Does Familiarity Breed Contempt Among Judges Deciding Patent Cases?[1]

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Abstract

We offer the first comprehensive look at how a district judge's experience affects decisionmaking in patent cases. We find that that there is a strong, statistically significant relationship between a judge's experience and case outcome: more experienced judges are less likely to rule for the patentee. Notably, the relationship exists for rulings finding noninfringement; judicial experience had no relationship to the likelihood a judge would find a patent invalid. The relationship appears to hold across judges, rather than to be driven by the rulings of particular judges. Beyond individual judges, some technologies (biotechnology, mechanics) are associated with more patentee wins, while patentees are less likely to win computer hardware and software cases. Some district courts (Delaware, New Jersey) are more likely to find patents infringed. By contrast, perhaps surprisingly, we find no significant relationship between litigation in the Eastern District of Texas and a judge's ruling for or against the patentee. Finally, we find that suing on multiple patents is associated with an increased likelihood that at least one patent will be found to be infringed.

Our results challenge what has been an implicit assumption in the literature and discussion that particular districts are biased in a particular direction, driving forum shopping. And they test for the first time the implicit assumption in the literature, in calls for specialized patent trial courts, and in the Patent Pilot Program, that experience with patent cases at the trial level will lead to different—usually assumed to be "better"—outcomes from what we see from generalist courts. Our results suggest that there is a difference, but that "better" may be in the eye of the beholder. They suggest some sort of learning effect among district court judges across the country, and that patentees benefit from litigating before inexperienced judges, at least on issues of infringement. Depending on the reason for this effect, adoption of a specialized patent trial court might help accused infringers but not patentees, raising broader questions about patent reform and how to measure the value of an expert court.

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Judges notoriously dislike patent cases, which they view as arcane, complex, and surprisingly hard-fought. Proponents of specialized trial courts for patent cases argue that patent litigation is inherently complex and involves technical factual background that is especially difficult and specialized.[5] They would like to limit patent cases to judges with technical expertise, or at least judges who have demonstrated a willingness to engage with patent law.[6] The creation of the Federal Circuit was in part a response to such calls for specialization, though it was also designed to make the substantive law more patent-friendly.[7]

For proponents of judicial specialization, the Federal Circuit's lamented reversal rate may be related to judicial inexperience at the trial level (though there has been much ink spilled on other reasons why the reversal rate might be high).[8] Among other benefits, proponents of specialization expect it to produce both coherence in decision-making and a higher proportion

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[5] Rochelle Cooper Dreyfuss, *Specialized Adjudication*, 1990 BYU L. REV. 377 (1990); Donna M. Gitter, *Should the United States Designate Specialist Patent Trial Judges? An Empirical Analysis of H.R. 628 In Light of the English Experience and the Work of Professor Moore*, 10 COLUM. SCI. & TECH. L. REV. 169 (2009); Court of Appeals for the Federal Circuit: Hearings on H.R. 2405 Before the Subcomm. on Courts, Civil Liberties, and the Administration of Justice of the H. Comm. on the Judiciary, 97th CONG. 42-43 (1981) (statement of the Honorable Howard T. Markey, C.J., Court of Customs and Patent Appeals) ("[I]f I am doing brain surgery every day, day in and day out, chances are very good that I will do your brain surgery much quicker, or a number of them, than someone who does brain surgery once every couple of years.").

[6] For an effort to study whether technical background makes a difference in decisions by Federal Circuit judges, see Dunstan H. Barnes, *Technically Speaking, Does It Matter? An Empirical Study Linking the Federal Circuit Judges' Technical Backgrounds to How They Analyze the Section 112 Enablement and Written Description Requirements*, 88 **Chi.-Kent L. Rev.** 971 (2013) (finding judges with technical knowledge were more likely to reverse district courts). We originally thought to include a measure of technical specialization for district judges, but abandoned the effort because so few district judges had technical backgrounds.

[7] Rochelle Cooper Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, 64 N.Y.U.L. REV. 1 (1989).

[8] Kimberly A. Moore, *Are District Court Judges Equipped to Resolve Patent Cases?*, 15 HARV. J.L. & TECH. 1 (2001); David L. Schwartz, *Courting Specialization: An Empirical Study of Claim Construction Comparing Patent Litigation Before Federal Courts and the International Trade Commission*, 50 WM. & MARY L. REV. 1699 (2009); J. Jonas Anderson & Peter S. Menell, *Informal Deference: An Historical, Empirical, and Normative Analysis of Patent Claim Construction*, 108 NW. U. L. REV. (forthcoming Oct. 2012), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2150360.

of high-quality or "correct" decisions.[9] An experienced trial court, it is argued, could dispose of cases more accurately, more efficiently, and without forum shopping. Congress has responded by creating the Patent Pilot Program, intended to channel many patent cases in fourteen test districts to judges who opt to hear them.[10] The Patent Pilot Program is not itself a specialized court, but it encourages specialization within a district, concentrating experience with patent cases in the hands of a few judges.

Others oppose specialized trial courts. Generalist courts, they argue, may be better able to connect specialty law with other doctrines and with broader societal interests.[11] And specialized courts may be susceptible to forum-shopping, bias, and even capture, both because their importance depends on the continuing robustness of patent protection and because specialized judges are likely to spend time with lawyers who share that specialization.[12] This concern is frequently voiced about the Federal Circuit and the "de facto" specialized docket in the Eastern District of Texas.[13]

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[9] Dreyfuss, *Specialized Adjudication*, *supra* note __; Richard L. Revesz, *Specialized Courts and the Administrative Lawmaking System*, 138 U. PA. L. REV. 1111 (1990); Gitter, *Should the United States Designate Specialist Patent Trial Judges? An Empirical Analysis of H.R. 628 In Light of the English Experience and the Work of Professor Moore*, *supra* note __.

[10] Patent Pilot Program, Pub. L. No. 111-349, 124 Stat. 3674 (2011).

[11] Simon Rifkind, *A Special Court for Patent Litigation? The Danger of a Specialized Judiciary*, 37 ABA J. 425 (1951); Saran Vijay Damle, *Specialize the Judge, Not the Court: A Lesson from the German Constitutional Court*, 91 VA. L. REV. 1267 (2005).

[12] Kimberly A. Moore, *Forum Shopping in Patent Cases: Does Geographic Choice Affect Innovation?*, 79 N.C. L. REV. 889 (2001); Dreyfuss, *Specialized Adjudication*, *supra* note __. *See also* Lab. Corp. of Am. Holdings (LabCorp) v. Metabolite Labs., Inc., 548 U.S. 124, 135 (2006) (Breyer, J., dissenting) ("[O]ccasional decisions [on issues of patent law] by courts with broader jurisdiction will provide an antidote to the risk that the specialized court may develop an institutional bias.").

[13] Arti K. Rai, *Specialized Trial Courts: Concentrating Expertise on Fact*, 17 BERKELEY TECH.L.J. 877 (2002); Jay P. Kesan & Gwendolyn G. Ball, *Judicial Experience and the Efficiency and Accuracy of Patent Adjudication: An Empirical Analysis of the Case for a Specialized Patent Trial Court*, 24 HARV. J.L. & TECH. 393 (2011).

So far, this literature has been based on speculation. It has been unable to tell us the answer to the question parties most care about when they take a case to a trial court: does judicial experience with patent cases affect how the judge rules in the case? The rich literature on Federal Circuit reversal rates cannot tell us. Reversal rates for experienced patent judges are not different from those with less experience;[14] in any case, reversal rates may be driven by any number of factors that are hard to separate from district judge experience. The answer may affect both statutory proposals for district court specialization and the focus of the courts and Congress on forum-shopping.

In this paper, we offer the first comprehensive look at how a district judge's experience with patent cases affects that judge's decisionmaking. We look both at district outcomes and at outcomes by judge. Using both logistic regression and fixed effect analyses, we then relate outcomes to each judge's experience level, measured by the number of patent cases that judge decided over the observed time period.

We find a strong, statistically significant relationship between a judge's experience and case outcome: more experienced judges are less likely to rule for the patentee. Notably, this is true only of findings of infringement; judicial experience had no relationship to the likelihood a judge would find a patent invalid. It is true across all judges, and is not driven by particular judges. We also find that patentees are more likely to win biotechnology and pharmaceutical patent cases and less likely to win computer cases.

Our findings suggest that some sort of learning effect is going on among district judges across the country, and that patentees benefit from litigating before inexperienced judges.

[14] David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223 (2008).

That learning effect is quite steep – judges who have heard even a few patent cases quickly become less likely to rule for the patentee. We cannot tell whether the effect results from substantive shifts in attitude – judges growing frustrated with repeated suits by patent trolls or overclaiming by patentees – or represent a general increase in confidence in claim construction or assertiveness on the bench that comes with greater experience. Depending on the reason for this effect, adoption of a specialized patent trial court, or other methods of increasing trial judges' experience with patent cases, might help accused infringers, not patentees. Our results also call into some question what has been an implicit assumption in the literature and discussion: that particular districts are biased in a particular direction, driving forum shopping.[15]

In Part I we discuss the issues most relevant to debates over judicial specialization and forum shopping in patent law. In Part II, we explain our study methodology. Part III presents our results, focusing on the effect of judicial experience and district-specific results. Part IV offers some preliminary thoughts as to why more experienced judges are less likely to rule for patentees, what our findings might mean for patent policy and patent reform, and some thoughts on future work.

I. Specialized Patent Courts and Forum Shopping

Whether specialized courts are a good idea is a longstanding question, considered at length in the literature. The general expected benefits include greater efficiency in case

[15] Separate empirical work by one of the authors has found evidence that *juries* in particular districts, including the Eastern District of Texas, are somewhat more favorable than juries elsewhere, though the small number of jury trials make accurate prediction difficult. Mark A. Lemley et al., *Rush to Judgment? Trial Length and Outcomes in Patent Cases*, 41 AIPLA Q.J. 169 (2013).

management and disposition,[16] outcomes of higher "quality" or correctness in complex areas of fact or law, and more stable outcomes in similar cases, leading to coherent caselaw over time.[17] Proponents argue that specialized courts would be beneficial for complex areas of law, especially those that are factually complex,[18] both by improving the accuracy of outcomes[19] and because it would streamline overloaded generalist dockets by giving time-consuming cases to judges with greater expertise.[20] Unsurprisingly, proposals for specialized patent trial courts are well-represented in the academic literature,[21] following the intention to concentrate

[16] Revesz, *Specialized Courts and the Administrative Lawmaking System*, *supra* note __; Dreyfuss, *Special Adjudication*, *supra* note __.

[17] Jay P.Kesan and Gwendolyn Ball ably chart the main arguments for and against specialized courts both generally and in the patent context; we will thus not review them in detail here. Kesan & Ball, *Judicial Experience and the Efficiency and Accuracy of Patent Adjudication: An Empirical Analysis of the Case for a Specialized Patent Trial Court*, *supra* note __. Kesan and Ball find that rationales on both sides sort into four basic categories: judicial human capital; the creation of uniform and predictable legal doctrine; effects on the political economy of the judicial system; and efficiency gains, including increased accuracy in decision-making. *Id*. at 400-417.

[18] Revesz, *Specialized Courts and the Administrative Lawmaking System*, *supra* note __; Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, at __, *supra* note __ ("A trial judge who has never read a technical document before is less likely to interpret it correctly, no matter how many expert witnesses are called to testify, than an appellate judge who has extensive experience in dealing with such matters. Thus, it seems somewhat peculiar to allow a layman's decision to stand on a technical issue . . . when the experienced judges of the [Federal Circuit], and the experts they employ, think that the finding is wrong, but not 'clearly erroneous.'"); LeRoy L. Kondo, *Untangling the Tangled Web: Federal Court Reform Through Specialization for Internet Law and Other High Technology Cases*, 6 UCLA J.L. & TECH. 1 (2002).

[19] Gitter, *Should the United States Designate Specialist Patent Trial Judges? An Empirical Analysis of H.R. 628 In Light of the English Experience and the Work of Professor Moore*, *supra* note __; Moore, *Forum Shopping in Patent Cases: Does Geographic Choice Affect Innovation?*, *supra* note __; Damle, *Specialize the Judge, Not the Court: A Lesson from the German Constitutional Court*, *supra* note __.

[20] Dreyfuss, *Special Adjudication*, at__, supra note __; Douglas H. Ginsburg & Joshua D. Wright, *Antitrust Courts: Specialists versus Generalists*, 36 **Fordham Int'l L.J.** 788, 793 (2013) (identifying efficiency, subject matter expertise, and uniformity as the three benefits offered for judicial specialization).

[21] *See e.g.*, Rai, *Specialized Trial Courts: Concentrating Expertise on Fact*, *supra* note __; John B. Pegram, *Should There Be a U.S. Trial Court With a Specialization in Patent Litigation?*, 82 J. PAT. & TRADEMARK OFF. SOC'Y 765 (2000); Note, Gregory J. Wallace, *Toward Certainty and Uniformity in Patent Infringement Cases After Festo and Markman: A Proposal for a Specialized Patent Trial Court With a Rule of Greater Deference*, 77 S. CAL. L. REV. 1383 (2004); Jeanne Fromer, *Patentography*, 85 N.Y.U. L. REV. 1444 (2010) (arguing for a change in venue rules that would promote natural specialization among district judges hearing patent cases, which would cluster in technology-intensive districts).

expertise at the appellate level by creating the specialized Court of Appeals for the Federal Circuit, and have been regularly proposed in Congress.[22] Other countries—notably Korea, Japan and the United Kingdom—presently use some manner of specialized courts for patent cases,[23] and the European Union is currently seeking ratification of an agreement on a specialized Unified Patent Court.[24]

Others raise concerns, about specialized courts generally and patent courts specifically. These include both forum-shopping[25] and more broadly, overall capture of specialized courts by interested groups.[26] Some scholars have more general concerns about the effect of isolating certain types of cases into specific courts. They worry about negative effects on both the

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[22] H.R. 628, 111th CONG. (2009); H.R. Res. 5418, 109th CONG. (2006); S. 3923, 109th CONG. (2006).

[23] Kong-Woong Choe, *The Role of the Korean Patent Court*, 9 FED. CIR. B.J. 473 (2000); Adam Shartzer, *Patent Litigation 101: Empirical Support for the Patent Pilot Program's Solution to Increase Judicial Experience in Patent Law*, 18 FED. CIR. B.J. 191 (2009); Christian Helmers & Luke McDonagh, *Patent Litigation in the UK*, (LSE Legal Studies, Working Paper No. 12/2012, 2012), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2154939. Notably, however, the U.K. has bucked this trend, decreasing judicial specialization on patents in recent reforms. The U.K. has two specialized patent trial courts, the Patents Court, http://www.justice.gov.uk/courts/rcj-rolls-building/patents-court, and the Patents County Court, http://www.judiciary.gov.uk/you-and-the-judiciary/going-to-court/county-court/patents-county-court.

[24] NEWLEGAL REVIEW, *EPO Emerges as Diplomatic Force Over Unitary Patent and Language Barriers*, http://www.cpaglobal.com/newlegalreview/5556/epo_emerges_as_diplomatic_forc, (last visited July 9, 2011).

[25] Paul R. Gugliuzza, *Rethinking Federal Circuit Jurisdiction*, 100 GEO. L.J. 1437 (2012); Charles Adams, *The Court of Appeals for the Federal Circuit: More than a National Patent Court*, 49 MO. L. REV. 43 (1984); Moore, *Forum Shopping in Patent Cases: Does Geographic Choice Affect Innovation?*, *supra* note ___. In the case of patent courts, Judge Moore has argued that specialized trial courts would instead decrease forum-shopping. Moore, *Forum Shopping in Patent Cases: Does Geographic Choice Affect Innovation?*, supra note ___.

[26] Lawrence Baum, *Specializing the Federal Courts: Neutral Reforms or Efforts to Shape Judicial Policy?*, 74 JUDICATURE 217 (1991) (arguing that specialized courts represent "efforts by interest groups to secure advantages for themselves," the main example of such an interest being the federal government). Paul R. Gugliuzza similarly argues that the Federal Circuit's focus on government programs may make tend to bias it in favor of the PTO, and thus in favor of patent validity. Gugliuzza, *supra* note ___; Jeffrey Lefstin, *The Constitution of Patent Law: The Court of Customs and Patent Appeals and the Shape of the Federal Circuit's Jurisprudence*, 43 LOY. L.A. L. REV. 843 (2010) (arguing that the Federal Circuit was shaped by the fact that it was created out of the Court of Customs and Patent Appeals, which heard PTO appeals but not infringement cases).

specialty area of law and adjudication more generally.[27] In patent law in particular, commentators have worried that a specialized court would ignore precedent from other courts in favor of its own views.[28] This unease is longstanding; in 1951, Samuel Rifkind outlined his concerns that specialization would remove patent from the whole body of law of which it is a part. Rifkind worried this would lead to "tunnel vision" and the creation of a court with "a jargon of its own, thought-patterns that are unique, internal policies which it subserves and which are different from and sometimes at odds with the policies pursued by the general law."[29] Without the cross-pollination of legal theories from other areas of law, specialized courts could undermine, rather than enhance, the law's overall coherence.[30] Moreover, the quality of their overall decisions could suffer if judges do not have sufficient exposure to related areas of law, for example, commercial and antitrust law, when deciding patent cases.[31] Relatedly, commentators worry that specialist benches would attract judges who are less

[27] Baum, *Specializing the Federal Courts: Neutral Reforms or Efforts to Shape Judicial Policy?*, *supra* note ___; Dreyfuss, *Specialized Adjudication*, *supra* note ___; Diane P. Wood, *Generalist Judges in a Specialized World*, 50 **S.M.U. L. Rev.** 1755, 1767 (1997).

[28] William C. Rooklidge & Matthew F. Weil, *Stare Un-decisis: The Sometimes Rough Treatment of Precedent in Federal Circuit Decision-Making,* 80 J. PAT. & TRADEMARK OFF. SOC'Y 791 (1998). And indeed, over the past decade the Supreme Court has repeatedly reversed the Federal Circuit when it ignored Supreme Court precedent or departed from the general rule in other circuits. eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388 (2006); MedImmune, Inc. v. Genentech, Inc., 549 U.S. 118 (2007); KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007), Quanta Computer, Inc. v. LG Elecs., Inc., 553 U.S. 617 (2008); Bilski v. Kappos, 130 S. Ct. 3218 (2010). *See* Daniel Kazhdan, *Beyond Patents: The Supreme Court's Evolving Relationship with the Federal Circuit*, 94 J. PAT. & TRADEMARK OFF. SOC'Y 275 (2010). *See also* John M. Golden, *The Supreme Court as "Prime Percolator": A Prescription for Appellate Review of Questions in Patent Law*, 56 UCLA L. REV. 657 (2009) (arguing that periodic Supreme Court changes can prevent the "doctrinal ossification" that results from a specialized appellate court).

[29] Rifkind, *A Special Court for Patent Litigation? The Danger of a Specialized Judiciary*, at 426, *supra* note __.

[30] Dreyfuss, *Specialized Adjudication*, *supra* note __.

[31] *Id.*; Gugliuzza, *Rethinking Federal Circuit Jurisdiction*, *supra* note __.

qualified overall.[32] And some have suggested de-specialization – bringing in additional courts to hear some patent cases.[33]

At the same time, commentators sometimes limit such concerns to appellate courts, on the theory that it is the appellate bench's job to consider legal development in light of other areas of law, and that the trial bench can improve its fact-finding work through specialized expertise.[34] On this view, the Federal Circuit may have been the wrong place to introduce specialization—what we need is a specialized trial bar.[35] Indeed, some of the criticisms of the Federal Circuit have focused on their alleged "hyperactivity" in reviewing district court factual determinations.[36] The worry that a specialized court will be too interested in the facts may be a problem for an appellate court that owes deference to trial court findings, but if anything it should be an affirmative benefit for a trial court that is supposed to make those findings.

There is some degree of differential experience in patent cases already. A handful of districts handle a relatively high proportion of the patent cases filed each year.[37] And as our study shows, only a handful of judges in even fewer districts decided more than ten final patent rulings from 2002 through 2011.

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[32] Dreyfuss, *Specialized Adjudication*, *supra* note _; Gugliuzza, *Rethinking Federal Circuit Jurisdiction*, supra note __.

[33] Craig Allen Nard & John F. Duffy, *Rethinking Patent Law's Uniformity Principle*, 101 NW. U. L. REV. 1619 (2007).

[34] Revesz, *Specialized Courts and the Administrative Lawmaking System*, *supra* note __.

[35] Moore, *Forum Shopping in Patent Cases: Does Geographic Choice Affect Innovation?*, supra note __; Rai, *Specialized Trial Courts: Concentrating Expertise on Fact*, *supra* note __; Gugliuzza, *Rethinking Federal Circuit Jurisdiction*, *supra* note __.

[36] William C. Rooklidge & Matthew F. Weil, *Judicial Hyperactivity: The Federal Circuit's Discomfort With Its Appellate Role*, 15 BERKELEY TECH. L.J. 725 (2000).

[37] Kesan & Ball, *Judicial Experience and the Efficiency and Accuracy of Patent Adjudication: An Empirical Analysis of the Case for a Specialized Patent Trial Court*, *supra* note __; PRICEWATERHOUSECOOPERS, 2012 PATENT LITIGATION STUDY: LITIGATION CONTINUES TO RISE AMID GROWING AWARENESS OF PATENT VALUE (2012), *available at* http://www.pwc.com/en_US/us/forensic-services/publications/assets/2012-patent-litigation-study.pdf.

To increase experience in individual judges, Congress recently attempted to harness the perceived benefits of greater expertise and to avoid concerns about specialized courts by establishing the Patent Pilot Program (PPP). Under the program, fourteen district courts give judges the option to reassign patent cases randomly assigned to them after filing; these cases are then randomly reassigned to a pool of judges in the district who have volunteered to hear patent cases. The idea is that judges who volunteer can develop greater expertise in patent cases. Supporters of the new law expect that this will increase efficiency by decreasing the time-to-decision and lowering litigation costs, while preserving the generalist nature of the district courts and preserving random assignment to forestall forum-shopping.

Supporters also expect the PPP to improve outcomes—that it will improve the "quality" of trial court decision-making. For the most part, supporters expect to measure outcome quality by reversal rate, and hope that slowly concentrating experience will result in decisions that are "adjudicate[d] properly [rather than] . . . decided, unfortunately, incorrectly the first time and only decided correctly after they come back from the Fed circuit."[38]

The bill establishing the PPP was consistently popular with industry groups—including hardware, software, pharmaceutical, and biotech companies—and was supported by the patent bar, indicating industry and bar support for at least the kind of "soft" specialization it creates.[39] It unanimously passed the House several times with broad bipartisan support, but ran into Senatorial concerns that mirror the longstanding concerns about specialized courts described above and that caused the House subcommittee to reject earlier proposals for an

[38] 155 CONG. REC. H3456 (2009) (statement of Rep. Darrell Issa).
[39] Erik Larson, *Special IP Trial Courts a Bad Idea, Lawyers Say*, IP LAW360, Feb. 1, 2006, http://www.law360.com/articles/5183/special-ip-trial-courts-a-bad-idea-lawyers-say (subscription required).

actual specialized court.[40] Senators were still concerned that the program would promote forum-shopping, that it would undermine the generalist nature of the federal district court, and that it would limit the "legal percolation"[41] among district courts, presumably by limiting the courts litigants want to file in and thus limiting variety in decisions.

It is too soon tell whether the PPP is working or failing on any of these measures, as it took effect only late in 2011. However, there are some interesting notes. In the Northern District of California and the Southern District of New York, non-volunteer judges are keeping patent cases –as of January 2013, out of 143 cases filed since the PPP's inception in the Southern District of New York, only 14—10%—had been declined by the initially assigned judge and sent to the volunteer pool. The results are even more striking in the Northern District of California, where no sitting judge has transferred a patent case to the six patent pilot judges. While some of this may be due to non-volunteer judges accepting cases related to pending matters already on their dockets, it may turn out that judges in at least some districts are more interested in hearing patent cases than our received wisdom would predict.[42] And of course, if it turns out that nonparticipating judges would often prefer to gain experience themselves rather than reassign the cases, any benefits of additional experience will need to be attained some other way. We take up the relevance of our results to the PPP below, in Section IV.

[40] 152 CONG. REC. H7851 (2006) (statement of Rep. Adam Schiff).
[41] 156 CONG. REC. H8536 (2010).
[42] But that attraction is not universal. When new judges are added to a district, existing judges can transfer cases to them, and in many districts patent cases are a favorite to "dump" on the new judge. In the District of Utah, for example, the newest of the nine district judges, Robert Shelby, who was appointed in September 2012, had 31 of the 83 open patent cases on his docket as of July 2013. https://law.lexmachina.com/court/utd. Clearly his colleagues had reassigned a disproportionate number of patent cases to him.

Some of the disputes over judicial specialization boil down to ideological commitments or viewpoint. One might believe in the value of generalist courts in society regardless of what the evidence shows, for example. But other questions—such as whether judicial experience can shorten patent cases and bring down costs—are empirical questions that can be tested. Among other efforts, Professors Kesan and Ball recently contributed a through review of PACER records, finding that experience with patent cases does seem to bring down the duration of a case, though this finding is moderate and contains substantial nuance.[43]

As to whether specialist results are "better," ongoing attempts to answer this question focus on reversal rates, looking both at differences in rulings by patent-expert Federal Circuit judges and others on the court,[44] and whether Federal Circuit reversal rates overall vary for different district courts or judges.[45] Kesan and Ball also sought to measure some form of "quality" or accuracy in decisions in light of district court experience with patent cases, again by measuring the likelihood of reversal on appeal. They found a moderate likelihood that judges with more patent case experience will be upheld on appeal on infringement findings. They also found that judges with recent claim construction experience will be upheld on claim construction, though this finding does not hold true for cumulative experience with claim

[43] Kesan & Ball, *Judicial Experience and the Efficiency and Accuracy of Patent Adjudication: An Empirical Analysis of the Case for a Specialized Patent Trial Court*, *supra* note __.

[44] John R. Allison & Mark A. Lemley, *How Federal Circuit Judges Vote in Patent Validity Cases*, 27 FLA. ST. U. L. REV. 745 (2000); Kimberly A. Moore, *Markman Eight Years Later: Is Claim Construction More Predictable?*, 9 231 (2005); Christian A. Chu, *Empirical Analysis of the Federal Circuit's Claim Construction Trends*, 16 BERKELEY TECH. L.J. 1075 (2001). Notably, these studies do not show a difference in reversal rates between patent- or technical-expert Federal Circuit judges.

[45] Schwartz, *supra* note __. Again, Schwartz does not find that specialization reduces the chance of reversal.

construction over time.[46] Kesan and Ball used the proxy of differences in reversal rates in light of experience with patent cases, a reasonable approach given the limitations of the PACER dataset. However, reversal rates are inherently bound up with questions about the Federal Circuit's own approach to patent cases, limiting their ability to shed light on the district courts' decision-making.

Differences in district court behavior are important because both proponents and opponents of judicial specialization rely on an implicit assumption that specialized courts produce different outcomes. This has not been directly studied for district courts prior to appeal. In this paper, we test that assumption by studying trial court outcomes directly.

II. Methodology

Using the Lex Machina database,[47] we collected data on every final district court decision on a substantive patent issue filed between 2000 and 2012; the set totals 2185 cases. We excluded decisions made in 2000[48] because only certain districts made their decisions available on Pacer during that period, and including those years would have biased the experience characteristics for judges in some districts. We also excluded decisions made on cases filed in 2011 and 2012, because very few cases filed in those years had proceeded to decision by the fall of 2012, when we collected our data, and those that were decided so quickly were likely to be outliers in various respects. Because we were concerned with the behavior of district court judges, we excluded jury verdicts, though we did include JMOL rulings

[46] Kesan & Ball, *Judicial Experience and the Efficiency and Accuracy of Patent Adjudication: An Empirical Analysis of the Case for a Specialized Patent Trial Court*, *supra* note __. Compare Schwartz, *supra* note __.

[47] http://law.lexmachina.com. Lex Machina is the most comprehensive database of patent lawsuits filed since 2000.

[48] We tried the same models with and without 2001 data, which also may be limited in how complete it is. Results remained the same.

after jury trial.[49] We excluded default judgments, which we believe to largely represent either a settlement or an automatic win rather than a considered decision on the merits. And we excluded decisions that were only interim wins, such as denials of summary judgment, keeping only final rulings on the merits of an infringement, validity, or enforceability issue.[50] We were left with 1,298 observations in the multivariate analysis. Our unit of measure is a decision on a patent; each observation represents a final ruling on a substantive issue with respect to a single patent.[51] The 1298 observations were contained in 1171 separate caes.

For each ruling, we collected a variety of data, including the name of the judge, whether the judge was a magistrate or district judge at the time of the ruling, the district in which the case was filed, the year decisions were made, the patent number and area of technology (by international patent class), who won the case, whether the victory was on infringement,

[49] For a recent study of jury verdicts in patent cases, *see* Lemley et al., *Rush to Judgment? Trial Length and Outcomes in Patent Cases*, *supra* note _.

[50] This decision has the advantage of allowing us to make apples to apples comparisons. But it is important to note that it affects both the number and the nature of the decisions in our study. Prior work has found that district judges are more likely to hold patents invalid on summary judgment than to hold them valid; patentees are generally angling for a jury trial and may be less likely to move for summary judgment that their patent is valid. John R. Allison & *Mark A. Lemley, Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185 (1998). Further, as one of us has observed elsewhere, because patentees generally must win on every issue, a final win for an accused infringer on a single issue usually disposes of the whole case, while a final win for the patentee on a single issue often will not mean that the patentee has won the whole case. *See* Mark A. Lemley, *The Fractioning of Patent Law*, in **Intellectual Property and the Common Law** 504 (Shyamkrishna Balganesh ed., Cambridge University Press 2013). As a result, one should not read our descriptive statistics as indicating the actual total patentee win rate; they do not.

Allison, Lemley and Schwartz are currently at work on a paper that collects data on all merits rulings including denials of summary judgment, not just final rulings on an issue, for certain years. John R. Allison et al., *Who Wins Patent Cases?* (vaporware 2013). As a robustness check, we intend in future research to include data from that study to see if including denials of summary judgment affects our results.

[51] In a very small number of cases different claims of the same patent were treated differently. When that happened, we coded each group of claims separately.

validity, or some other ground, and whether there were decisions on multiple asserted patents. We hand-coded the outcomes and basis for the rulings for each patent.[52]

For each judge, we determined when he or she took the bench. For each decision rendered by that judge in our data set, we determined how many years she had been on the bench at the time of decision, and how many prior patent decisions she had issued up until that point since the year 2000. That allowed us to calculate an "experience" variable using the total number of patent cases a judge had handled at the time of decision, divided by the number of years the judge had been on the bench by that time, giving us the average number of patent decisions per year for each judge at the time each ruling was made. We made the experience variable our primary dependent variable for two reasons. First, if there is a learning effect, it seems likely that the intensity of exposure to patent cases, not merely the fact that a judge had a few scattered cases over forty years of service, would be responsible for that learning. Second, because the available electronic records are reliable only back to 2001, we have no comprehensive data on decisions before that time. A measure of "total patent cases decided" would therefore be accurate for judges appointed in 2000 or later but underinclusive for judges appointed before 2000. Nonetheless, we also report data on the total number of patent cases each judge had previously decided since 2000 at the time of each ruling and the total number of years the judge had served on the bench at the time of that ruling.

Our experience variable was not a static number, but a number recalculated anew for each case, capturing growing experience over time. This was our main independent variable.

[52] Coding was done by a group of four Stanford law students working under Lemley's supervision. They each coded a test set, which we compared for errors and coding refinement; the remainder of the cases were coded with spot-check review that showed a high degree of reliability.

We considered these dependent variables: whether the patentee won a ruling, whether noninfringement was found, and whether a patent was found valid.

We used a variety of controls. Out of the 74 districts in the data, we created dummy variables for each of the "big" patent districts, chosen according to the volume of cases filed during the period of the time in the data.[53] These districts were coded as dummy variables to be compared to the remaining "small districts." We also created a dummy variable to indicate those "big" patent law districts as a set. We then used the "big district" dummy variables as controls, to tell us whether the decision was rendered in one of the top patent districts. We also controlled for whether there were multiple patents at issue, the area of technology, and the year a case was decided (to account for substantive changes in the law over time). We clustered robust standard errors on patent cases to avoid skewing results in multi-patent cases. And we included individual judge fixed effects, though for reasons of sample size we were able to do that only for judges with fifteen or more decisions in the database.

We ran logistic regressions with the all the control variables mentioned above. We also ran fixed-effect logistic regressions with both years of experience (judge's time on bench) and total number of patent cases, but discarded those models because they had substantial co-linearity with the patent cases per year measure of experience.[54]

III. Results

A. Descriptive Statistics

[53] We defined a big district as one with more than 50 final decisions in our data set. There were nine such districts; they are set out in Table 3, *infra*.

[54] That is, judges who have been on the bench longer are naturally likely to have had more total patent cases, so in regression analysis that includes both variables, the two variables are likely to interfere with each other, making it to difficult to find either one statistically significant.

We collected a variety of descriptive statistics in the course of our research. We report some of these below to aid in ongoing understanding of the patent litigation system.[55] Among the more notable descriptive results are the relatively small number of judges (and districts) with substantial experience with patent cases and the low number of prior patent decisions the average judge has when rendering a patent decision. Patent litigation, it seems, is already specialized in the district courts to some extent.

Table 1: Overall Descriptive Statistics for the Dataset

	Mean	Median	S.D.	Min	Max	N
Total Patents Handled So Far*	7.38	4	9.37	1	50	1213**
Time on Bench (in years)	20.01	19	8.66	3	53	1285
JMOL	3%			0	1	1298
Bench Trial	11%			0	1	1298
Summary Judgment	85%			0	1	1298
Motion to Dismiss	1%			0	1	1298
On Remand	2%			0	1	1298
Patentee Win	21%			0	1	1298
Accused Infringer Win	79%			0	1	1298
AI Win: Invalidity	26%			0	1	1298
AI Win: Infringement	55%			0	1	1298
AI Win: Other	4%			0	1	1298
Multiple Patents Decided in Ruling	0.17	0	0.37	0	1	1298

* Note that N in the descriptive statistics is slightly larger than N for the regression analyses. This is because some variables in the regression models have missing values.

[55] Note that some the data reflected in these descriptive tables does not include 2001. Only about half of the federal courts reported via Pacer in 2001; as such, for absolute counts—for example, showing the number of cases a given judge heard during the date range—including 2001 confuses the results. It did not, however, affect the results of our regressions, so we did not remove it from those results.

**As noted above, these tables do not include 2001 data where including that data would affect the results to a meaningful degree. As such, "total patents handled so far" does not include 2001.

Patentees won just over 20% of the substantive rulings in our data set, a number that is consistent with (albeit slightly lower than) prior findings.[56] The disparity results from the fact that our study focuses only on judge decisions, excluding jury trials, and juries are more likely to favor patentees.[57] Courts ruling for accused infringers pretrial were much more likely to do so on the basis of noninfringement than invalidity, reflecting both the strong presumption of validity and the dominant role of claim construction during the period of our study.[58]

The decisions were heavily concentrated in a few districts; the top ten districts accounted for more than half of all decisions. Table 3 shows the top ten districts.[59] And within those districts only a few judges issued a significant number of final patent decisions. Table 4 reports all the judges with ten or more final patent decisions in our data set.

[56] *See, e.g.,* Paul Janicke & LiLan Ren, *Who Wins Patent Infringement Cases?*, 34 **AIPLA Q.J.** 1 (2006) (finding plaintiff win rate of 26%); Allison & Lemley, *supra* note __ (finding that plaintiffs finally won 28% of cases resolved on pretrial motions from the period 1989-1996).

[57] Allison & Lemley, *supra* note __; Lemley et al., *Rush to Judgment*, *supra* note __; Kimberly A. Moore, *Judges, Juries, and Patent Cases – An Empirical Peek Inside the Black Box*, 99 **Mich. L. Rev.** 365 (2000).

[58] The numbers for type of accused infringer win do not add to the total number of accused infringer wins because some accused infringers won on more than one ground.

For an argument that claim construction has driven more findings of noninfringement, see Lemley, *Fractioning*, *supra* note __.

[59] Table 3 reports all decisions, including jury decisions and motions to dismiss that were later dropped from the substantive analysis.

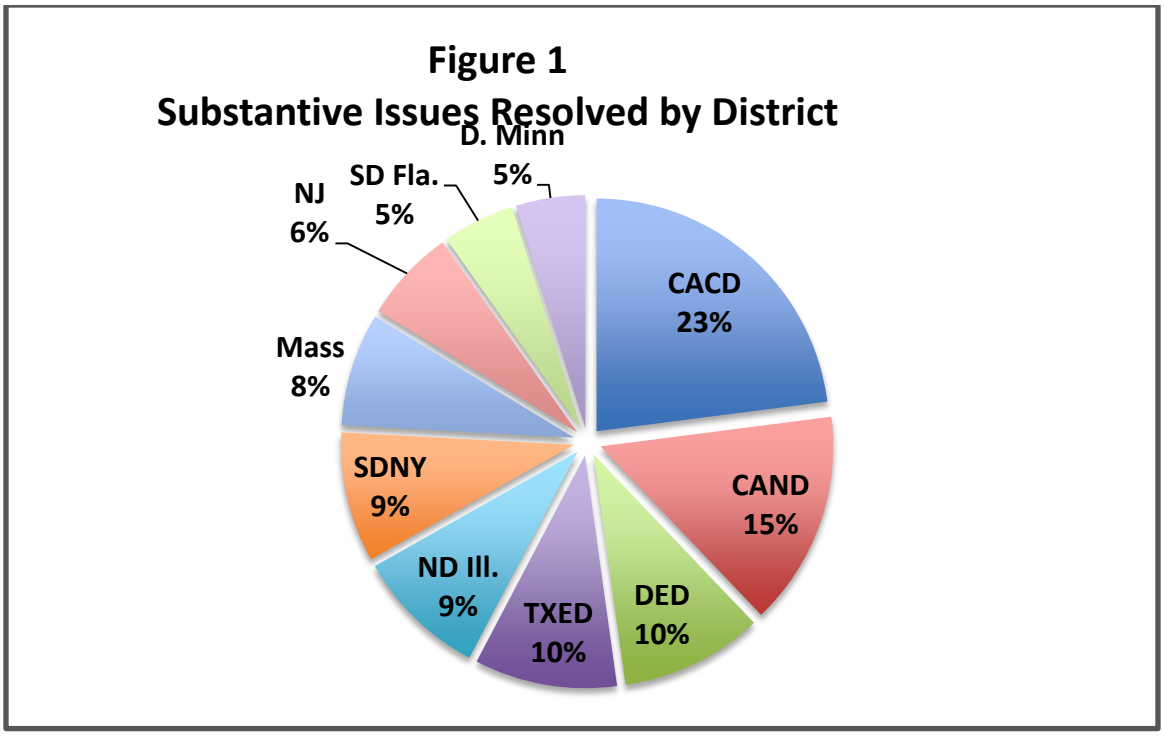


Figure 1
Substantive Issues Resolved by District
D. Minn 5%
SD Fla. 5%
NJ 6%
Mass 8%
CACD 23%
CAND 15%
DED 10%
TXED 10%
ND Ill. 9%
SDNY 9%

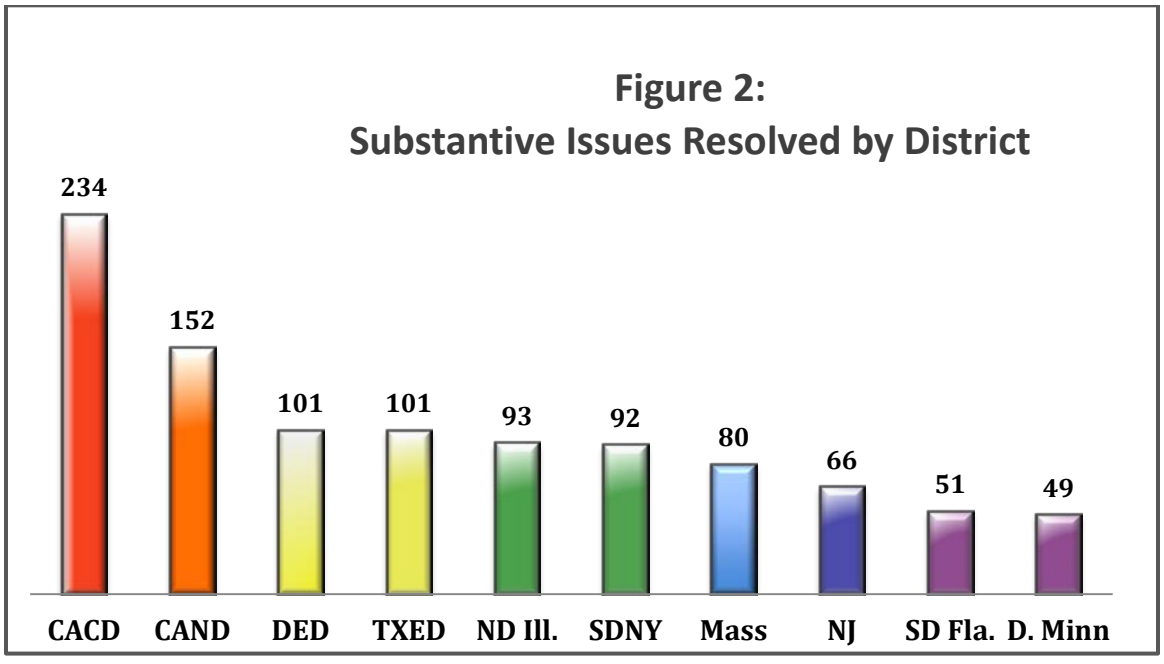


Figure 2:
Substantive Issues Resolved by District
234
152
101
101
93
92
80
66
51
49
CACD
CAND
DED
TXED
ND Ill.
SDNY
Mass
NJ
SD Fla.
D. Minn

Table 2: Number of Patent Cases Per District		
District	**No. of Patent Rulings**	**Percentage of Rulings Decided by District**
CACD	234	18.0%
CAND	152	11.7%
DED	138	10.6%
TXED	101	7.8%
N.D. Ill	93	7.2%
SDNY	92	7.1%
Mass	80	6.2%
NJ	66	5.1%
S.D. Fla	51	3.9%
D. Minn.	49	3.8%

Table 3:
Judges Who Finally Ruled on 10 or More Substantive Patent Issues Between 2001 and 2010

Judge	District	Number of patent cases finally resolved
Sue Lewis Robinson (SLR)	**DED**	**50**
T John Ward (TJW)	**TXED**	**28**
Leonard E Davis (LED)	**TXED**	**27**
Joseph James Farnan, Jr (JJF)	**DED**	**25**
Gregory Moneta Sleet (GMS)	**DED**	**24**
Barbara B. Crabb	**W.D. Wis.**	**23**
Ron Clark (RHC)	**TXED**	**20**
Kent A Jordan (KAJ)	**DED**	**19**
James Selna	**CACD**	**19**
Susan Yvonne Illston (SI)	**CAND**	**18**
Mariana Pfaelzer	**CACD**	**15**
David Carter	**CACD**	**15**

Garrett Brown	NJ	14
Manuel Real	CACD	13
James Ware (JW)	CAND	13
Gary Taylor	CACD	13
Rya Zobel	Mass	12
David J Folsom (DF)	TXED	12
William Haskell Alsup (WHA)	CAND	11
Mary Pat Thynge	DED	11
Marilyn Hall Patel (MHP)	CAND	11
Avern Cohn	ED Mich	11
William Young	Mass	10
John C. Shabaz	W.D. Wis.	10

B. Primary Results

The primary results of our logistic regression model are reported in Table 4. We find that judges with more experience deciding patent cases are less likely to find for the patent owner.

Table 4

Logistic Regression Results - Judge "Experience" Variable

```
Logistic regression                                     Number of obs   =       1271
                                                        Wald chi2(21)   =      40.34
                                                        Prob > chi2     =     0.0068
Log pseudolikelihood =  -626.4253                       Pseudo R2       =     0.0333

                                  (Std. Err. adjusted for 1184 clusters in casename)
------------------------------------------------------------------------------------
                     |               Robust
     Patentee Win    | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------------------+--------------------------------------------------------------
    Patents Per Yr   |    .655953   .1104339    -2.50   0.012     .4715931    .9123845
        East Texas   |    1.05856   .4766021     0.13   0.899     .4379996    2.558334
              CACD   |   .8682382   .2154299    -0.57   0.569     .5338708    1.412022
              CAND   |   .5170905   .1641273    -2.08   0.038     .2775816    .9632576
               DED   |   2.534205   .8137976     2.90   0.004     1.350515    4.755369
             NDILL   |    .886301   .3136817    -0.34   0.733     .4429167    1.773538
              SDNY   |    1.28214   .3931151     0.81   0.418     .7029909    2.338412
                NJ   |   1.975196   .6289204     2.14   0.033      1.05823    3.686724
              Mass   |   1.474962    .478018     1.20   0.230     .7814768    2.783847
             SDFLa   |   .6840722   .3745774    -0.69   0.488     .2338888    2.000757
             DMinn   |   .8464228   .4216488    -0.33   0.738     .3188291     2.24707
```

Multi-patent Case	1.451495	.2892012	1.87	0.061	.9822429	2.144925
Year						
2002	.7027226	.2825529	-0.88	0.380	.3195436	1.545389
2003	.9192429	.3476006	-0.22	0.824	.4380853	1.928865
2004	.6087242	.2387435	-1.27	0.206	.2822129	1.312999
2005	.6606825	.2499514	-1.10	0.273	.3147485	1.386826
2006	.9177426	.336593	-0.23	0.815	.4472317	1.883255
2007	.6443168	.2383048	-1.19	0.235	.3120879	1.330215
2008	.5803302	.2313365	-1.37	0.172	.2656816	1.267619
2009	.7554214	.2834184	-0.75	0.455	.3621064	1.57595
2010	.6540791	.2527334	-1.10	0.272	.3067112	1.394861
_cons	.3811809	.1219097	-3.02	0.003	.2036567	.7134499

The dependent variable in this regression is *patentee win* – that is, that the patent was both valid and infringed. We report the results in the form of an odds ratio. In this form, an odds ratio of below 1 (or a negative z value) indicates that the independent variable makes a patentee win less likely, and a ratio above 1 (or a positive z value) indicates that a patentee win is more likely. The highlighted results are statistically significant at the 95% confidence level. The magnitude of the odds ratio indicates the strength of the effect, though there is not a simple relationship between how far that number is from 1 and the likelihood of a patentee win.

Notably, the more patent cases a judge has had per year at the time he or she decides a case, the less likely the judge is to rule for the patentee. That effect is highly statistically significant (p=0.012). The effect is driven by the intensity of experience with patent cases, not simply time on the bench. In a separate regression, not reported here, total time on the bench was actually correlated with an increased likelihood of patentee win, while the total number of patent decisions pointed in the opposite direction. But as noted above, we do not think total patent decisions is a useful measure, since it is truncated in 2000. Patent decisions per year are a more reliable measure of exposure to the patent system.

Our results may also have some implications for forum shopping.[60] In this first model, we find that patentees are more likely to win cases in the District of Delaware and the District of New Jersey, and that they are less likely to win cases in the Northern District of California. Interestingly, despite the patent-friendly reputation of the Eastern District of Texas, it was not significantly more likely to produce patentee wins. We note, however, that because our data set includes only final decisions, these results do not account for the possibility that patentees may be more likely to get to trial in those districts,[61] proportionally even more likely to win at trial than in other districts,[62] or more likely to procure a favorable settlement from a dispute filed there. They also do not account for the fact that non-practicing entities make up a higher proportion of plaintiffs in the Eastern District of Texas than in other districts,[63] or for potential

[60] On forum shopping in patent cases, *see* Moore*, Forum Shopping in Patent Cases: Does Geographic Choice Affect Innovation?*, *supra* note __; Chester S. Chuang, *Offensive Venue: The Curious Use of Declaratory Judgment to Forum Shop in Patent Litigation*, 80 GEO. WASH. L. REV. 1065 (2012), *available at* http://works.bepress.com/chester_chuang/2.

[61] In fact, prior work has shown that patentees are more likely to get to trial in the District of Delaware and the Eastern District of Texas than elsewhere. See Mark A. Lemley, *Where to File Your Patent Case*, 38 AIPLA Q.J. 1 (2010).

[62] Patentees are much more likely to win in front of a jury than they are in front of a judge, *see* Lemley et al., *Rush to Judgment? Trial Length and Outcomes in Patent Cases*, *supra* note __; PRICEWATERHOUSECOOPERS, 2011 PATENT LITIGATION STUDY: PATENT LITIGATION TRENDS AS THE "AMERICA INVENTS ACT" BECOMES LAW (2011) *available at* http://www.pwc.com/us/en/forensic-services/publications/assets/2011-patent-litigation-study.pdf; PRICEWATERHOUSECOOPERS, 2012 PATENT LITIGATION STUDY: LITIGATION CONTINUES TO RISE AMID GROWING AWARENESS OF PATENT VALUE (2012); Allison & Lemley, *supra* note __, and they can expect far higher awards from juries, as well. But this does not hold for repeat plaintiffs, who "overwhelmingly" lose both bench judgments and trial verdict. John R. Allison et al, *Patent Quality and Settlement Among Repeat Patent Litigants*, 99 GEO. L.J. 677 (2011). The latter result seems to be driven by the fact that non-practicing entities and those wielding software patents do poorly in court. *Id*.

[63] Non-practicing entities are generally less likely to win before both judges and juries than practicing entities, Allison et al, *supra* note __, though like all patentees, they do better with juries. PRICEWATERHOUSECOOPERS, 2011 PATENT LITIGATION STUDY: PATENT LITIGATION TRENDS AS THE "AMERICA INVENTS ACT" BECOMES LAW (2011); PRICEWATERHOUSECOOPERS, 2012 PATENT LITIGATION STUDY: LITIGATION CONTINUES TO RISE AMID GROWING AWARENESS OF PATENT VALUE (2012).

selection effects that might send lower-quality patent cases to the Eastern District of Texas.[64] As a result, we urge caution in concluding that one district is necessarily more patent-friendly than another.

We also compared the large districts to one another directly by performing pair-wise comparisons of each against one another, and against the set of all smaller districts, using a t-test. The results of these tests confirm the statistical significance of our regression results, and provide another way of ranking districts according to patentee win rate. These results track our regression results: the Districts of Delaware and New Jersey are more likely to find for patentees, including against other large districts; the Northern District of California is much less likely to find for patentees when compare to the other large districts; and the Eastern District of Texas shows no significant differences.

When we break the results out by the basis for decision, it becomes evident that infringement, not validity, rulings are driving the judicial experience result. Table 5 shows the results for infringement-related motions, and Table 6 the results for validity-related motions.

[64] George Priest and Ben Klein hypothesized decades ago that plaintiff win rates in litigation should approach 50% because of selection effects. George L. Priest & Benjamin Klein, *The Selection of Disputes for Litigation*, 13 J. LEGAL STUD. 1, 24 (1984). Whether or not this is true in other areas of the law, see Steven Shavell, *Any Frequency of Plaintiff Victory at Trial is Possible*, 25 J. LEGAL STUD. 493 (1996), every empirical study of patent law refutes it; each (including ours) shows systematic variation from a 50% win rate. Whether that is a problem with the theory or represents something specific about patent law is beyond the scope of this paper. But while we do not think one can conclude that plaintiff win rates should approach 50%, the basic insight of the Priest-Klein hypothesis – that selection effects can significantly skew the set of cases litigated to judgment – is correct.

Table 5:

Logistic Regression Results - Infringement Motions

```
Logistic regression                                   Number of obs   =       1271
                                                      Wald chi2(21)   =      39.68
                                                      Prob > chi2     =     0.0081
Log pseudolikelihood = -622.72367                     Pseudo R2       =     0.0330

                                  (Std. Err. adjusted for 1184 clusters in casename)
------------------------------------------------------------------------------
                     |               Robust
Accused Infringer Win| Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------------------+--------------------------------------------------------------
     Patents per year |   1.513805    .251202     2.50   0.012     1.093506    2.095651
           easttexas |   .9311597   .4189379    -0.16   0.874     .3855319    2.248993
                CACD |   1.134265   .2818553     0.51   0.612     .6969443    1.845997
                CAND |   1.893104   .6041847     2.00   0.046     1.012776    3.538635
                 DED |   .3925756   .1258429    -2.92   0.004     .2094424    .7358377
               NDILL |   1.119784   .3981159     0.32   0.750     .5578367    2.247818
                SDNY |   .7664084   .2374713    -0.86   0.391      .417557     1.40671
                  NJ |   .4972156   .1589422    -2.19   0.029     .2657331    .9303444
                Mass |   .8088406   .2683754    -0.64   0.523     .4221163    1.549865
               SDFLa |   1.438031   .7854162     0.67   0.506     .4930191    4.194431
               DMinn |   .9149538   .4286014    -0.19   0.850     .3653103    2.291588
  Multi-patent Case  |    .679523   .1360336    -1.93   0.054      .458989    1.006019
                     |
        Year         |
               2002  |   1.389921   .5572259     0.82   0.411     .6334891    3.049586
               2003  |   1.069617   .4029878     0.18   0.858      .511129     2.23834
               2004  |   1.613644   .6317225     1.22   0.222     .7491564    3.475706
               2005  |   1.505435   .5679246     1.08   0.278     .7186982    3.153388
               2006  |   1.076586   .3940239     0.20   0.840     .5254295    2.205888
               2007  |   1.805981    .678255     1.57   0.116     .8650386    3.770429
               2008  |   1.696166   .6737511     1.33   0.183     .7786713     3.69473
               2009  |   1.247022   .4665112     0.59   0.555     .5990174    2.596024
               2010  |   1.505451   .5811512     1.06   0.289     .7064416    3.208168
                     |
               _cons |   2.684744   .8576777     3.09   0.002     1.435407    5.021468
------------------------------------------------------------------------------
```

Table 6:
Logistic Regression - Invalidity Motions

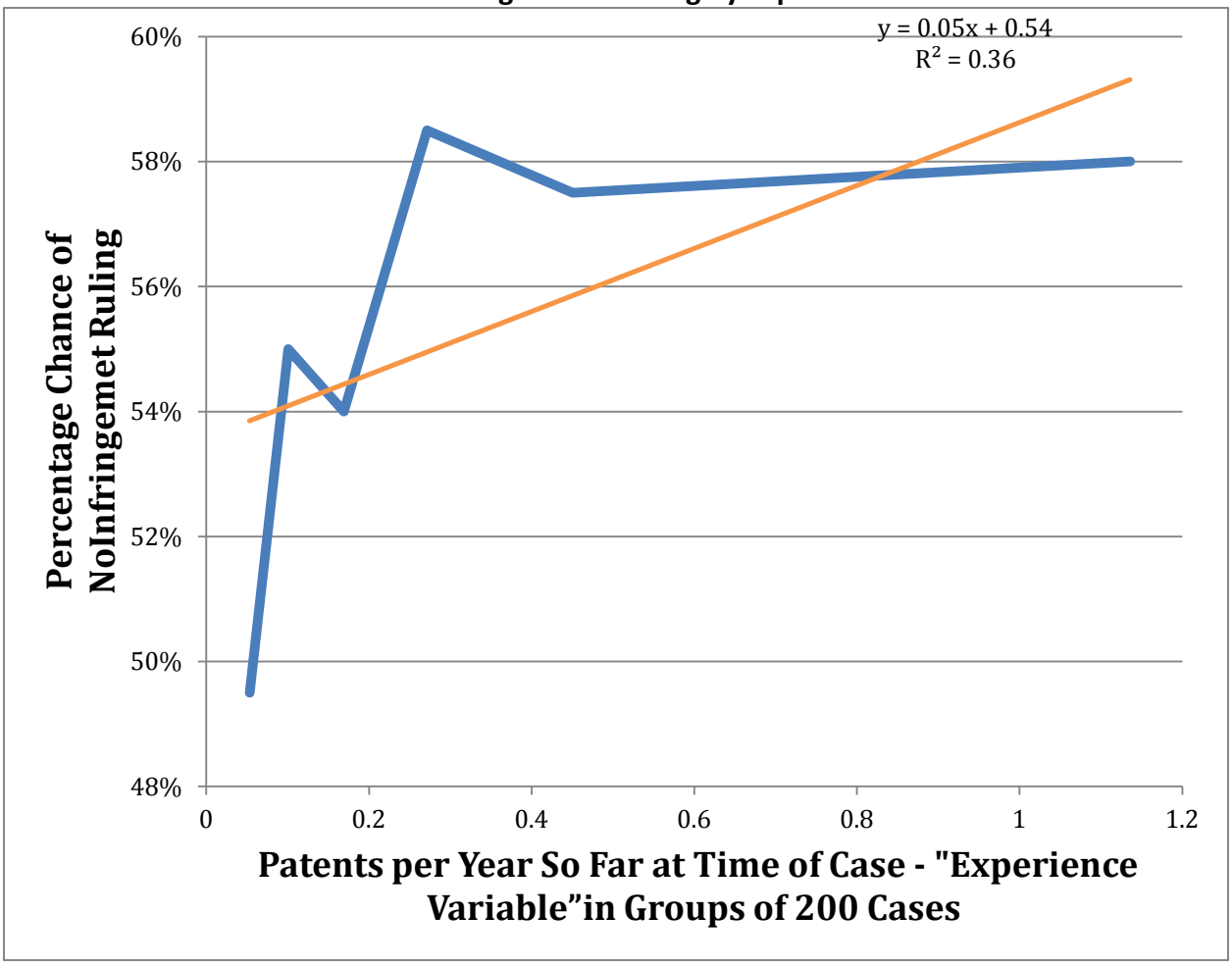
```
Logistic regression                                     Number of obs   =       1271
                                                        Wald chi2(21)   =      45.17
                                                        Prob > chi2     =     0.0016
Log pseudolikelihood =  -711.1486                       Pseudo R2       =     0.0312

                                  (Std. Err. adjusted for 1184 clusters in casename)
------------------------------------------------------------------------------------
                    |               Robust
    Invalidity      | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
    Patents per yr  |   1.056414   .1179431     0.49   0.623     .8487931     1.31482
        easttexas   |   1.722783   .6266964     1.50   0.135     .8444795    3.514568
             CACD   |   1.033064   .2189225     0.15   0.878     .6819371    1.564985
             CAND   |   1.738712   .3928688     2.45   0.014     1.116594    2.707447
              DED   |   1.208671   .3687905     0.62   0.535     .6646434    2.197998
            NDILL   |   1.483712   .4368954     1.34   0.180     .8331128     2.64238
             SDNY   |   1.378458   .4095101     1.08   0.280      .770052    2.467557
               NJ   |   1.065208   .3617953     0.19   0.852     .5474265    2.072731
             Mass   |   .5029714   .2027461    -1.70   0.088     .2282584    1.108306
            SDFLa   |   1.129028   .4808121     0.28   0.776     .4900147    2.601361
            DMinn   |   1.664154   .7137488     1.19   0.235     .7179872    3.857184
Multi-patent Case   |   1.183401    .215812     0.92   0.356     .8277551    1.691851
                    |
      Year          |
             2002   |   1.202369   .4874445     0.45   0.649     .5431974    2.661447
             2003   |   .5405723   .2244024    -1.48   0.138     .2396089    1.219564
             2004   |   1.433183   .5349811     0.96   0.335     .6895464    2.978788
             2005   |   1.064961   .3949225     0.17   0.865     .5148495    2.202862
             2006   |    1.31617   .4897427     0.74   0.460     .6347203    2.729238
             2007   |   1.262341   .4575812     0.64   0.520     .6203373    2.568772
             2008   |   2.261891   .8282315     2.23   0.026     1.103543    4.636115
             2009   |   2.065348   .7461411     2.01   0.045     1.017379    4.192797
             2010   |   1.435019   .5373659     0.96   0.335     .6888288    2.989535
                    |
            _cons   |   .2230679   .0708444    -4.72   0.000     .1197024    .4156917
------------------------------------------------------------------------------------
```

Note that in Tables 5 and 6, because we are testing the likelihood of a finding of noninfringement (Table 5) or invalidity (Table 6), the significance of the odds ratios are reversed. That is, a positive z (or an odds ratio above 1) is associated with an increased likelihood of *accused infringer win*.

The results are graphically depicted in Figures 3 and 4. In those figures, we have clustered groups of decisions by the average number of prior patent decisions per year the judge has rendered at the time that case is decided. As these figures show, the results are

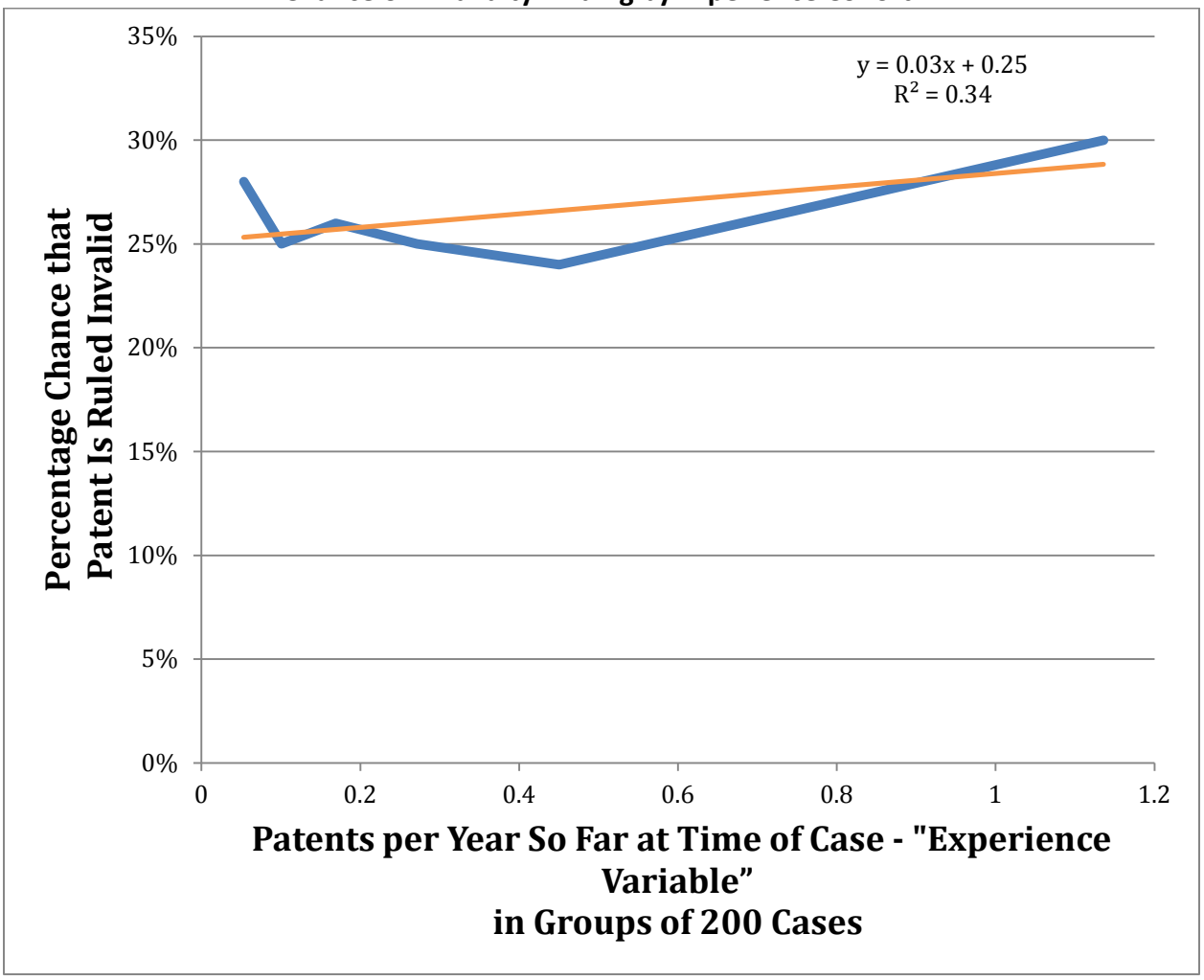
driven by an increased chance of finding noninfringement as the number of cases per year increases. Further, much of the effect seems to come at the low end of the experience cohort. Put another way, it is only the judges who very rarely see patent cases that tend to rule more often for the patentee on infringement. Even a modest volume of patent cases – corresponding to less than one final ruling every three years – is enough to drive a significantly higher rate of noninfringement findings. Once a judge has even a modest volume of patent cases, the effect levels off and further specialization does not appear to affect outcomes.

Figure 3
Chance of Noninfringement Finding by Experience Cohort



There is no corresponding increase in the chance of finding invalidity; while more experienced judges are slightly more likely to find patents invalid, that increase is not statistically significant.

Figure 4
Chance of Invalidity Finding by Experience Cohort



Each of the findings in the overall dataset is driven by the findings on infringement, not validity. Judges with more patent experience are more likely to find noninfringement, but not to find patents invalid. Judges in the District of Delaware and the District of New Jersey are more likely to find infringement, but not validity. Only the Northern District of California has a significant result on validity; judges there are more likely both to find patents invalid and to find

them not infringed. But the Northern District of California finding likely has a different explanation: the different mix of technology cases in the different districts.

Both the District of Delaware and the District of New Jersey get a disproportionate share of pharmaceutical patent cases, and that may help explain our results in part. Pharmaceutical suits against generic drug companies are much less likely to turn on infringement issues for the simple reason that the generic has deliberately copied the active ingredient of the plaintiff's product in order to get quicker approval from the Food and Drug Administration. That doesn't mean there are never infringement disputes in pharmaceutical cases; patentees often sue on patents that cover inactive ingredients or dissolution profiles that the generic need not have copied.[65]

To test that hypothesis, we categorized each litigated patent into one or more of nine different technology categories, using the PTO's Technology Center classifications. Those technology classifications are set out in Table 7. A patent can belong to more than one class, and many do. Further, many cases involve more than one patent, and we coded all technology areas involved. For both reasons, the numbers add to more than 100%.[66]

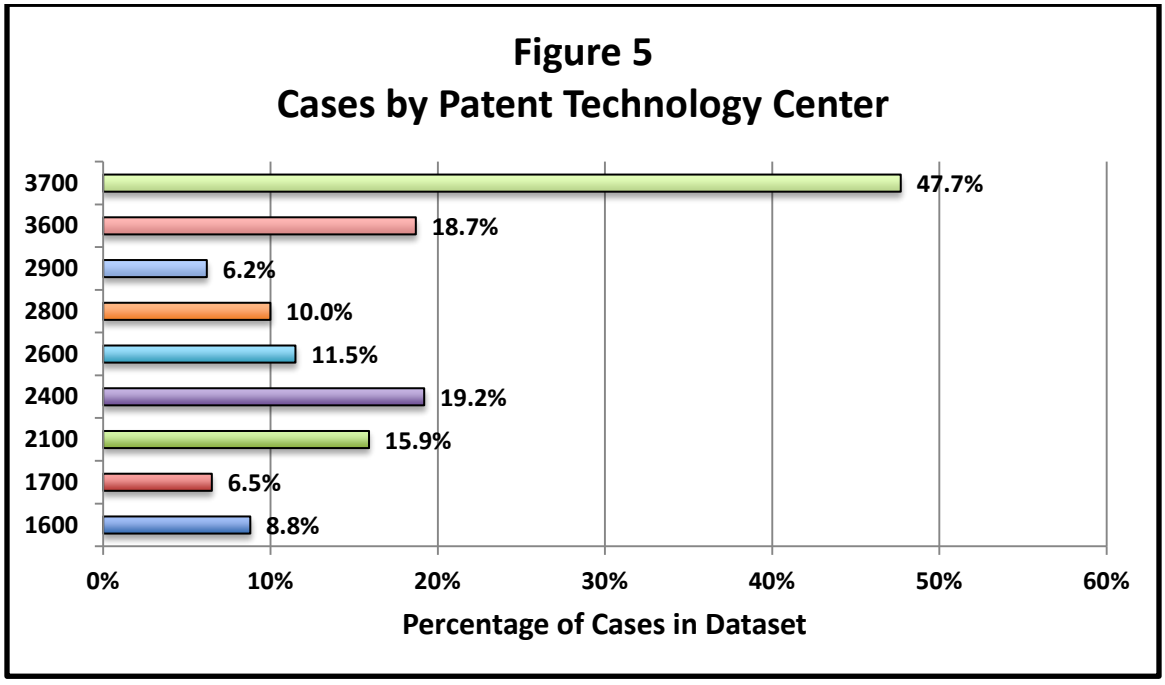
[65] C. Scott Hemphill & Bhaven N. Sampat, *When Do Generics Challenge Drug Patents?*, 8 J. EMPIRICAL LEGAL STUD. 613 (2011); Lisa Larrimore Ouellette, *How Many Patents Does It Take To Make a Drug? Follow-On Pharmaceutical and University Licensing*, 17 MICH. TELECOMM. TECH. L. REV. 299 (2010).

[66] We did not simply use the technology center that actually examined the patent. Rather, we studied each patent to determine the various technologies it claimed, and assigned those technologies to the closest technology centers.

Table 7 Cases by Patent Technology Center	
Patent Technology Center	**Percentage of Cases**
1600 - Biotechnology and Organic Chemistry	8.8%
1700 - Chemical and Materials Engineering	6.5%
2100 - Computer Architecture, Software, and Information Security	15.9%
2400 - Computer Networks, Multiplex communication, Video Distribution, and Security	19.2%
2600 - Communications	11.5%
2800 - Semiconductors, Electrical and Optical Systems and Components	10.0%
2900 - Designs	6.2%
3600 – Transportation, Construction, Electronic Commerce, Agriculture, National Security and License & Review	18.7%
3700 - Mechanical Engineering, Manufacturing, Products	47.7%

As we suspected, some districts are much more likely to hear certain types of technology cases than others. Biotechnology cases (class 1600), for instance, represent 8.8% of all patent lawsuits in our data set, while computer hardware and software excluding Internet and telecommunications (class 2100) represent 15.9% of the lawsuits we studied. But in the District of Delaware, 35.0% of all lawsuits are biotechnology cases, while only 8.0% are computer hardware and software. In the Northern District of California, by contrast, the numbers are reversed: 6.3% of lawsuits are biotechnology cases, while 34.2% are computer

hardware and software patents.[67] This difference is highly statistically significant. [The full data for all districts and all technology classes are reported in Appendix B].



The technology differences matter because patentees are significantly more likely to win cases involving certain technologies (biotechnology and mechanical engineering) than others (computer hardware and software). When we re-ran our logistic regressions including technology area as a variable, the results were largely the same as those reported in Table 5, with one significant exception: the Northern District of California was no longer less likely to rule for the patentee. The lower number of patentee wins in the Northern District of California appears to be an artifact of the large number of computer technology cases filed there, coupled with the lower likelihood that a patentee will prevail in such a case. Delaware, by contrast,

[67] Jeanne Fromer has suggested that we encourage technical specialization among courts by creating mechanisms that drive cases involving certain technologies to particular districts. Fromer, *supra* note __. But as our data suggests, we may already have such a system sorting biotechnology from software cases.

remained more likely to rule for patentees even controlling for technology area. We report the results in Table 8.

Table 8
Logistic Regression Results With Technology Areas Included[68]

```
Logistic regression                                     Number of obs   =       1091
                                                        Wald chi2(30)   =      51.09
                                                        Prob > chi2     =     0.0095
Log pseudolikelihood = -469.26987                       Pseudo R2       =     0.0557

------------------------------------------------------------------------------
             |               Robust
  patenteewin | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  avecasesofar |   .5852613   .1194957    -2.62   0.009     .3922436    .8732604
    easttexas |   1.426458   .7112996     0.71   0.476     .5367962    3.790604
         CACD |   1.014768   .2818818     0.05   0.958      .588736    1.749094
         CAND |   .8186339   .3242151    -0.51   0.613     .3766833    1.779111
          DED |   2.146653   .8334734     1.97   0.049     1.002926    4.594676
        NDILL |   1.055457   .3875944     0.15   0.883     .5138716    2.167836
         SDNY |   1.443924   .4665634     1.14   0.256     .7664829    2.720108
           NJ |   1.851084   .6221861     1.83   0.067     .9579005    3.577106
         Mass |    1.36283   .5166867     0.82   0.414     .6482272    2.865206
        SDFLa |   .8929742   .4809198    -0.21   0.834     .3107536     2.56603
        DMinn |   1.296772   .7981288     0.42   0.673     .3881254    4.332669
ifmultipatentcase |   1.530473   .3195571     2.04   0.042     1.016478    2.304376
      pto1600 |   1.828532   .4839058     2.28   0.023     1.088527     3.07161
      pto1700 |    .688418   .2431792    -1.06   0.291     .3444854    1.375732
      pto2100 |   .4595466   .1394043    -2.56   0.010     .2535806    .8328045
      pto2400 |   .7918368    .621834    -0.30   0.766     .1698956    3.690533
      pto2600 |    1.27051   .3655051     0.83   0.405     .7229387    2.232827
      pto2800 |    1.36778   .3952915     1.08   0.279     .7762777    2.409991
      pto2900 |   1.253195   .4362958     0.65   0.517     .6333963    2.479486
      pto3600 |   1.376937   .3097208     1.42   0.155     .8860324    2.139828
      pto3700 |   1.415385   .2724219     1.80   0.071     .9706041    2.063987
 _IYear_Deci_2002 |   .6239145   .2864655    -1.03   0.304     .2536895    1.534432
 _IYear_Deci_2003 |     .80799   .3489902    -0.49   0.622     .3465387    1.883911
 _IYear_Deci_2004 |   .6215711    .272524    -1.08   0.278     .2632005    1.467894
 _IYear_Deci_2005 |   .4655746   .2015241    -1.77   0.077      .199318    1.087507
 _IYear_Deci_2006 |   .7477843   .3104865    -0.70   0.484     .3313982     1.68734
 _IYear_Deci_2007 |   .8019354   .3314939    -0.53   0.593     .3566815    1.803011
 _IYear_Deci_2008 |   .5688571   .2509767    -1.28   0.201     .2395839    1.350669
 _IYear_Deci_2009 |    .740896   .3090646    -0.72   0.472     .3270987    1.678169
 _IYear_Deci_2010 |   .5591925   .2378865    -1.37   0.172     .2429132    1.287276
            _cons |   .3077651   .1250011    -2.90   0.004     .1388345    .6822465
------------------------------------------------------------------------------
```

Biotechnology and pharmaceutical patentees are significantly more likely to win, while computer hardware and software patentees are significantly less likely to win. But the effect of

[68] The number of observations is slightly smaller than in previous tables because we did not have reliable technology information for some cases.

judicial experience remains; indeed, it is somewhat more significant (p=0.009) in this model than in previous ones. Notably, once we control for areas of technology filing suit on multiple patents also is significantly correlated with patentee win.[69]

We have clearly identified a patent experience effect. But our data so far cannot tell us whether that effect results from the behavior of individual judges, or whether it is more general. To test that, we experimented with adding judge-specific fixed effects. But because we have so many judges in the data set (508) and so many of them decide only a few cases, adding fixed effects for every judge rendered the model unstable. As a result, we ended up including individual judge dummies for every judge with 15 or more decisions, to see whether particular judges influenced the result.[70] We present the results in Table 9. None of the individual judges with significant numbers of cases were significantly more or less likely to rule for patentees. The findings of significance for both the biotechnology and software technology areas and the effect of judicial patent experience remained robust.

[69] Multi-patent cases were correlated with patentee win in each of our prior specifications, but only at the 90% confidence level.

[70] Doing so necessitated dropping the district variables, which are collinear with individual judges. We also dropped the year variables, which have not been significant in any prior model, to preserve sufficient degrees of freedom.

Table 9
Logistic Regression Results With Judge Fixed Effects

```
Logistic regression                                     Number of obs   =       1026
                                                        Wald chi2(20)   =      36.00
                                                        Prob > chi2     =     0.0154
Log pseudolikelihood = -521.30892                       Pseudo R2       =     0.0408

                              (Std. Err. adjusted for 954 clusters in casename)
------------------------------------------------------------------------------
             |               Robust
 patenteewin | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Patents Per Yr |   .5864759   .1465996    -2.13   0.033     .3593171    .9572437
      pto1600 |   1.802708   .4895969     2.17   0.030     1.058639    3.069749
      pto1700 |   .8112083    .279666    -0.61   0.544     .4127419    1.594359
      pto2100 |   .4455556   .1345514    -2.68   0.007     .2465195    .8052904
      pto2400 |   .5610674    .451849    -0.72   0.473     .1157471    2.719694
      pto2600 |   1.192194    .337003     0.62   0.534     .6850684    2.074723
      pto2800 |   1.341196   .3681731     1.07   0.285     .7831192    2.296976
      pto2900 |   .9804449   .3253571    -0.06   0.953     .5116289    1.878847
      pto3600 |    1.22839   .2586851     0.98   0.329      .812986     1.85605
      pto3700 |   1.384897   .2453797     1.84   0.066     .9785867    1.959908
              |
       judge2 |
          27  |          1  (empty)
          87  |   1.211823   1.062537     0.22   0.827     .2173191    6.757409
         141  |   3.397825   2.273133     1.83   0.068      .915694    12.60816
         157  |   1.083229   .9389059     0.09   0.927     .1981198    5.922603
         200  |          1  (empty)
         202  |   1.502964   1.600066     0.38   0.702     .1865321    12.10998
         238  |   2.475921   1.501825     1.49   0.135     .7540876    8.129278
         248  |          1  (empty)
         263  |   .9318225   1.091548    -0.06   0.952      .093805    9.256365
         283  |   1.552158   1.028047     0.66   0.507     .4237951    5.684808
         287  |          1  (empty)
         288  |   1.719736    1.55138     0.60   0.548     .2934874    10.07706
         445  |   2.552107   1.454033     1.64   0.100     .8354817    7.795803
         447  |          1  (empty)
         452  |   4.549585   3.676549     1.87   0.061     .9334915    22.17345
              |
       _cons |   .2640639   .0522625    -6.73   0.000     .1791607    .3892023
------------------------------------------------------------------------------
```

IV. Implications

A. Familiarity Breeds Contempt -- Sometimes

In some respects our findings confirm received wisdom. Patentees are well advised to bring suit on multiple patents if possible to increase the likelihood that at least one of those patents is found infringed. And as expected, the benefit to patentees there comes in findings of

infringement, not validity; multiple bites at the apple give patentees better chances for at least one positive outcome. That has significant implications for portfolio theory; building a fence with many patents seems to be an effective strategy, which may help explain both why firms invest in it and why companies with the largest portfolios rarely have to resort to litigation to enforce them.[71]

It is also not surprising that patentees do better in certain plaintiff-friendly forums, such as Delaware. The results of our technology area study might also have been expected. Most of the complaints about the patent system come from the computer industries, not from biotechnology or more traditional mechanical patents. Previous work shows that software patents are more likely to be declared invalid,[72] as are patents wielded by non-practicing entities,[73] suggesting that sorting by industry was likely. And various scholars have suggested that the patent system works better in the life sciences than in computers.[74] Some of our district-specific results can accordingly be explained as a natural form of technology sorting by district.[75]

Our most significant result may be more surprising. We find that judges with more patent experience are less likely to rule for patentees on infringement, though not on validity.

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[71] *See* Parchomovsky & Wagner, *supra* note __; Lemley & Melamed, *supra* note __.

[72] Shawn P. Miller, *Where's the Innovation: An Analysis of the Quantity and Qualities of Anticipated and Obvious Patents*, 18 **Va. J.L. & Tech.** 1, 29–31, 49–50 (2013); Shawn P. Miller, *What's the Connection Between Repeat Litigation and Patent Quality? A (Partial) Defense of the Most Litigated Patents*, 16 **Stan. Tech. L. Rev.** 313, 334, 336 (2013).

[73] Allison et al, *Patent Quality and Settlement Among Repeat Patent Litigants*, *supra* note __.

[74] *See, e.g.,* James Bessen & Michael J. Meurer, **Patent Failure: How Judges, Lawyers, and Bureaucrats are Putting Innovation at Risk** (2008).

[75] On the merits of resolving forum shopping by allowing technology to naturally sort into different districts based on clusters of innovation, see Jeanne Fromer, *Patentography*, *supra*.

Familiarity, it seems, breeds contempt – not necessarily of patents, but of the breadth patentees sometimes claim for their legal rights.

Our data cannot tell us why more experienced patent judges are more likely to reject infringement claims. We do know that it is not a judge-specific or a district-specific effect, that it seems to happen fairly quickly, and that it seems to be driven by the number of patent cases a particular judge has handled, not how long the judge has been on the bench. One possibility is simply greater confidence – that inexperienced patent judges are less likely to rule on summary judgment at all, or less likely to narrow the putative scope of a patentee's claims. But the data do not suggest any change in a judge's willingness to second-guess the PTO, which would have shown up as a change in the willingness to hold patents invalid. And both patentees and accused infringers move for summary judgment on infringement in roughly equal proportions, because infringement is driven by claim construction. So the change in judicial attitudes seems likely to be related to the substantive merits of patent claims, not to the judges' greater willingness to address them head-on.

Perhaps judges who see a large number of patent cases conclude that patentees frequently overclaim the scope of their rights. There is certainly evidence to suggest that patent trolls tend to allege that their patents are extremely broad, covering entire industries.[76] And the imprecision of claim language in many areas means that parties are likely to vary widely in what they think a patent claim covers.[77] So one possibility is that once a judge has seen several patentees claiming to have invented an entire industry, she becomes more

[76] Mark A. Lemley, *Software Patents and the Return of Functional Claiming,* __ **Wisc. L. Rev.** __ (forthcoming 2013), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2117302; Allison et al, *Patent Quality and Settlement Among Repeat Patent Litigants*, *supra* note _.

[77] JAMES BESSEN & MICHAEL J. MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK (2008).

skeptical of patentee assertions that their patents are truly broad.[78] This possibility finds some support in other work suggesting that patent trolls far less well in court than others.[79] Judges may also be finding noninfringement rather than invalidity because doing so is easier than ruling for the patentee (which often requires a trial), and somewhat more likely to survive Federal Circuit scrutiny than invalidating patents.[80] We emphasize that we cannot prove either hypothesis with the data we have, but both seem plausible.

B. The Promise and Peril of Judicial Specialization

The fact that district court judges grow more likely to find against patentees as their experience with patent cases grows is a provocative finding that prompts a number of additional questions and paths for future work.

First, what is a "good" or "better" outcome for patent case, and how is it measured? If you are an alleged infringer, or concerned about overclaiming and patent threats, our results will seem logical and comforting. If you are a patentee seeking to assert, they will seem less so.

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[78] Judge Posner, for instance, has heard a number of patent cases, and has recently expressed skepticism about the patent system as a whole. Richard A Posner, *Do patent and copyright law restrict competition and creativity excessively?*, http://www.becker-posner-blog.com/2012/09/do-patent-and-copyright-law-restrict-competition-and-creativity-excessively-posner.html.

[79] Allison et al., *supra* note __. *But cf.* Shawn P. Miller, *Patent Trolls: Rent-Seeking Parasites or Innovation-Facilitating Middlemen?*, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1885538 (measuring cases differently and focusing only on validity and finding that trolls do not fare worse than others).

There is no comprehensive database identifying patent trolls, but we hope in future work to test whether exposure to prior troll cases is more likely to lead judges to find noninfringement.

[80] *See, e.g.* Roger Ford, *Patent Invalidity vs. Noninfringement*, 99 **Cornell L. Rev.** __ (forthcoming 2013), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2256207 (observing that courts are too quick to rule on noninfringement rather than invalidity). Whether or not the Federal Circuit has a pro-patent "bias," previous empirical research has found that district judges are more likely to cite Federal Circuit precedent when ruling for the patentee than when ruling against it. David R. Pekarek Krohn & Emerson H. Tiller, *Federal Circuit Patent Precedent: An Empirical Study of Institutional Authority and Intellectual Property Ideology*, 2012 **Wisc. L. Rev.** 1177.

If judges do grow more skeptical of patentee infringement claims as they see more overblown claims, this has some interesting implications for patent reform. A number of proposals for judicial specialization center on the idea that a judge with more patent experience will make better decisions in patent cases. That seems reasonable to us, but it is worth noting that based on the evidence before us, "better" decisions tend to be decisions that favor accused infringers, not patentees, at least on the question of infringement. Specialization may be good, but whether you think it is good may well depend on the side of the fence on which you sit. And if it is right that more specialized judges make better decisions, our evidence suggests that patentees are over-claiming the scope of their patents.

Our finding in turn means that seemingly good-government reform proposals like the Patent Pilot Project or calls for specialized district courts may have an unintended political valence. Our finding raises questions about how to measure whether reforms are working. The Patent Pilot Project's implementing legislation requires reporting by courts, but only some of the requirements can help address the—to be fair, perhaps ineffable—question of decision "quality," and those are limited to reviewing any general increase in experience levels[81] and Federal Circuit reversal rates.[82] Moreover, our results raise some interesting questions about the original goal of strengthening patents through the creation of the specialized Federal Circuit and about other areas of patent reform. Whether the district courts' high reversal rates in the Federal Circuit relate to a relative lack of experience with the law or technology or instead represent an informed view from the ground—after all, the district court is involved most deeply in the facts of the case—that patents are too strongly asserted is an open question. But

[81] Patent Pilot Program Act, § 1(e)(1)(A), 124 Stat. at 3675.
[82] Patent Pilot Program Act, § 1(e)(1)(B), 124 Stat. at 3675.

it is possible that the goal of specialization and the goal of strengthening patents that jointly motivated the creation of the Federal Circuit are in some tension with each other.[83]

Second, how does one measure expertise? This is a longstanding question in the broader literature[84] and perhaps important here. Some have used technical education or work experience as a proxy.[85] We considered including this, but found the available information far too limited to create a useful measure—where judges' undergraduate and graduate backgrounds were available in publicly accessible sources, they were too limited to be of much use, and often raised more questions than they answered. One person's Bachelor of Arts may be in physics, another in English. What technical training or knowledge accrued with that degree, and whether it has been maintained, is either unknowable without more detailed information or lost in the mists of time. The judge with a Master's in English who has spent ensuing years becoming an autodidact in neuroscience—or simply being exposed to cutting-edge science through hearing evidence in a wide variety of civil and criminal cases—is hidden from view. Whether the judge's technical training is relevant to the case at issue depends heavily on the case. And so on. We think that judging experience with patent cases is the most direct measure. It also allows judges across the bench to be compared, apples to apples.[86] Just the same, with better information, and perhaps a more qualitative methodology like surveys or interviews, knowing more about a judge's technical expertise might be able to help us better

[83] Cases today are assigned randomly to judges, whether they want patent cases or not. It is possible that judges who opt into the Patent Pilot Program will have different (and perhaps more favorable) views of the patent system than judges generally.

[84] Stuart Minor Benjamin & Arti K. Rai, *Who's Afraid of the APA? What the Patent System Can Learn from Administrative Law*, 95 GEO. L.J. 269 (2007); Daniel J. Meador, *A Challenge to Judicial Architecture: Modifying the Regional Design of the U.S. Courts of Appeals*, 56(2) U. CHI. L. REV. 603 (1989).

[85] Moore, *Markman Eight Years Later: Is Claim Construction More Predictable?*, *supra* note __.

[86] With the important caveat that, as discussed above, the technical subject matter and industry types involved vary widely across cases, as well.

understand whether confidence with technical material is driving the learning effect we found, or may provide other useful information.

Third, we looked at judges, not juries, for this study. It is also received wisdom that patentees want jury trials and this wisdom generally is corroborated by consistent findings that juries are more likely to find infringement and award higher damages than judges.[87] We had the rather surprising finding that judges in the "plaintiff-friendly" Eastern District of Texas show no difference in infringement outcomes compared to other courts in our study. Other work, however, shows that Eastern District of Texas *juries* may still favor patentees above juries in other districts,[88] and that there are more jury trials there than in most other districts.[89] What that means for decisional quality and litigants is an interesting question that we cannot answer with this dataset alone. Similarly, our data do not include the sometimes subtle differences in procedure between district courts, nor the new patent-specific local rules that many courts are adopting.

C. Future Work

Our results, and these remaining questions, indicate some paths for further work. It is too early to see if judges who gain additional patent case experience through the Patent Pilot Project's channeling model will follow these overall results. Judges who self-select into hearing extra patent cases may have different views about patents and patentees than those who are randomly selected. An obvious follow-up would test whether the outcomes in Pilot Project

[87] *See supra* note __.
[88] Lemley et al, *supra* note __.
[89] Lemley, *Where to File, supra* note __ (finding that 8% of patent cases in the Eastern District of Texas make it to trial, more than any other district except Delaware).

courts change over the ten years of the project, and whether they differ substantially from courts not in the program. This would add some valance to the measures Congress required courts to track and provide further important information about whether increased experience leads judges to reach different outcomes over time.

While we think testing ongoing experience with actual cases is the most direct measure of experience, data on the technical expertise of judges and whether it affects outcomes would also add to understanding how cases are decided. Knowing whether any technical or patent litigation background—which may increase overall confidence with technical cases—matters, as well as whether case-specific technical expertise matters, would offer litigants more information and could indicate further paths for reform.

And as noted, our results are necessarily limited in that they do not take into account differences in local rules and other specifics local to trial courts. More broadly, as the literature demonstrates, isolating the effects of specialist experience or expertise is an exceedingly complex task. Further theoretical modeling and empirical work would be helpful in better understanding the overall picture and the likely effect of reforms that target different aspects of litigation.

V. Conclusion

The more experience judges have with patent cases, the less likely they are to rule for patent owners. Our finding is a strong and highly significant finding, robust across districts, across time, and across areas of technology. It has potentially profound implications for patent

law, where it might lead us to question the way we design patents, and for the broader project of judicial specialization, which may have unintended substantive consequences.

Appendix A: Summary results of our three main logistic regression models

Patentee Win, Infringement, Invalidity –
Using "Experience" Variable as the Main Independent Variable

	Model 1	Model 2	Model 3
	Patentee win	Result based on infringement finding	Result based on invalidity finding
Ave # cases far	0.582	1.703	1.071
	(2.98)**	(2.98)**	-0.62
East Texas	1.226	0.804	1.844
	(0.45)	(0.48)	(1.71)
CACD	1.032	0.955	0.907
	(0.13)	(0.18)	(0.43)
CAND	0.575	1.705	1.718
	(1.72)	(1.66)	(2.38)*
DED	2.931	0.341	1.322
	(3.25)**	(3.27)**	(0.94)
NDILL	0.945	1.054	1.483
	(0.16)	(0.15)	(1.34)
SDNY	1.375	0.716	1.273
	(1.03)	(1.08)	(0.8)
NJ	2.104	0.468	0.97
	(2.35)*	(2.40)*	(0.09)
Mass	1.348	0.956	0.53
	(0.84)	(0.12)	(1.45)
S.D. FLa	0.705	1.4	1.121
	(0.64)	(0.61)	(0.27)
D. Minn	0.913	0.851	1.718
	(0.18)	(0.35)	(1.26)
Multiple Patents	1.406	0.703	1.197
	(1.81)	(1.86)	(0.98)
2002	0.659	1.478	1.362
	(1.03)	(0.97)	(0.74)
2003	0.893	1.097	0.586
	(0.3)	(0.24)	(1.19)
2004	0.589	1.661	1.591
	(1.34)	(1.29)	(1.16)
2005	0.602	1.654	1.175
	(1.33)	(1.32)	(0.4)
2006	0.777	1.271	1.634
	(0.68)	(0.65)	(1.23)
2007	0.628	1.851	1.407
	(1.25)	(1.63)	(0.87)
2008	0.585	1.683	2.534
	(1.34)	(1.3)	(2.35)*
2009	0.727	1.289	2.399
	(0.85)	(0.68)	(2.24)*
2010	0.598	1.641	1.673
	(1.33)	(1.28)	(1.28)
Observations	1270	1270	1270

Robust z-statistics are shown in parentheses.

* indicates significance at 5% level; ** indicates significance at 1% level
Model 1 corresponds to Table 1, above. The dependent variable in the model 1 regression is *patentee win*. Models 2 and 3 correspond to Tables 3 and 4 above, respectively. Model 2 again shows the results for infringement-related motions, and Model 3 again shows the results for validity-related motions. As above, the results are reported in the form of odds ratios. For each model, the top number represents the odds ratio and the number in parenthesis shows the standard error of the odds ratio. The odds ratios marked with asterisks are statistically significant.

The magnitude of the odds ratio indicates the strength of the effect, though there is not a simple relationship between how far that number is from 1 and the likelihood of a patentee win. Note that as above, because we are testing the likelihood of a finding of noninfringement (Model 2) or invalidity (Model 3), the significance of the odds ratios are reversed from Model 1. That is, a positive z (or an odds ratio above 1) is associated with an increased likelihood of *accused infringer win* instead of *patentee win*. As above, an odds ratio of below 1 (or a negative z value) indicates that the independent variable makes a patentee win less likely, and a ratio above 1 (or a positive z value) indicates that a patentee win is more likely.

Appendix B
Percentage of Cases in Each District by Technology Area

District	pto1600	pto1700	pto2100	pto2400	pto2600	pto2800	pto2900	pto3600	pto3700
AZD	.1428571	0	.2857143	0	0	0	0	.1428571	.5714286
C.D. Ill.	0	.3333333	0	0	.3333333	0	.6666667	0	.3333333
CACD	.0394737	.0328947	.1184211	.0328947	.0986842	.1907895	.0855263	.1710526	.5197368
CAED	0	.1	.1	0	0	0	0	.6	.3
CAND	.0632911	.0253165	.3417722	.0126582	.164557	.1898734	.0126582	.0759494	.3670886
CASD	.0833333	.0416667	.2916667	.125	.1666667	0	.25	.1666667	.4166667
COD	0	0	0	0	0	0	0	.125	.875
Conn	.1111111	0	.2222222	0	0	.1111111	0	.1111111	.5555556
D. Minn.	.0714286	0	.2142857	0	.0714286	.0714286	.1428571	.1428571	.5714286
D. Neb.	0	0	0	0	0	0	0	.6666667	.3333333
DDC	.1428571	0	.2857143	0	0	0	0	.1428571	.5714286
DED	.3492063	.0634921	.0793651	.015873	.1111111	.0793651	0	.1111111	.6190476
E.D. La.	0	0	0	0	1	0	0	0	0
E.D. Mo.	0	0	0	0	0	0	0	0	1
E.D. Wis.	0	0	0	0	0	0	0	.6666667	.3333333
ED KY	0	.3333333	0	0	.3333333	0	0	.3333333	.3333333
ED Mich	.03125	.125	.0625	0	.125	.09375	0	.28125	.4375
ED Tenn	0	0	0	0	0	.25	.25	.25	.5
EDNY	0	0	.1333333	0	.2	0	.1333333	.1333333	.5333333
EDPA	.0833333	0	.0833333	0	.0833333	.0833333	.0833333	.25	.4166667
IDD	0	0	0	0	0	0	0	.3333333	.6666667
KSD	0	0	0	0	.2	0	0	.4	.4
M.D. Fla.	0	0	.3529412	.0588235	.2352941	.0588235	.0588235	.2352941	.2352941
MD Ga	0	0	1	0	1	0	0	0	0
MD Tenn	0	0	0	0	0	.25	0	0	.75
MDD	0	0	.1428571	0	.2857143	0	0	.4285714	.4285714
MDPA	0	0	0	0	0	.5	0	.5	0
Mass	.0588235	.0980392	.0784314	0	.1176471	.0980392	0	.0588235	.5882353
Me	0	1	0	0	0	0	0	0	1
N.D. Ill.	.0819672	.0655738	.147541	.0163934	.1147541	.0983607	.0491803	.1803279	.5245902
N.D. Ind.	0	0	0	0	0	0	0	.3333333	.6666667
N.D. Iowa	0	0	0	0	0	0	0	0	1
N.D. Tex.	0	.0555556	.1111111	0	.2222222	.2222222	.2777778	.1666667	.1666667
NCED	0	.5	0	0	0	0	0	0	.5
NCMD	0	0	0	0	0	0	0	.5	1
NCWD	0	0	0	0	.25	.25	0	0	.75
ND Fla	0	0	0	0	0	0	0	0	1
ND Ga	0	.05	.2	0	.05	0	0	.3	.6
ND Ohio	0	.0833333	.0833333	0	.0833333	0	0	.375	.5416667
NDNY	.75	0	.25	0	0	0	0	0	0
NH	0	0	.1111111	0	.1111111	0	.1111111	.3333333	.3333333
NJ	.2909091	.1090909	.0727273	0	.0909091	.0545455	.0545455	.0909091	.6363636
NMD	0	0	.5	0	0	0	0	0	.5
NVD	0	0	.2307692	.0769231	.1538462	.1538462	.0769231	.3076923	.6153846
OKND	0	0	0	0	0	0	0	1	0
OKWD	0	.2	0	0	0	0	0	.4	.4
ORD	.2	.25	.15	.05	.05	.1	.1	.2	.3
RI	0	.5	0	0	0	.5	0	0	.5
S.D. Fla.	.0344828	.1034483	.2068966	.1034483	.0344828	0	.1034483	.3103448	.3103448
S.D. Ill.	0	0	0	0	1	0	0	0	0
S.D. Ind.	.375	0	0	0	0	.125	.125	.5	.5
S.D. Iowa	0	1	0	0	0	0	0	0	0
S.D. Tex.	0	.15	.3	0	.1	.1	.1	.2	.35
SCD	.1818182	.3636364	0	0	.0909091	.0909091	0	.3636364	.4545455
SD Ohio	0	0	.1111111	0	.1111111	0	.1111111	.4444444	.3333333
SDNY	.1833333	.0666667	.1333333	.0166667	.0833333	.1	.0666667	.0833333	.4666667
TXED	.0434783	.0652174	.3478261	.0434783	.2608696	.173913	.0434783	.1521739	.2826087
UTD	0	0	.1	0	0	0	.5	.3	.7
VAED	.1333333	.0666667	.2666667	0	.2666667	0	.0666667	.2	.3333333
Ver	0	0	.5	0	0	.5	0	0	0
W.D. Ark.	0	0	0	0	0	0	1	0	0
W.D. La.	0	0	0	0	0	0	0	.5	.5
W.D. Mo.	0	.2	.4	0	.2	0	0	.2	.4
W.D. Tex.	0	.1111111	.2222222	0	.2222222	0	.2222222	.1111111	.3333333
W.D. Wis.	.0454545	.0909091	.2727273	0	.1363636	.2272727	0	.1818182	.3181818
WAWD	.0625	.0625	.3125	0	.0625	.125	.125	.1875	.4375
WD KY	0	0	0	1	0	0	0	0	0
WD Mich	0	0	0	0	0	0	0	.5	.9
WD Tenn	0	0	0	0	0	0	0	0	1
WDNY	0	0	0	0	.3333333	0	0	.3333333	.6666667
WDPA	.1666667	0	.1666667	0	0	0	0	.3333333	.6666667
Total	.0879121	.0650183	.1593407	.0192308	.1153846	.0998168	.0622711	.1868132	.4771062