Working Paper Series
No. 14008

Understanding the Realities of Modern Patent Litigation

John R. Allison
McCombs School of Business, University of Texas at Austin

Mark A. Lemley
Stanford Law School
Durie Tangri LLP

David L. Schwartz
Kent College of Law, Illinois Institute of Technology

April 2014

Hoover Institution Working Group on
Intellectual Property, Innovation, and Prosperity
Stanford University

www.hooverip2.com

Understanding the Realities of Modern Patent Litigation[1]

John R. Allison,[2] Mark A. Lemley,[3] & David L. Schwartz[4]

Sixteen years ago, two of us published the first detailed empirical look at patent litigation.[5] That study provided a wealth of valuable information about patent validity litigation, including the discovery that nearly half of all patents litigated to judgment were held invalid. But it was also limited in various respects. The study was based only on patent validity decisions that finally resolved the case on the merits, and only on those that had been reported in published decisions. The latter limitation meant that most of the decisions were appellate. Importantly, the cases serving as the study's data sources are now on average more than twenty years old.

In this paper we update and expand the earlier study with a new hand-coded data set. We evaluate all substantive decisions rendered by any court in every patent case filed in 2008 and 2009 – decisions made between 2009 and 2013. We consider not just patent validity but also infringement and unenforceability. Moreover, we relate the outcomes of those cases to a host of variables, including variables related to the parties, the patents, and the court in which

---

 The authors thank David Abrams, Jeremy Bock, Shari Diamond, Stuart Graham, Arti Rai, Ted Sichelman, and participants at the Texas Law Review Symposium on "Steps Toward Evidence-Based IP" and the Works-in-Progress IP Conference at Santa Clara. We would like to especially thank Fang Tang for his help with data analysis and statistics, and Andrew Thompson for his research assistance.

[2] Spence Centennial Professor, McCombs Graduate School of Business, University of Texas at Austin.

[3] William H. Neukom Professor, Stanford Law School; partner, Durie Tangri LLP.

[4] Associate Professor of Law, Co-Director, Center for Empirical Studies of Intellectual Property, Chicago-Kent School of Law.

[5] John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 **AIPLA Q.J.** 185 (1998).

the case was litigated. The result is a comprehensive picture of the outcomes of modern patent litigation, one that confirms conventional wisdom in some respects but upends it in others.

In Part I, we discuss previous efforts to evaluate patent litigation empirically. In Part II, we discuss our methodology and the choices we made in study design. We present our results in Part III.

I. The Prior Art: Efforts to Understand Patent Litigation So Far

A number of cholars have empirically studied specific patent law doctrines. Claim construction is the most common, with most articles focusing on appellate cases.[6] Obviousness has also been a point of scholarly interest,[7] as have inequitable conduct[8] and the doctrine of equivalents.[9] Nearly all of the empirical research into patent litigation has focused on Federal

---

[6] See e.g., Jonas Anderson & Peter S. Menell, *Informal Deference: An Historical, Empirical, and Normative Analysis of Patent Claim Construction,* 108 **N.U. L. Rev**. __ (forthcoming 2014); Shawn P. Miller, *Do Software Patent 'Fuzzy' Boundaries Explain High Claim Construction Reversal Rates?,* *http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2139146;* David L. Schwartz, *Practice Makes Perfect?: An Empirical Study of Claim Construction Reversal Rates in Patent Cases,* 107 **Mich. L. Rev.** 223 (2008); David L. Schwartz*, Courting Specialization: An Empirical Study of Claim Construction Comparing Patent Litigation Before Federal District Courts and the International Trade Commission,* 50 **Wm. & Mary L. Rev**. 1699 (2009)*;* David L. Schwartz*, Pre*-Markman *Reversal Rates,* 43 **Loyola LA L. Rev.** 1073 (2010); *Gretchen Ann Bender, Uncertainty and Unpredictability in Patent Litigation:* Christian A. Chu*, Empirical Analysis of the Federal Circuit's Claim Construction Trends,* 16 **Berkeley Tech. L.J.** 1075 (2001); Kimberly A. Moore, *Are District Court Judges Equipped to Resolve Patent Cases?,* 15 **Harv. J.L. & Tech.** 1 (2001); Kimberly A. Moore, *Markman Eight Years Later: Is Claim Construction More Predictable?,* 9**Lewis & Clark L. Rev.** 231 (2005).

[7] Lee Petherbridge & R. Polk Wagner, *The Federal Circuit and Patentability: An Empirical Assessment of the Law of Obviousness,* 85 **Texas L. Rev.** 2051 (2007); Jason Rantanen, *The Federal Circuit's New Obviousness Jurisprudence: An Empirical Study,* 16 **Stan. Tech. L. Rev**. 709 (2013); Christopher A. Cotropia, *Obviousness and the Federal Circuit: An Empriical Analysis of Recent Case Law,* 82 **Notre Dame L. Rev**. 911 (2007)

[8] Lee Petherbridge, Jason Rantanen, & Ali Mojibi, *The Federal Circuit and Inequitable Conduct: An Empirical Assessment,* 84 **S. Cal. L. Rev.** 1293 (2010); Christian Mammen, *Controlling the 'Plague': Reforming the Doctrine of Inequitable Conduct*, 24 **Berkeley Tech. L. J**. 1329 (2010).

[9] *See, e.g.,* John R. Allison & Mark A. Lemley, *The (Unnoticed) Demise of the Doctrine of Equivalents*, 59 **Stan. L. Rev.** 955 (2007); David L. Schwartz, *Explaining the Demise of the Doctrine of Equivalents*, 26

Circuit decisions. To the extent district court opinions are used, the research typically limits it to opinions available on Westlaw or Lexis. Unreported decisions, especially denials of summary judgment and the results of jury trials, are lacking from these datasets.[10]

Recently, the underlying documents, including motions and opinions, from district court litigation became more readily available. Electronic filing requirements meant that Pacer has a near complete collection of litigation documents from patent cases. Some scholars have taken advantage of Pacer data to analyze district court decisions.[11] But the raw data provided by the Administrative Office of the courts is notoriously error-prone,[12] and it does a poor job of classifying outcomes.[13]

II. Our Methodology

In this Part, we explain in detail the techniques we used to locate and collect the data. We describe the data sources and provide information about the coders. And we describe our process of selecting data for inclusion in the dataset.

a. Data Collection

Berkeley Tech. L.J. 1157 (2011); Lee Petherbridge, *On the Decline of the Doctrine of Equivalents*, 31 **Cardozo L. Rev.** 1371 (2010).

[10] *See, e.g.*, Paul Janicke & LiLan Ren, *Who Wins Patent Cases?*, A notable exception is Moore, *Equipped, supra* note __, which is limited to appellate decisions but does evaluate both unpublished decisions and even one-word Rule 36 affirmances.

[11] Jay P. Kesan & Gwendolyn G. Ball, *How Are Patent Cases Resolved? An Empirical Examination of the Adjudication and Settlement of Patent Disputes*, 84 **Wash. U. L. Rev.** 237 (2006).

[12] *See id*. at __ (finding a substantial percentage of cases misclassified as patent cases); Kimberly A. Moore, *Judges, Juries, and Patent Cases – An Empirical Peek Inside the Black Box*, 99 **Mich. L. Rev.** 365 (2000).

[13] Kesan & Ball, *supra* note __, at __.

We used the Lex Machina database as our data source.[14] Lex Machina provides convenient access to cleaned Pacer data for district court patent litigation, which permitted us to evaluate all patent lawsuits. Lex Machina data offer three primary benefits. First, it includes all lawsuits, even those without a decision available on Westlaw or Lexis, so we do not over-count appellate decisions. Second, Lex Machina has cleaned and evaluated the Pacer data, eliminating many of the errors in the raw data. Finally, Lex Machina has indexed the cases to identify all summary judgment rulings, trial events, and appeals.

Our study covers all patent lawsuits filed in a federal district court between January 1, 2008 and December 31, 2009. We selected 2008 and 2009 for several reasons. First, those years are sufficiently recent to provide a snapshot of current patent litigation. Second, because the cases were initiated several years ago, the overwhelming majority of those cases were finally resolved or settled before our project began.[15] Lex Machina graciously provided us with a list of 2008 and 2009 lawsuits that contained at least one ruling on summary judgment or trial. Lex Machina furnished us a second list of 2008 and 2009 lawsuits, the second list including cases with an appeal but without a summary judgment ruling or trial. The second list allowed us to capture cases in which the parties stipulated to judgment based upon a claim construction decision with the goal of placing the case in condition for appeal. Both lists provided by Lex Machina included basic information about each lawsuit, including the judicial district in which the case was filed, the identity of the district court judge, and the filing date of the lawsuit.

---

[14] http://www.lexmachina.com.

[15] We conducted the coding in the late summer and fall of 2013. By February 2014, it appears that only 2-3% of 2008 and 2009 cases were still open. Dennis Crouch, *Pendency of Patent Infringement Litigation*, PATENTLY-O, (Feb. 17, 2014), http://patentlyo.com/patent/2014/02/pendency-infringement-litigation.html. *See also* Kesan & Ball, *supra* note __ (defending the decision to study cases by year filed rather than year terminated).

From the cases provided by Lex Machina, we excluded lawsuits that did not include a complaint for infringement of a utility patent or declaratory relief of non-infringement or invalidity of a utility patent. Thus, we excluded inventorship and licensing disputes, malpractice actions, and allegations of design or plant patent infringement. After removing these lawsuits, we reviewed the docket report in detail, reading all relevant orders, opinions, motions, verdicts, appellate rulings, and other necessary court documents to code the litigation outcomes.

Because many of the dockets were extremely complicated − it was not uncommon for a patent case to have over 500 docket entries − we felt that student coders would be ill-suited to the task. Coding of outcomes, especially in patent cases, is notoriously difficult and time consuming, requiring deep knowledge of patent law and litigation and the motivation to devote long hours to the task. Consequently, Lemley and Schwartz each personally coded the litigation outcome information for approximately half of the lawsuits. Both Lemley and Schwartz are experienced patent litigators who understand how to read a docket and appreciate complex litigation rulings. The hand coding was extremely time intensive; it took several hundred hours in the aggregate. To permit an evaluation of the reliability and consistency of the coding, Lemley and Schwartz also overlapped in their coding of approximately ten percent of the lawsuits.[16]

Our study uses a patent-case combination as the unit of analysis. For each case, we coded the outcome separately for each asserted patent. For instance, if the jury returned a

[16] Report intercoder reliability here.

verdict on two patents, then we recorded separately what occurred for each patent.[17] For each patent, we also obtained various patent demographic information from Thomson Innovation Solutions, including citations received (or "forward citations"), each type of prior art reference,, maintenance status, number of claims, number of inventors, and geographic location of the inventors, and the assignee when there was one. Allison manually coded for whether the patented invention had a US or foreign origin using a decision model that was based on the domicile of a majority of the inventors and resorting to the domicile of the assignee as a tie breaker in the unusual case in which this was required.[18]

We also located the first lawsuit in which each patent had been asserted. From the first lawsuit information, we calculated the age of the patent at first lawsuit. We also determined the age of the patents as of the filing of the 2008-2009 lawsuit.

For each patent in a lawsuit, the coders reviewed and captured all rulings on summary judgment relating to a patent law issue. This includes rulings on motions of summary judgment of noninfringement, infringement, validity, invalidity, inequitable conduct, and no inequitable conduct. We excluded rulings on issues that were not patent-specific, such as laches. We also excluded summary judgment rulings on patent law issues if the court did not reach the merits of the issue, such as denials of summary judgment motions as being premature. The coders also reviewed and recorded all trial outcomes, whether there was a jury or bench trial, and decisions on post-verdict JMOL motions. Finally, we recorded whether an appeal was lodged,

[17] Occasionally, the court ruled differently on different claims of a patent. For instance, claim 1 may be infringed and not invalid, but claim 2 was not infringed and anticipated. In these cases, we would create a new record for each group of claims that had a different substantive outcome.

[18] Allison also performed a substantial amount of additional hand coding, but we do not use these resulting data in this paper.

and how the appeal was resolved. The resolution data includes whether the ruling on the patent was affirmed or reversed on appeal, or whether an appeal is pending or was dismissed (typically because the case settled).

We coded merits decisions at a low level of granularity. For invalidity, we coded whether the ruling was based on utility, patentable subject matter, 102 prior art, obviousness, indefiniteness, written description, enablement, and best mode. We also coded various bases for section 102 invalidity. For infringement, we captured literal doctrine of equivalents, and various types of indirect infringement. And we coded enforceability as well as the basis for the unenforceability argument. In addition to the separate coding of issues for summary judgment and trial, we also recorded the final resolution for each patent on the issues of infringement, validity, and enforceability.

Notably, we coded the issues litigated to decision, whether or not that decision resulted in a trial outcome or a grant of summary judgment. Thus, if an accused infringer argued that the patent was invalid for lack of patentable subject matter, anticipation, and obviousness, and the court denied the first two motions but granted the third, each of those three rulings shows up in our data set. To understand how the final resolution variables were coded, one should understand that denial of summary judgment does not result in a final resolution. Instead, denial of summary judgment means that there is an unresolved disputed issue of material fact. Consequently, denials of summary judgment alone would not result in a final ruling in either direction. If, however, the issue had been resolved at trial, then the final ruling was coded as the trial resolution. If summary judgment had been granted on an issue, then the summary

judgment ruling was coded as the final resolution in our coding.[19] We coded decisions that finally ruled for a party on an issue as definitive wins, and decisions that ruled for a party but kept the issue alive (largely denial of summary judgment, but also remands on appeal) as interim wins.

b. Potential Limitations

Our dataset and the implications which can be drawn therefrom are subject to several limitations. For brevity, we discuss two important limitations here.

First, our dataset is limited to lawsuits filed in 2008 and 2009. It is sufficiently recent, in our opinion, that the results are generally applicable today. However, there have been several legal changes in the interim that may make lawsuits today different from those in our dataset. The most salient changes are the passage of the America Invents Act in 2011, the Federal Circuit's en banc *Therasense* decision in 2011,[20] and three Supreme Court cases involving the doctrine of patentable subject matter in 2010, 2012, and 2013.[21] The Federal Circuit issued several opinions involving patent damages, which may have affected litigant behavior and settlement.[22] These law changes may influence what issues litigants press, and separately, which cases reach the stage of a ruling on the merits. Accordingly, the cases filed today in 2014 may differ from those we studied.

---

[19] Of course, if the Federal Circuit reversed a ruling relating to a patent on appeal, we updated the final resolution coding to reflect the appellate decision.

[20] Therasense, Inc. v. Becton, Dickinson & Co., 649 F.3d 1276 (Fed. Cir. 2011) (en banc).

[21] Bilski v. Kappos, 561 U.S. 177 (2010); Prometheus v. Mayo 566 U.S. 10 (2012); Ass'n for Molecular Pathology v. Myriad Genetics, 569 U.S. __ (2013).

[22] See, e.g. Uniloc v. Microsoft, 632 F.3d 1292 (Fed. Cir. 2011); see also ResQNet.com v. Lansa, 594 F.3d 860 (Fed. Cir. 2010).

Second and perhaps more importantly, our dataset only contains patents which were subject to a ruling on summary judgment, a trial, or an appeal. To be sure, we have the population of cases that resulted in a ruling on a dispositive motion or trial. For these cases, we report statistical results on the outcomes. However, most lawsuits settle, and as our data confirms, most lawsuits settle before any ruling on the merits. Cases that settled before any substantive patent ruling are completely absent from our dataset, with the exception of some basic descriptive statistics reported in Table 1. Moreover, many disputes do not result in litigation. Obviously, our dataset lacks unlitigated disputes about patents. The upshot is that our data and results are not generalizable to the cases or disputes that settled without any substantive ruling. Thus, while our data sheds light on who wins and loses patent cases and dispositive motions, it cannot tell us who *would* win cases that were filed but settled without a judgment.

We do not even have a sense of which direction the bias, if any, would point if one were interested in all litigated cases. It may be that the cases that are settled before a merits ruling are mainly strong cases in which the parties overlapped in their expectations on success. If this is true, then the defendant win rates we observe in our dataset would be higher than the win rate if all cases were litigated to judgment. On the other hand, it could be that the cases that settled before a merits ruling consist disproportionally of meritless cases that were resolved via a cost-of-defense settlements.[23] If this alternative hypothesis was true, then our estimates of defendant win rates from the cases which reached the merits phase would be lower than the defendant win rate if all filed cases went to judgment. Because almost all of the settlements are

[23] For some reason to think such claims are common, see, e.g., Mark A. Lemley & A. Douglas Melamed, *Missing the Forest for the Trolls*, 113 **Colum. L. Rev.** 2117 (2013).

confidential, we cannot assess the direction of the bias. For these reasons, we urge readers to interpret our results with these limitations in mind.

III. Our Results

In this section, we present some basic descriptive statistics, and then draw some lessons from the data.

A. Description of the Patents and Cases

As of the date of our study, there were 949 merits decisions on patents based on infringement lawsuits filed in 2008 and 2009.[24] Those decisions were made in 474 different cases involving 779 different patents. Most of those cases were concentrated in a relatively small number of judicial districts. Leading the way were the Eastern District of Texas and the District of Delaware, two districts perennially favored by plaintiffs.[25] We present the data in Table 1, along with data on where all of the roughly 5000 lawsuits filed in 2008 and 2009 were filed.

Of the 949 merits decisions, 636 were definitive wins on an issue for one side or the other; the remainder were interim wins (usually the denial of the other side's summary judgment motion). The most common occasions for a merits ruling were summary judgment motions of invalidity (430 observations) and noninfringement (473 observations, increasing to 509 when we added stipulated judgments of noninfringement after claim construction). By

[24] We cut off our data collection on June 1, 2013.

[25] *See, e.g.,* Mark A. Lemley, *Where to File Your Patent Case*, 38 **AIPLA Q.J.** 401 (2010). Note, however, that because we count only cases with merits decisions, rather than all cases filed, a district's share of cases in our data set may not match their share of filed cases, because cases in some districts are more likely to settle than others.

contrast, patentees were less likely to seek and obtain a ruling in their favor on summary judgment. Patentees brought and received a ruling on only 125 summary judgment motions on validity[26] and 128 summary judgment motions on infringement. They also brought 116 summary judgment motions of no inequitable conduct which resulted in a ruling on the merits. Accused infringers only brought 24 summary judgment motions of inequitable conduct, and none were successful.

Of our 949 merits cases, 290 patents went to trial. Over seventy percent (206 patents) were heard by juries, with the remainder (84) decided in bench trials. A total of 273 of the 949 merits decisions reached a Federal Circuit decision on appeal, though another 126 merits decisions were appealed and then settled before decision. There are presently 82 merits decisions pending before the Federal Circuit. **Table 1**

2008-2009 Patent Lawsuit Filings and Merits Decisions by District

District	% of Merits Decisions in Our Database (#)	% of 2008-2009 Lawsuit Filings (#)
TXED	11.9% (128)	10.4% (524)
DED	11.3% (122)	7.8% (394)
CAND	7.5% (81)	6.5% (325)
CACD	5.2% (56)	9.0% (454)

[26] Summary judgment of validity differed from the other summary judgment motions we classified. A motion for summary judgment of validity often encompassed one ground for invalidity. For instance, the patent holder may move for summary judgment of no anticipation. Even if the motion was granted, it would not preclude an accused infringer from contesting the validity on a different basis such as lack of enablement. Thus, even a successful patent holder on a motion for summary judgment of validity did not necessarily prevail on all invalidity defenses. For summary judgment of invalidity, non-infringement, infringement, inequitable conduct, and no inequitable conduct, the winner of the motion completely resolved the issue in the case.

CASD	**4.7% (51)**	**2.7% (138)**
NYSD	**4.4% (47)**	**4.3% (216)**
ILND	**3.7% (40)**	**5.5% (275)**
NJD	**3.2% (34)**	**6.0% (302)**
WIWD	**2.8% (30)**	**1.3% (65)**
VAED	**2.8% (30)**	**2.2% (112)**
MAD	**2.5% (27)**	**2.2% (108)**
TXSD	**2.0% (22)**	**1.3% (67)**
OHND	**1.6% (17)**	**1.8% (89)**
All Other Districts	**36.4% (392)**	**39.0% (1960)**

The columns in Table 1 require some interpretation before being compared with each other. The middle column, providing the percentage of merits decision, is done on a per patent-case basis, as our data is broken down in this manner. A single case may involve multiple patents. The far right column utilizes Lex Machina's raw data on case filings, which is done on a per case basis. While the patent-case and case basis differ, a comparison is useful to see basic trends.

First, less than ten percent of the patent lawsuits filed in 2008 and 2009 (476 of 5029) resulted in any merits decision.[27] In other words, greater than 90% of lawsuits settle before the court resolves summary judgment or tries the case. Second, as shown in Table 1, the identity of the districts with the most merits decisions loosely tracks the identity of the districts with the most filings.

[27] The percentage is slightly understated because some of the filed lawsuits and still pending, and may reach of merits decision after the date of our coding. But there is reason to believe that is true of no more than 2-3% of cases filed in 2008 and 2009. *See* Crouch, *supra* note __.

However, some districts, such as Northern California and Western Wisconsin, appear overrepresented in merits decisions relative to filings. Western Wisconsin is known as a "rocket docket," which may provide less time for the parties to settle, and Northern California has had local patent rules for many years that may stage the case for resolution on summary judgment. Other districts, such as Central California, appear underrepresented. Central California has a large number of district court judges – like Northern Illinois, another venue underrepresented in merits decisions – and also has a long average case pendency. Longer pendency may increase the possibility of settlement before a merits decision.

B. The Realities of Patent Litigation

In this section, we draw a number of lessons from our results – both the descriptive statistics and our multivariate regression analysis.

Reality #1: The nature of validity challenges is changing

In our 1998 study, we found that decided validity challenges were overwhelmingly based on obviousness – so much so that even though obviousness challenges had the lowest win rate, they were also responsible for the largest number of judicial patent invalidations. Prior art challenges were close behind. And what 112 challenges we found were almost entirely enablement-based.[28]

Things have changed. While there are still a sizeable number of adjudicated obviousness challenges (149 summary judgment motions decided), there were fewer decisions

[28] Allison & Lemley, *supra* note __, at __.

on summary judgment motions of obviousness than for anticipation (154). There are a growing number of decisions based on patentable subject matter (26), a category of minor importance in the 1998 study. We suspect that if we reviewed lawsuits filed even more recently, such as those filed in 2010 and 2011, the number of summary judgment motions on patentable subject matter would have substantially increased. Recent Supreme Court and Federal Circuit case law likely encouraged more litigation on the doctrine.[29] And the single largest category of adjudicated challenges was for indefiniteness (176), a validity doctrine that barely registered in the 1998 study.

We attribute the growth of indefiniteness challenges to two factors. First, a major portion of the decisions in our data set involve software patents,[30] and the Federal Circuit in the 2000s developed a doctrine that applied indefiniteness to software means-plus-function claims with more force than elsewhere.[31] Second, indefiniteness is a pure question of law that is normally decided in connection with claim construction,[32] because the defendant's argument is

---

[29] *See, e.g.,* Bilski v. Kappos, 130 S.Ct. 3218 (2010); Mayo Collaborative Servs. v. Prometheus Labs, 132 S.Ct. 1289 (2012); CLS Bank Int'l v. Alice Corp. Pty, 717 F.3d 1269 (Fed. Cir. 2013) (en banc), *cert. granted*, 134 S.Ct. 734 (2013).

[30] Over one-third of the merits decisions in our study concerned software patents (339/949). We discuss technology- and industry-specific results in a subsequent paper.

[31] *Function Media, LLC v. Google Inc.*, 708 F.3d 1310, 1318 (Fed. Cir. 2013); *ePlus, Inc. v. Lawson Software, Inc.*, 700 F.3d 509, 518–19 (Fed. Cir. 2012); *Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1312–13 (Fed. Cir. 2012); *Ergo Licensing, LLC v. CareFusion 303, Inc.*, 673 F.3d 1361, 1362, 1365 (Fed. Cir. 2012); *Typhoon Touch Techs., Inc. v. Dell, Inc.*, 659 F.3d 1376, 1384–86 (Fed. Cir. 2011) (means-plus-function software claims required disclosure of corresponding structure performing that function in the specification, but that structure did not need to be described in the form of software code); *In re Aoyama*, 656 F.3d 1293, 1294, 1297–98 (Fed. Cir. 2011) (means-plus-function software patent claim invalid as indefinite for failure to disclose the corresponding algorithm performing that function); *Aristocrat Techs. Austl. PTY Ltd. v. Int'l Game Tech*., 521 F.3d 1328, 1337–38 (Fed. Cir. 2008); *WMS Gaming, Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1349 (Fed. Cir. 1999) ("[T]he disclosed structure is not the general purpose computer, but rather the special purpose computer programmed to perform the disclosed algorithm."). For discussion, see, e.g., Mark A. Lemley, *Software Patents and the Return of Functional Claiming*, 2013 **Wis. L. Rev.** 905.

[32] *See, e.g.,* Teva Pharms. v. Sandoz, 723 F.3d 1363 (Fed. Cir. 2013).

that the claim term is not capable of being construed. Claim construction itself was rare in our 1998 paper, which ended in 1996, the same year *Markman* was decided.[33] Today, however, claim construction is the most likely form of substantive ruling in a patent case, because it is a prerequisite to virtually any type of summary judgment motion on validity or infringement. Because courts often decide indefiniteness issues while construing claims, they are likely to see more indefiniteness motions than other forms of invalidity issues. Cases that settle after claim construction, for instance, never reach the merits of other arguments, but will decide indefiniteness.[34]

It appears that the indefiniteness doctrine plays a larger role than previously recognized in patent law. Remarkably, the rise of indefiniteness motions occurred despite Federal Circuit hostility to the doctrine. The Federal Circuit has made it very difficult to prevail on indefiniteness outside of software means-plus-function claims; a claim is indefinite under current law only if it is "insolubly ambiguous."[35] The Supreme Court granted certiorari in January 2014 in an indefiniteness case, and seems poised to broaden the doctrine considerably.[36] If it does, indefiniteness may play an even larger role in patent litigation in the near future.

---

[33] Markman v. Westview Instruments, 517 U.S. 370 (1996).

[34] Notably, the fact that indefiniteness is decided during claim construction means that we may actually under count the number of indefiniteness motions. Not all indefiniteness motions or rulings are styled "summary judgment"; some rulings on indefiniteness may evade our view because they are buried inside an order that purports to be only about claim construction. While we have done our best to identify all such cases, we cannot guarantee that we have them all. So, if anything, our numbers understate the growth in the importance of indefiniteness.

[35] *See, e.g.,* Teva Pharms. v. Sandoz, 723 F.3d 1363 (Fed. Cir. 2013).

[36] Nautilus v. Biosig, 715 F.3d 891 (Fed. Cir. 2013), *cert. granted*, 2014 WL 92363 (U.S. 2014).

Reality #2: Individual validity challenges lose

The courts ruled on validity in a large number of cases, mostly on summary judgment. Most of those motions failed. Table 2 reports the success rates of summary judgment motions of invalidity, both overall and by specific issue.

Overall, patentees won only 30% of their invalidity challenges on summary judgment. For many of the most common sorts of challenges, the win rate was even lower. Patentees defeated summary judgment motions based on prior art, obviousness, and section 112 more than four times in five. Notably, patentable subject matter motions were the only ones to prevail a majority of the time (14 of 26, or 54%, were successful).

Table 2

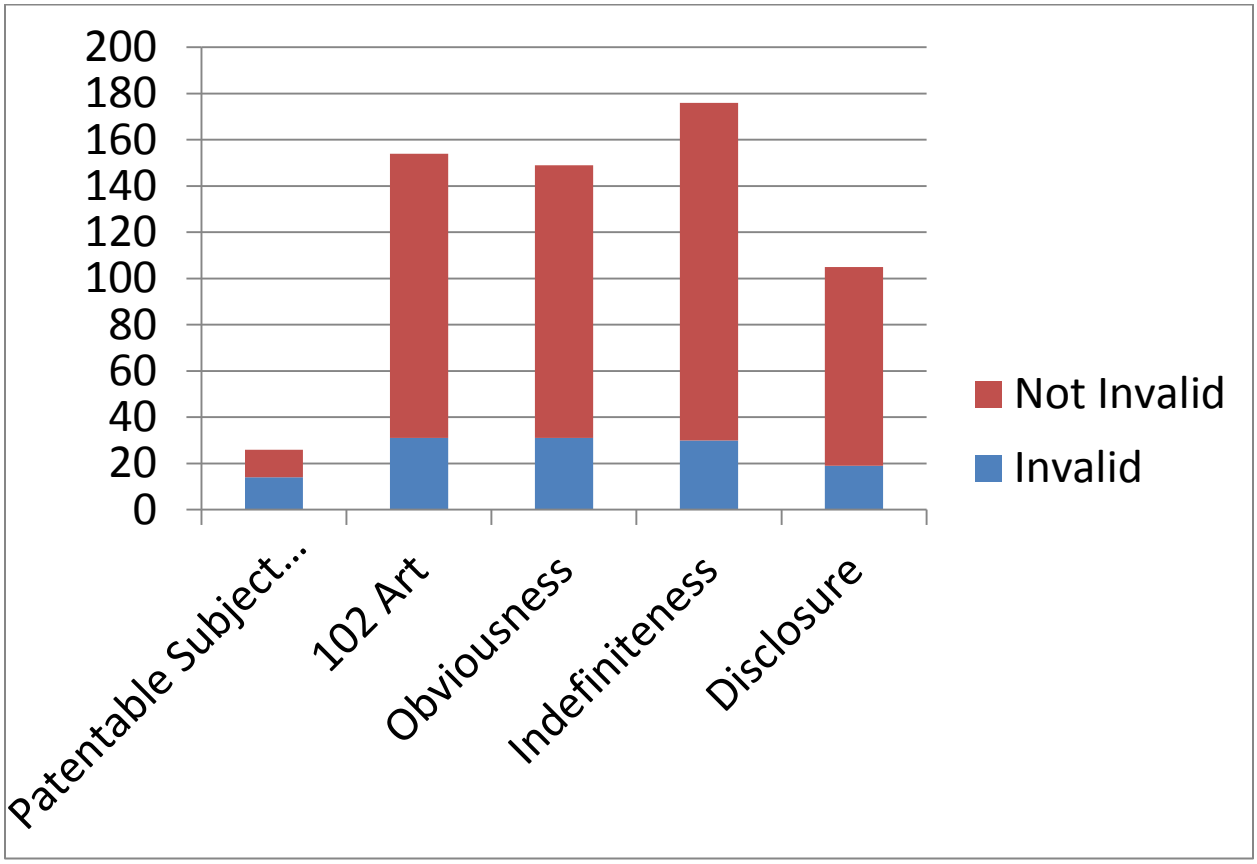
Win Rates of Invalidity Summary Judgment Motions[37]

- ✖ **Summary Judgment of Invalidity overall 131/430 (30%)**
- ✖ **SJ Invalidity—No patentable subject matter 14/26 (54%)**
- ✖ **SJ Invalidity-–Section 102 prior art 31/154 (20%)**
- ✖ **SJ Invalidity—Sec. 103 Obviousness 31/149 (20%)**
- ✖ **SJ Invalidity—Sec. 112 Indefiniteness 30/176 (17%)**
- ✖ **SJ Invalidity—Sec. 112 lack of enablement 8/63 (13%)**
- ✖ **SJ Invalidity—Sec. 112 Inadequate written description 11/73 (15%)**

[37] The numbers of individual challenges do not add to the total because some motions were brought on multiple grounds. The numbers of successful challenges do not add to the total because a few successful motions were brought on grounds not listed here, like utility or inventorship.

Figure 1

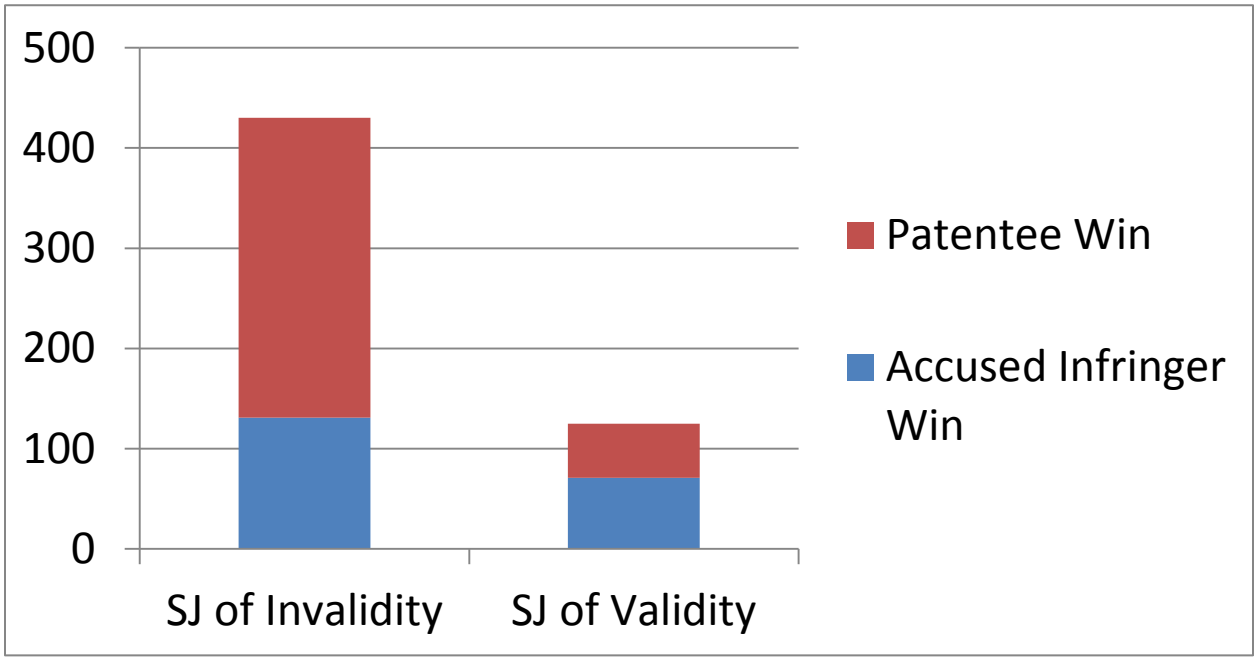
Win Rates on Invalidity Summary Judgment Motions by Issue



Patentees were much less likely to obtain summary judgment of validity, as Figure 2 shows.

Figure 2

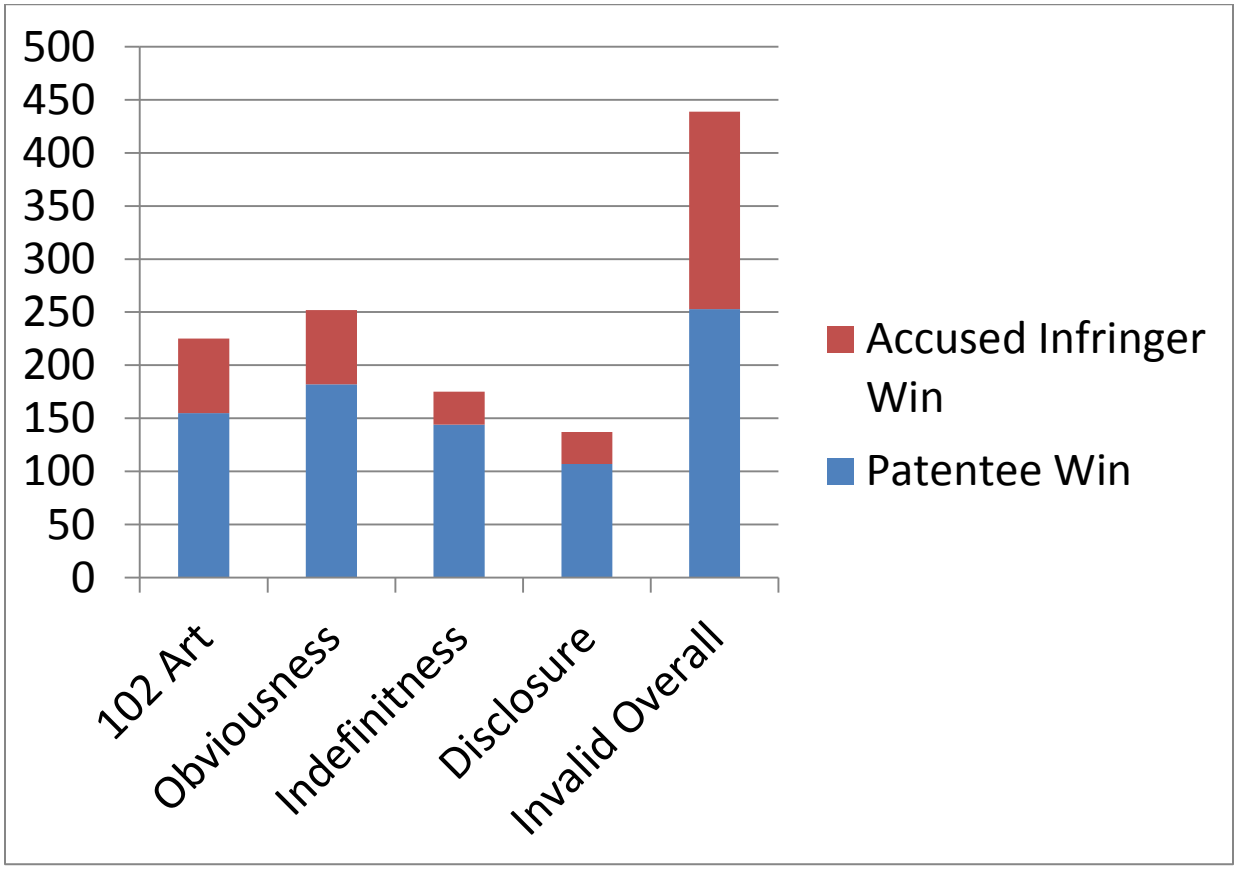
Overall Results on Summary Judgment of Validity



The fact that most individual validity challenges fail is true not just of summary judgment rulings, but also of overall final decisions on validity. Figure 3 shows the overall win rate for validity across all procedural postures.

Figure 3

Overall Invalidity Win Rates



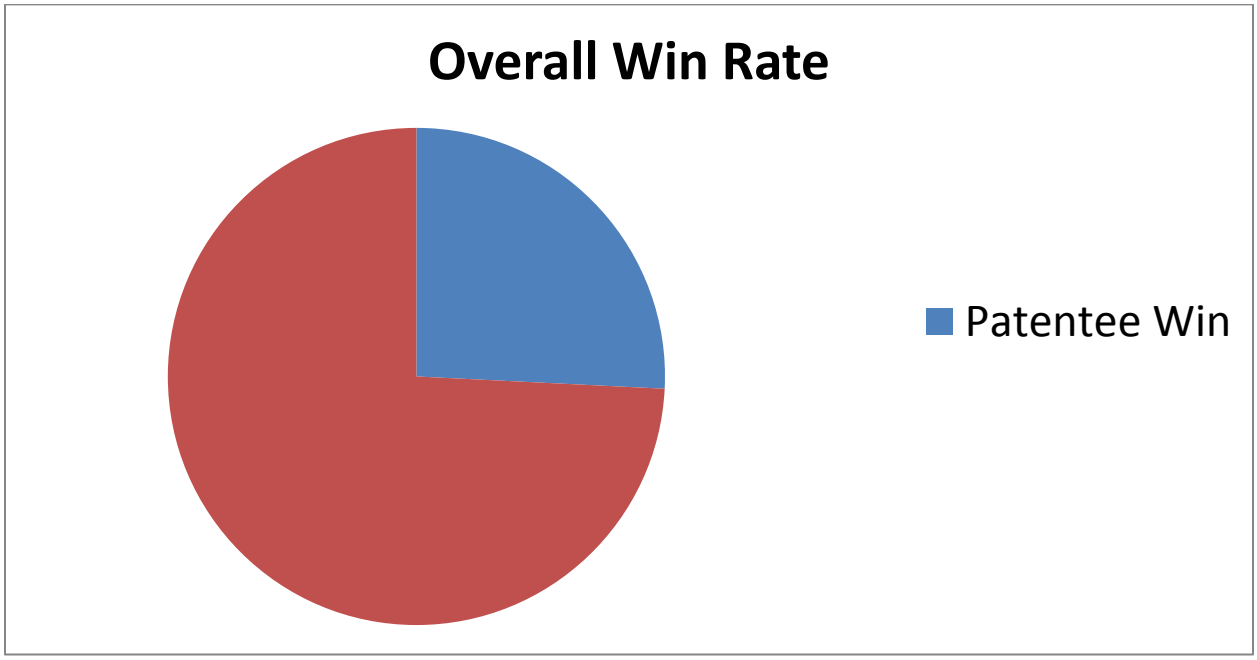
Reality #3: Overall, challengers win

Notwithstanding our finding that most individual validity challenges fail, the overall picture for patentees is considerably darker. Patentees won only 164 of the 636 definitive merits rulings, or 26%. Notably, that number is essentially unchanged from Janicke and Ren's study nearly a decade ago, despite substantial changes in the nature of patent plaintiffs in that decade.[38]

[38] Janicke & Ren, *supra* note __ (finding that patentees won 26% of cases).

Figure 4

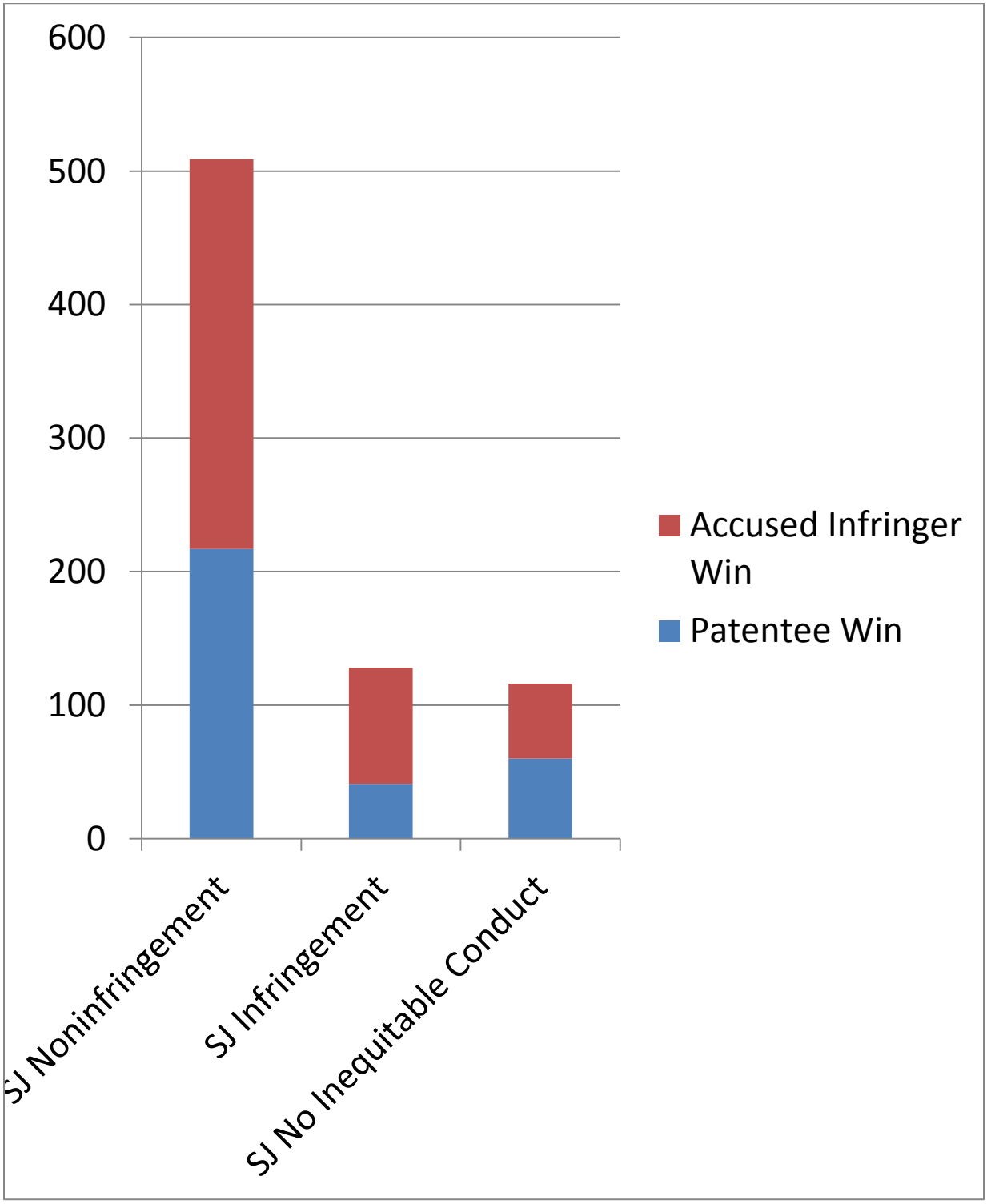
Overall Patentee Win Rate



Why do patentees lose nearly three-quarters of the time when the court definitively resolves the merits? The answer is two-fold. First, while courts turn away most validity challenges, patentees do not fare as well when it comes to infringement. Accused infringers won 54% of their summary judgment motions alleging noninfringement (256 of 473). That number rises to 57% (292 of 509) when we include stipulated judgments of noninfringement after claim construction, which are functionally equivalent to summary judgments of noninfringement; the patentee concedes that it cannot win under a particular claim construction in order to tee the case up for appeal.

Figure 5

Summary Judgments of Infringement



Second, the nature of patent litigation requires patentees to win every issue before the court. A patentee who defeats five of six invalidity challenges, only to lose the sixth, loses the case. So does a patentee who wins on validity and inequitable conduct but loses on infringement. One of us has referred to this as the "fractioning" of patent law.[39] Our data suggest that it has a significant effect on patent cases overall, because many of our cases had motions on multiple issues, and those motions were not always decided in favor of the same party. In patent law, a split decision is almost always a decision for the accused infringer, not the patentee.

The summary judgment process exacerbates the fractioning. Summary judgment in most areas of law is predominately used by defendants, and patent law is no exception. Patentees had relatively fewer motions for summary judgment of infringement ruled upon (128) than accused infringers had ruled upon seeking non-infringement. Moreover, patentees won less than a third of their motions for summary judgment of infringement (41, or 32%). The patentee's burden to be entitled to summary judgment of infringement is higher than the burden on accused infringers for non-infringement. A patentee must show a lack of disputed issues of material fact for *all* elements of the claimed invention, while the accused infringers merely need to show a lack of disputed issue of material for *any* element of the claimed invention.

Furthermore, because the defendant only needs to prevail on one defense, it can move on one or more basis on summary judgment. Even if unsuccessful, the accused infringer has another chance to win the case at trial. In contrast, the patentee must both survive summary

---

[39] Mark A. Lemley, *The Fractioning of Patent Law*, in **Intellectual Property and the Common Law*** 504 (Shyamkrishna Balganesh ed., Cambridge University Press 2013).

judgment and prevail at trial. Thus, the accused infringers have several bites at the proverbial apple.

If a case reached the trial stage, patentees fared much better. Overall, patentees won 60.7% of the trials, which included prevailing on 59.4% of patents decided by juries, and 63.9% of patents decided by the bench.

Reality #4: Where you stand depends on where you sit

Both patentees and accused infringers engage in forum shopping, filing suit in the district court they believe is likely to be most favorable to their claim. The reality is that forum shopping works, at least in cases that reach a merits decision. Our multivariate regression analysis of the merits decisions indicates that several districts are correlated with higher win rates for one side or the other, either overall or on various issues, even after we control for the characteristics of the patents, the patentees, the technology, and the industry.[40] We report the effects of district on overall win rates in Table 3.[41] It is important to keep in mind that the

[40] We used logistic regression, or logit, models because each of our dependent variables (specific outcomes) is binary (or "dummy"—"yes" or "no"). Almost anytime one uses multiple regression in studying patent litigation, the typical assumption that all variables are independent of one another does not hold. There are several reasons for this: (1) Many cases involve the assertion of multiple patents, and decisions about these patents are made by the same judge and jury; (2) It is common to find in one's data set that the same patent has been litigated in more than one separate lawsuit against different defendants, and even though the decision makers may be different, the same patent has the same attributes in each case: (3) Some cases will be consolidated, with the same decision maker deciding certain issues, usually only pretrial summary judgments, but sometimes trial decisions as well.

To account for the lack of complete independence among observations, we clustered on the standard errors of the unique patent numbers.

[41] In addition to our having to resolve the problem caused by lack of complete independence among our observations, we also had to contend with the fact that when one runs multiple tests from the same data set, there is the problem that we might obtain one or more findings of statistical significance by pure chance. Of the various techniques that have been proposed for correcting this problem, we decided that the use of bootstrapping would best serve our needs. To correct for any possible false

regression results we report show correlations and are not proof of causation. The success of patentees in any particular district may be a function of the quality of cases brought in that district, rather than any particular pro- or anti-patent sentiment.[42]

The two districts with the most patent cases – the Eastern District of Texas and the District of Delaware – were both significantly more likely to rule for the patentee in the cases we studied than are the "non-busy" patent districts.[43] So too is the Southern District of New York. By contrast, only one district is significantly less likely to rule for patentees – the Central District of California.

These results differ to some extent from the results in prior literature.[44] While those prior papers have found some differences in district outcomes, they have done so using

---

significance findings (false discovery rate) resulting from doing multiple tests from the same data set, we used a bootstrapping procedure when running the logistic regressions on the various merits decisions. The bootstrapping technique consisted of first resampling the original data to construct fifty samples with the original size. Thus, we had 949 observations, and from that we took a random sample of 949 fifty different times. Each sample of 949 from the original 949 observations is clearly *not* identical to the original 949 because of the randomness of the samples. We then ran the logistic regression on the first sample, and generated a coefficient, standard error, and p-value. Sample number 1 was then added to the original data set of 949 observations. Then sample number 2 was taken, another logistic regression was run on this second sample, and a second coefficient was generated, along with a standard error and p-value. Sample number 2 was then added back into the set consisting of the original 949 observations plus the first random sample. This process was repeated a total of fifty times. Finally, we averaged the fifty coefficients and derived a final standard error and p-value. Note that we clustered on the standard errors of the unique patent numbers when running each of the fifty logistic regressions. Also, the combination of bootstrapping and standard error clustering was employed for each regression model—there was a separate regression model for each of the merits outcomes. We were required to do separate logits on each merits outcome, and could combine all of these outcomes into a single multinomial regression model because the different outcomes possible for each patent were not independent of one another. [add a cite explaining/justifying the bootstrapping procedure]

[42] For more discussion of this issue, see Lemley, Kendall & Martin, *supra* note __.

[43] The omitted districts in this analysis are all districts other than the top thirteen.

[44] Among the prior studies examining district-specific outcomes, see Mark A. Lemley, Jamie Kendall, & Clint Martin, *Rush to Judgment? Trial Length and Outcomes in Patent Cases*, 41 **American Intellectual Property Law Association Quarterly Journal** 169 (2013) (no significant differences by district in trial results); Mark A. Lemley, Jennifer Urban, & Su Li, *Does Familiarity Breed Contempt Among Judges*

bivariate results. By contrast, our findings are part of a large multivariate regression. Thus, some facts apparent from other studies – like the fact that the Northern District of California rules for accused infringers more than other districts – turn out to be explained by other characteristics, such as the industry or technology category of the litigated patents, rather than by the venue itself. We show results for some of the top districts in Table 4.

Table 3

Outcomes by District

	TX ED	DE D	CA ND	CA CD	CA SD	NY SD	IL ND	WI WD	NJ D	MA D	VA ED	OH ND	TX SD	All Others
	% Win Rates by District; X = No Observations													
Patentee Definitive Winner	45	33	15	5	20	54	5	32	17	0	19	25	33	19
SJ Invalid Any	18	22	44	59	18	31	56	17	39	13	19	0	11	40
SJ invalid PSM	X	X	X	33	X	57	X	X	100	0	0	X	X	67
SJ Invalid 102 P.A.	0	12	25	43	17	0	50	0	0	17	11	0	20	30
SJ Invalid 103 Obv.	17	8	31	50	50	0	20	40	0	25	0	0	0	29
SJ Invalid 112 Indef	15	20	40	67	14	0	25	0	X	0	25	0	8	28
SJ Invalid 112 Discl	0	33	20	50	0	100	40	0	57	0	0	0	0	12
SJ Validity	40	46	50	100	20	100	50	100	38	67	29	100	0	43
SJ No infr + stip. jdg no infr	45	64	64	64	54	64	41	75	56	53	65	0	91	58
Patentee Trial Win	72	49	50	83	55	100	20	88	27	0	43	50	60	71

Deciding Patent Cases?, __ **Stanford Law Review** __ (forthcoming 2014) (finding that Delaware judges are more likely to rule for patentees).

Accus Infr Trial Win No Infr	100	94	100	100	0	X	100	100	100	100	89	100	100	82
Accus Infr Trial Win Inval	80	77	100	X	83	0	X	X	80	100	38	X	100	100

These differences are fairly striking. Forum shopping, it seems, can pay dividends for cases that reach merits decisions.

Table 4

Definitive Win Rate by District—Multivariate (Logit) Regression Results[45]

District	Patent Owner Definitive Winner	Accused Infringer Definitive Winner
TX ED	**1.252*** **	**-1.252*** **
	(0.331)	(0.331)
DE D	**0.745** **	**-0.745** **
	(0.337)	(0.337)
CA ND	-0.316	0.316
	(0.426)	(0.426)
CA CD	**-1.532** **	**1.532** **
	(0.607)	(0.607)
CA SD	0.0522	-0.0522
	(0.551)	(0.551)
NY SD	**1.593*** **	**-1.593*** **
	(0.493)	(0.493)
IL ND	**-1.557*** **	**1.557*** **
	(0.599)	(0.599)
WI WD	0.685	-0.685
	(0.481)	(0.481)
NJ D	-0.120	0.120
	(0.617)	(0.617)
MA D	X	X

[45] Because we performed quite a few separate logistic regression tests using the same data set, there is a chance of deriving a finding of statistical significance by pure chance, which is often referred to as the false discovery rate problem (false positive finding of significance). As noted above, we used a bootstrapping methodology to control for this risk. In the table above, the districts are the independent variables and the specific outcome—Definitive Winner—is the dependent variable.

	X	X
VA ED	-0.00844	0.00844
	(0.590)	(0.590)
OH ND	0.340	-0.340
	(0.781)	(0.781)
TX SD	0.745*	-0.745*
	(0.386)	(0.386)
N	620	620
Standard errors in parentheses		
* p<0.1	** p<0.05	*** p<0.01
X = District omitted because of either too few observations, excessive collinearity, or lack of randomness among observations		

Reality #5: Diversification works

Modern patent litigation is often about more than enforcing a single patent.[46] A significant fraction of the cases in our study involved decisions on more than one patent. Notably, we find that cases in our study that evaluated more than one patent were significantly more likely to rule for the patentee, both in final outcome and in interim decisions. Notably, our finding is not merely that patentees who litigate multiple cases are more likely to win on at least one of them, but that the fact that a court rules on multiple patents is associated with an increased patentee win rate on each patent.

In addition to prevailing more overall, patentees also fared better on validity issues in multi-patent decisions. Specifically, patentees were significantly more likely to be granted summary judgment on a validity issue on a particular patent when the court ruled on multiple patents. It is possible that redundancy or diversification work, increasing the chances that the patentee will prevail on each patent. Here, the fractioning of patent law may work in favor of patentees. If a patentee prevails on a single patent in a lawsuit involving multiple patents, the

[46] *See* Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 **U. Pa. L. Rev.** 1 (2005).

patentee is entitled to damages and possibly an injunction. In fact, the damages may be the same for infringement on a single patent and infringement of multiple, related patents.[47] Alternatively, it is possible that causation works the other way, and that patentees with stronger inventions are more likely to obtain and assert multiple patents and take the case to judgment. That said, there may be multiple selection effects that contribute to these results, including the fact that the number of patents asserted may affect how parties decide to move for judgment and how courts evaluate those motions, so we urge caution in interpreting this result.

Reality #6: Foreign inventors do just fine

A number of studies have sought to evaluate whether the US patent system is biased against foreigners,[48] as a number of foreign companies suspect. In this study, we look, not at the location of the litigants, but at the domicile of the inventors themselves. We define a patent as being of foreign origin if a majority of its inventors were domiciled outside the U.S.[49] There were 146 foreign origin inventions out of 777 patents litigated to a merits decision in our study. 98 of those 146 patents were filed first in a foreign country, but not always in the country where the invention originated. The correlation between foreign-origin invention and

[47] This paper utilizes each patent in a lawsuit as the unit of observation. Future work includes transforming the unit of observation to each lawsuit, and performing similar empirical analysis. Analyzing the data using the lawsuit as the unit of observation may shed more light on litigation involving multiple patents.

[48] Kimberly A. Moore, *Xenophobia in American Courts*, 97 **Nw. U. L. Rev.** 1497 (2003); cf. Kevin Clermont & Theodore Eisenberg, *Xenophilia in American Courts*, 109 **Harv. L. Rev.** 1120 (1996).

[49] In the unusual case in which there was an equal split between an even number of U.S. and non-U.S. inventors, the domicile of the assignee was used as a tie breaker. There were no cases in which there was an equal number of U.S. and foreign inventors without there also being an assignee to break the tie.

foreign priority filing country was 0.72, which is high but not extremely high. Patents on only five foreign-origin inventions were filed first in the European Patent Office (EPO).

How did those foreign-origin patents fare in litigation? We find a very strong result: patents of foreign origin in our study were much more likely to prevail in court in a merits decision than those issued to domestic inventors. In addition to being more likely to prevail overall, foreign inventor patents were less likely to be held invalid, less likely to be held invalid on summary judgment, and less likely to be found obvious.

This result was frankly surprising to us. It may suggest that there is no bias against foreign inventors, though it may be driven in full or in part by selection effects. Kimberly Moore found that foreign litigants did not do worse in litigation, but that they were much less likely to enforce their patents in the US courts, suggesting that foreign litigants might be selecting only their best patents for suit.[50] While we investigate foreign inventors, not necessarily foreign owners, the two are likely to be correlated, and a similar effect might be at work here.

Reality #7: It's good to go first

Plaintiffs traditionally go first in litigation, and get the last word as well. There is some reason to think that confers an advantage in general in litigation.[51]

That seems to be true in patent law as well. Consistent with prior work,[52] we find that accused infringers who sue for declaratory judgment fare substantially better than other

[50] Moore, *supra* note __, at __.

[51] For general arguments that going first is an advantage in litigation, see, e.g., See Shari Seidman Diamond et al., *Juror Reactions to Attorneys at Trial*, 87 **J. Crim. L. & Criminology** 17, 27 (1996). Bernard Chao is studying this effect experimentally. Bernard Chao, cite.

accused infringers in cases which reach a merits decision. They are more likely to win overall, more likely to establish that the patent is invalid, and more likely to win their invalidity argument on summary judgment. Notably, while declaratory judgment allows accused infringers rather than patentees to pick the forum, and we found above that some fora are more favorable to patentees than others, this result is independent of the district-specific effects. That is, the benefit that declaratory judgment plaintiffs get is not simply a function of their ability to have their case heard in a more favorable forum.

Again, however, we encourage the reader not to read too much into this result. Selection effects may be at work. It is possible, for instance, that accused infringers who file declaratory judgments (or their counsel) are more sophisticated than those who just wait to be sued. That greater sophistication may translate into greater win rates. Correspondingly, patentees who actually send threat letters that can trigger declaratory relief may be less sophisticated than others; experienced patent lawyers can generally avoid creating declaratory judgment jurisdiction. We cannot test the quality of counsel on either side, but it is a possible explanation for these results.

Reality #8: Patent characteristics don't seem to matter much

Our final finding is quite surprising – the observable characteristics of the patents don't seem to have much if any bearing on the outcome of the cases involving those patents. Neither

---

[52] Kimberly A. Moore, *Jury Demands: Who's Asking?*, 17 **Berkeley Tech. L.J.** 847, 859-61 (2002) ("Accused infringers generally bring declaratory judgment actions when they believe they have a strong case on the merits.").

the number of adjusted citations received[53] nor the number of backward citations have any significant correlation to overall win rates, validity, or infringement outcomes. The only relationship that is significant (though minor) is between backward citations and final rulings on enablement and written description. Perhaps not surprisingly, including more information in the patent is associated with a somewhat reduced risk that the patent will be held invalid for failure to sufficiently describe or disclose the invention. But with that exception, citations seem to tell us nothing about how patents are valid or whether they are likely to be infringed. That is remarkable given how much effort economists have spent measuring the value of innovation by patent citation counts.[54]

More generally, it is notable how little explanatory power each of the independent variables in our model has. The pseudo R^2 is a measure in logit regression of how much explanatory power the independent variables together have in predicting the independent variables. The pseudo R^2s in our regressions are reported in Table __. [add]. They are quite low, suggesting that most of the variation in patent litigation outcomes is not predictable, at least based upon the extensive variables we captured.[55] In other work we consider some variables not present here, including industry and technology area.[56] While there are significant differences in patent litigation outcomes by industry and technology, even including those variables does not explain most of the differences in patent outcomes. The

---

[53] Explain the process here.

[54] cites

[55] This contrasts with Michael J. Matteo, Jonathan Hillel, & Samantha Zyontz, *Explaining the "Unpredictable": An Empirical Analysis of U.S. Patent Infringement Awards*, 35 **Int'l. Rev. L. & Econ.** 58 (2013), who find that damages (as opposed to liability rulings) are predictable based on some simple variables.

[56] *See* John R. Allison, Mark A. Lemley, & David L. Schwartz, *Differences in Patent Litigation Outcomes by Technology and Industry* (vaporware 2014).

characteristics of individual lawyers, clients, patents, and judges seem to matter quite a bit. We think that is as it should be.

IV. Conclusion

The overall picture painted by our data is complex. In many ways, patent litigation is rather different than it was when we conducted our original study. The top districts for patent litigation – the Eastern District of Texas and the District of Delaware – were not very important twenty years ago. The *Markman* hearing did not exist in our original study. Patent assertion entities (aka patent trolls) were a minor feature of patent litigation in the 1990s. And the most successful validity challenges today – patentable subject matter and indefiniteness – were virtually unknown twenty years ago.

At the same time, many of our results will sound familiar to experienced students of the patent system. Ten years ago, Janicke and Ren found that patentees won only 26% of decided cases; we find that number unchanged today. Forty-six percent of patents whose validity was decided in the 1990s were held invalid; today the invalidation rate is 43%. Much has changed about patent law, but the overall dynamics of patent litigation – in which patentees win at trial but not on summary judgment, and in which patentees win each individual issue but lose overall – remain remarkably similar to the patent litigation we studied twenty years ago.