable patents also differ from invalid patents along subject matter lines: compared to invalid patents, unenforceable patents are more likely to be directed to innovations in chemistry, electronics, and mechanics than to innovations in drugs or computers.

Finally, in order to explore further the differences between unenforceable patents and others—and thus evaluate the way the doctrine of inequitable conduct operates—we built a regression model comparing unenforceable patents to the other two datasets involving intensely litigated patents: those found invalid for obviousness under 35 U.S.C. § 103 at the Federal Circuit, and those found invalid for lack of disclosure under 35 U.S.C. § 112 at the Federal Circuit. Table 6 reports these results.

47. All else being equal, this might indicate that unenforceable patents could be characterized as "accidentally litigated" patents. This notion is substantially undercut, however, by the fact that unenforceable patents pend significantly longer and have significantly more claims than unlitigated patents.

Table 6: Unenforceable Patents vs. Obvious, vs. Undisclosed

VARIABLES	(1) invalidobvious	(2) invalid112
overallpend	1.220***	1.138*
	(0.0648)	(0.0844)
numclaims	1.114**	0.975
	(0.0553)	(0.0598)
totalref	0.850***	0.852***
	(0.0387)	(0.0491)
chemicalpatents	2.472**	3.252**
	(1.100)	(1.690)
computercommpatents	0.251***	1.160
	(0.132)	(0.753)
electricalelectronicpatents	2.118*	2.327*
	(0.888)	(1.146)
mechanicalpatents	1.783	5.682**
	(0.802)	(3.889)
otherpatents	1.237	5.291***
	(0.489)	(2.995)
usinventor	0.947	0.362*
	(0.330)	(0.196)
Constant	0.181***	1.889
	(0.0943)	(1.645)
Observations	330	175
r2	0.13	0.117
df_m	9	9
ll	-172.3	-106.5

Regression models comparing unenforceable patents with sets of patents containing claims to inventions deemed obvious, and claims to inventions deemed invalid for inadequate disclosure under 35 U.S.C. § 112 para. 1. The response variable is unenforceability for both columns. The subject matter variables, e.g., *chemicalpatents* are indicator variables that classify patents depending on the technological subject matter to which they are directed. The reference category is *drugsmedicalpatents*. Count variables were normalized for subject matter. The table reports odds ratios and (robust standard errors). Levels of significance are indicated, * p≤ .1, **p≤ .05, ***p≤ .01.

Here again, perhaps the most striking finding is with respect to prior art references: unenforceable patents cite statistically significantly fewer prior art references than do obvious or undisclosed patents. Unenforceable patents, in addition, pend longer and have more claims than obvious patents. Unenforceable patents also appear to differ from 112 patents, although perhaps not as extremely. Unenforceable patents appear not to have more claims than such patents, nonetheless they do pend longer, and the difference in the number of cited prior art references remains strong.

IV. Implications and Discussion

As discussed in Part II above,[48] this project seeks to analyze the performance of the patent law doctrine of inequitable conduct by exploiting differences between sets of patents affected by litigation. And primarily Tables 5 and 6 reveal a pattern of patent characteristics from which one can draw some inferences about the doctrine of inequitable conduct. Our discussion here proceeds as follows: First, we discuss the core finds of the data analysis—in particular that patents held unenforceable have statistically significantly fewer citations to prior art than other similarly litigated patents—and consider what these findings suggest about the operational performance of the inequitable conduct doctrine in the real world of patent litigation. Second, we explore possible alternative explanations for our results. Third, we draw some tentative conclusions about how to think about the role of inequitable conduct in the patent system, based on our findings. And finally, we offer some thoughts on the potential for future research for the methods developed in this project.

A. Our Results

Given the policing theory of inequitable conduct doctrine, we hypothesized that if the doctrine aligned well with its theory, then unenforceable patents might be different than other patents. More specifically, we thought unenforceable patents would be both:

1. Relatively more valuable than other patents (the risk/reward ratio means that the applicant must believe there is substantial value); and
2. Characterized by risky behavior in prosecution.

Perhaps the most revealing result of our study is that those patents found unenforceable have statistically significantly fewer citations to prior art than patents in other similarly tested groups. This is consistent with the doctrinal theory. In prosecution, applicants might sometimes risk later discovery of a

48. *See* discussion *supra* Part II.A.

withheld reference in order to get valuable claims allowed. Unenforceable patents, moreover, not only distinguish themselves from all other patents litigated to any degree in terms of their lack of reference to prior art, but they are also apparently among the most complex patents in our data in that they surpass all patents, including all other intensely litigated patents, in length of pendency, and nearly all other patents in number of claims. No set of patents had significantly more claims than unenforceable patents. It thus appears that unenforceable patents, while being among the most complex patents we examined, nonetheless make reference to the fewest pieces of prior art. It is this juxtaposition of characteristics—which obviously does not itself reveal inequitable conduct—that is consistent with what we might expect to observe given the theory.

Our findings are, therefore, consistent with the conclusion that inequitable conduct doctrine aligns well with its underlying theory. But we cannot claim an empirically airtight case. It is worth considering some of the explanations that might be available to describe why unenforceable patents, arguably the most complex set of patents we observe, reference the fewest pieces of prior art.

B. Possible Alternative Explanations

Although we think our results are most naturally interpreted in the manner described above, it is worth considering alternative explanations for the patterns of relationships our study reveals.

Alternative 1: "Pioneering" patents are more likely to be (erroneously) found unenforceable. "Pioneering" patents—those directed to especially innovative ideas—might also be expected to cite less prior art, for the reason that they are significant technological advances, and thus have less relevant sources of prior art (and consequently fewer citations to prior art). So perhaps our results might reveal that such patents are particularly susceptible to being identified (perhaps erroneously) as unenforceable by litigation. We think this is unlikely. First, our findings also suggest that unenforceable patents are characterized by long prosecution pendency, which is not consistent with the idea that less prior art is available to deploy

against the application. Indeed, it suggests the opposite: One predicts that pioneering patents, while perhaps subject to greater scrutiny under § 101[49] (for subject matter and perhaps utility) would be relatively easy to allow. The relative lack of art should result in short prosecution pendency, not encourage exceptionally long pending applications.[50] Second, we think there is little reason to suggest that the process of determining inequitable conduct (in other words, determining materiality and intent) should disproportionately target pioneer patents. And third, our experience in reading many of the cases that describe inequitable conduct does not suggest that patents found unenforceable are especially novel or innovative.[51]

Alternative 2: The intuition of the patent litigator. One possible explanation is that patent litigators sense patent characteristics, such as relatively few patent references, that suggest that the patent is particularly vulnerable to assertions of inequitable conduct—whether or not such conduct has occurred. They then aggressively act on this intuition, seeking to convince judges via the arts of advocacy and rhetoric that an applicant engaged in inequitable conduct. The basic idea here is that even in view of our results, we cannot rule out the possibility that we are observing some sort of artifact or flaw in the doctrine that defendants are able to exploit even when inequitable conduct has not genuinely occurred. We think this is somewhat unlikely; the unenforceable patents in our dataset were the subjects of extremely intense litigation, including an appeal to the Federal Circuit. Although lawyerly skill is clearly important, we doubt (though cannot definitively rule out) that it could systematically account for the patterns we find in our results.

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49. *See* 35 U.S.C. § 101 (2011) ("Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.").

50. *See* John R. Allison & Emerson H. Tiller, *The Business Method Patent Myth*, 18 BERKELEY TECH. L.J. 987, 1069 (2003) ("[I]t costs more to carry out more thorough prior art searches, and larger numbers of prior art references . . . correlate even more strongly with longer pendency times than the number of claims does.").

51. *See*, *e.g.*, Petherbridge et. al.*, supra* note 20, at 1308–29 (examining the content of all federal circuit inequitable conduct opinions).

Alternative 3: Unobserved effects. As with all empirical analyses, there may well be important drivers to the selection of patents for unenforceability that we cannot measure, and thus cannot account for in our methods.

C. The Inequitable Conduct Doctrine Generates Beneficial Incentives

We think our results, on balance, paint a relatively positive picture of the inequitable conduct doctrine. The doctrine seems to be working as expected, targeting patents that are significantly different than other similarly tested patents—and different in ways that the theory of the doctrine as serving a policing function would predict.

What we find most important about our findings, however, is that it allows us to conclude with some confidence that the inequitable conduct doctrine does not act randomly in the real world. There are indeed statistically significant differences in the characteristics of patents held unenforceable versus other types of patents, even those litigated in similar fashion. What that means is that the inequitable conduct doctrine is (or at least should be) generating incentives for certain behavior among patent applicants. If the converse were true, if the inequitable conduct doctrine appeared to apply randomly across patent characteristics, then the doctrine would not be generating any specific behavior other than generally reducing incentives to obtain patents.[52]

What incentives do we think the doctrine is creating? It should encourage patent applicants to reduce the characteristics we identified above as associated with unenforceability: longer pendency, more claims, and fewer prior art references. Put another way, the findings show that the doctrine of inequitable conduct should be encouraging patentees to offer less complex patents (fewer claims), engage in simpler prosecution (lower pendency), and provide more prior art references. To be sure, there are other factors that may encourage this sort of behavior,

52. The intuition here is that if some *n*% of patents were held unenforceable at random, then the incentive to obtain a patent would be correspondingly reduced.

as well as factors pointing the other direction. But our results suggest that the doctrine should have a generally positive effect on the mix of incentives that drive patenting behavior.

Thus, one implication of our study is that eliminating the doctrine of inequitable conduct may be a mistake. Patents held unenforceable are uniquely complex, pend for a long time, and cite less prior art. This is not, we think, a good combination; the doctrine is probably working reasonably well.

In addition, we do not see in our results any clear need to tweak the doctrinal framework. Indeed we were surprised how well our findings aligned with the way that we expected the doctrine to work. This is not to say the doctrine is perfect, but that over the long run, it seems to be having a real-world impact in the direction that one would expect.

It is worth acknowledging what our results are unlikely to reveal about inequitable conduct. As we noted above, there is a widely held—although empirically unverified—view that the doctrine is over-asserted in patent litigation. Our findings shed relatively little light on the assertion that inequitable conduct is so often alleged that there is a "plague" of inequitable conduct claims.[53] We do not count assertions or attempt to measure the litigation costs of failed assertions and the ex-ante effects of the fear of being accused of inequitable conduct. The data presented here, therefore, does not reach the question of whether there are too many inequitable conduct allegations in patent cases.

The most important thing these data cannot answer, perhaps, is whether the doctrine is efficient. That is, whether the types of behavior targeted by inequitable conduct could be addressed in more cost-effective ways. Any analysis of cost-efficiency would necessarily have to account for the substantial costs of the doctrine in terms of litigation and prosecution incentives. So while it may be the case that inequitable conduct encourages beneficial applicant behavior, the doctrine might also create such large incentives for defendants to assert it that the incidence of assertions far outweighs the level that would make the doctrine effective from a cost–benefit standpoint. For

53. *See* Burlington Industries, Inc. v. Dayco Corp., 849 F.2d 1418, 1422 (Fed. Cir. 1988) (describing allegations of inequitable conduct as a "plague"); Therasense, Inc. v. Becton, Dickinson & Co., 649 F.3d 1276, 1289 (Fed. Cir. 2011) (same (quoting *Burlington Industries*, 849 F.2d at 1422)).

example, it might be that rather than use inequitable conduct as a policing mechanism to force better disclosure of prior art, the patent law should simply require more disclosure from applicants—a prior art search, perhaps.[54] A search requirement would at least partially address our results (the relatively lower incidence of prior art citations).[55] But the reality is that we do not have a search requirement; until we do, it appears that the doctrine of inequitable conduct can provide some of the desired behavioral incentives.

Nonetheless, what our findings do suggest is that the inequitable conduct doctrine performs in the real world in a way that aligns well with the doctrine's theoretical purpose. In a sense, this does respond to the criticism we noted above: the doctrine appears to be working as intended. Patents are not randomly being declared unenforceable. Thus, there is, we think, evidence of value in the doctrine from our results.

D. Implications for Future Work

Another important aspect of our findings is that they suggest that our methodological approach to measuring the performance of the inequitable conduct doctrine—by studying the patterns of difference among the patents on which it operates—has promise in other areas. By exploiting the commonality of patents among patent litigations, as well as the easily measurable characteristics of patents, we think there are new insights available into doctrinal performance across patent law. This is not to suggest that more traditional ways of evaluating case law are not useful, but that the approach described in this paper may represent a new way of thinking about how patent doctrine meets patent policy.

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54. *See, e.g.*, H.R. 5364, 106th Cong. (2000) (proposing amendment to title 35 of the United States Code to require an applicant to a business method patent to disclose the extent to which the applicant searched for prior art).

55. *See* Kevin M. Baird, Note, *Business Method Patents: Chaos at the USPTO or Business as Usual?*, 2001 U. ILL. J.L. TECH & POL'Y 347, 360–62 (2001) (suggesting requiring a mandatory prior art search by the patentee).

V. Conclusion

Inequitable conduct doctrine engenders stronger feelings than perhaps any other patent doctrine. It is at the center of a battle for control over the substantive law of patentability that pits patent applicants against the courts and the Patent Office. The details of the doctrine are taught in every serious patent course offered by every serious law school. Yet somehow, remarkably little is known about whether there is a real-world link between inequitable conduct doctrine and patent policy.

This study takes a step towards unfurling some of the complexity of inequitable conduct law and policy. It empirically examines patents that have been determined unenforceable for inequitable conduct and reports evidence that unenforceable patents are significantly different from other types of patents. Unenforceable patents have significantly longer pendency, more parent applications, and contain more claims. Unenforceable patents also cite fewer prior art references. Based on these observations, this report raises empirically grounded hypotheses concerning inequitable conduct that should be useful to legal scholars and practitioners.