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JUDICIAL EXPERIENCE AND THE EFFICIENCY AND ACCURACY OF PATENT ADJUDICATION: AN EMPIRICAL ANALYSIS OF THE CASE FOR A SPECIALIZED PATENT TRIAL COURT

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TABLE OF CONTENTS

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I. INTRODUCTION

Proponents of increased specialization in the judicial structure of patent adjudication were temporarily quieted when Congress created the U.S. Court of Appeals for the Federal Circuit ("CAFC"). However, as the consequences of establishing this specialized appellate court transitioned from theories to observations, proponents for change once again found their voices, with some urging increased specialization at the trial level in addition to the appellate level. As Lawrence Sung noted:

> Patent litigation stands among the most complex, with disputes about cutting-edge technology muddied with esoteric and arcane language, laws, and customs. Even with the assistance of legal and technical experts as well as special masters, generalist judges and juries are often at sea almost from the beginning of a patent case. When compared to other adversarial actions, patent cases benefit significantly

> from having a judge hear the case who is familiar with technical issues.[1]

Academics began this new discussion as early as the mid-1990s. In 1995, John Pegram proposed creating a separate federal trial court specializing in patent cases, without a criminal docket, and using the U.S. Court of International Trade to fill this role.[2] More recently, Chief Judge James F. Holderman of the U.S. District Court for the Northern District of Illinois has called for similar patent specialization at the trial level.[3] As more cases passed through the CAFC, law reviews published articles on the need for change. In 2002, Arti Rai raised concerns about the CAFC's de novo appellate review of some largely factual issues, calling for the creation of a specialized patent trial court that the CAFC would defer to on questions of fact.[4] Rai argues that the risks of tunnel vision and bias that accompany specialized courts are of greater importance in appellate courts than in trial courts, because that is where the law is developed. She urges that patent trial courts can best leverage subject matter expertise, while appellate courts should be concerned with broader vision.[5]

This discussion is not just of scholarly or theoretical interest; several legislative reforms have been proposed to create opportunities for specialization at the district court level in patent cases.[6] For instance, in 2007, the Senate Judiciary Committee considered H.R. 34, which sought "to establish a pilot program in certain United States district courts to encourage enhancement of expertise in patent cases among district judges."[7] This bill would permit district court judges to "request to hear cases under which one or more issues arising under any Act of Congress relating to patents or plant variety protection must be decided."[8] The assumption, of course, is that allowing judges to spe-

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1. Lawrence M. Sung, *Strangers in a Strange Land: Specialized Courts Resolving Patent Disputes*, BUS. L. TODAY, Mar./Apr. 2008, at 27, 27.

2. John B. Pegram, *Should the U.S. Court of International Trade Be Given Patent Jurisdiction Concurrent with that of the District Courts?*, 32 HOUS. L. REV. 67, 71–72 (1995); *see id.* at 121–35 (using the theoretical models of Baum and Dreyfuss to evaluate his proposal, and concluding that it has several advantages over current trial-level patent courts); *see also* James F. Holderman, *Judicial Patent Specialization: A View from the Trial Bench*, 2002 U. ILL. J.L. TECH. & POL'Y 425, 431 (endorsing Pegram's proposal); 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) (further discussing Pegram's proposal).

3. *See* Holderman, *supra* note 2.

4. *See* Arti K. Rai, *Specialized Trial Courts: Concentrating Expertise on Fact*, 17 BERKELEY TECH. L.J. 877 (2002) [hereinafter Rai, *Specialized*]; *see also* Arti K. Rai, *Engaging Facts and Policy: A Multi-Institutional Approach to Patent System Reform*, 103 COLUM. L. REV. 1035 (2003).

5. Rai, *Specialized*, *supra* note 4, at 896.

6. *See, e.g.*, H.R. 5418, 109th Cong. (2006); S. 3923, 109th Cong. (2006).

7. H.R. 34, 110th Cong. (2007).

8. *Id.* § 1(a)(1)(A).

cialize in patent litigation will lead to better resolution of patent disputes. The House version of the same proposal from the 111th Congress, H.R. 628, was passed by the House and Senate and signed into law by President Obama on Jan. 4, 2011.[9] Under this law, a new pilot program will be implemented in certain U.S. District Courts to enhance the expertise of federal judges hearing patent disputes.[10] A minimum of six U.S. District Courts in at least three different judicial circuits will be designated as the initial trial courts for piloting this program.[11] These courts will be selected from among the fifteen judicial districts with the most patent filings in 2010 or from judicial districts that have adopted local rules for patent cases.[12] Participation in this pilot program is optional; judges from the selected districts have the choice to opt in.[13] The pilot program is scheduled to run for a period of ten years.[14] The objective of this pilot program is to steer patent cases to district court judges who have the interest and aptitude to hear more patent cases, thereby increasing the level of judicial expertise in patent litigation. At least two judicial districts, the Northern District of Texas and the Eastern District of Texas, have applied to be chosen as designated districts under this pilot program.[15]

This Article will examine whether there is empirical evidence supporting the assumption that increasing judicial patent specialization will result in "better" patent adjudication. Examination of the types of cases handled by district courts indicates that some districts already handle disproportionately high numbers of patent cases, and as a consequence, some judges have considerably more patent experience than others. This experience differential among judges allows us to empirically test the hypothesis that increasing specialized judicial experience at the district court level will improve the accuracy and efficiency of patent litigation. If the hypothesis is true, then there may be an argument that specialized courts composed of more experienced judges would improve patent litigation in the United States.

In Part II we discuss the general arguments for judicial specialization. In Part III we discuss the current specialized patent appellate court, the CAFC; how the arguments for creating it were derived from the general arguments for judicial specialization; and how well it has met its stated goals. In Part IV we discuss the current problems at the

9. H.R. 628, 111th Cong. (2009).
10. *Id*.
11. *Id*.
12. *Id*.
13. *Id*.
14. *Id*.
15. *See* John Council, *Program Funnels Infringement Suits to Judges for Patent Expertise*, TEX. LAW. (Mar. 28, 2011), http://www.law.com/jsp/tx/PubArticleTX.jsp?id=1202487881711.

trial court level that might be solved by an increase in specialized judicial human capital in the district courts. Finally, in Part V we present our empirical analysis to validate *vel non* the proposal for a spespecialized patent trial court. Part V.A is dedicated to our exploration of the current state of patent litigation. This analysis examines the concentration of patent cases not only in individual federal district courts but also in individual judges' dockets to determine whether certain judges have achieved a high degree of judicial experience at the trial level in this specialized area of litigation. The remainder of Part V is dedicated to our empirical findings as to whether concentrating judicial experience in a specialized patent trial court will increase the efficiency and accuracy of patent litigation. Our results establish a real but moderate case for the development of patent-specific judicial human capital at the district court level through the establishment of a specialized patent trial court. In addition, our empirical methods may be useful in studying the impact of specialization in judicial resources across all areas of the law.

II. JUDICIAL SPECIALIZATION: A BACKGROUND

A. The Theoretical Context for Judicial Specialization

Many countries, including the United States, have a long history of handling disputes by creating courts designed to deal with specific areas of the law. Specialized courts exist in a wide array of legal areas including: criminal courts,[16] bankruptcy courts,[17] tax courts,[18] juvenile courts,[19] business courts,[20] family courts,[21] mental health courts,[22]

16. *See*, *e.g.*, Tamar M. Meekins, *You* Can *Teach Old Defenders New Tricks: Sentencing Lessons from Specialty Courts*, CRIM. JUST., Summer 2006, at 28, 28 (stating that drug courts are increasingly prevalent across metropolitan areas of the United States); Thomas P. Schneider & Robert C. Davis, *Speedy-Trial Homicide Courts: Justice in Milwaukee Stops Spinning Its Wheels*, CRIM. JUST., Winter 1995, at 24, 26 (acknowledging the existence of homicide courts as a specialized form of criminal courts).

17. *See*, *e.g.*, John A. Terselic, *Bankruptcy Judges Conducting Jury Trials: Sidestepping the Statute and Hurdling the Constitution*, 4 DEPAUL BUS. L.J. 227 (1991).

18. *See*, *e.g.*, Deborah A. Geier, *The Tax Court, Article III, and the Proposal Advanced by the Federal Courts Study Committee: A Study in Applied Constitutional Theory*, 76 CORNELL L. REV. 985 (1991).

19. *See*, *e.g.*, TEX. CRIM. PROC. CODE ANN. art. 45.057(b) (Vernon 2003) (providing nontraditional options for juveniles including specialized courts); Robert E. Shepherd, Jr., *The Juvenile Court in the 21st Century*, CRIM. JUST., Fall 1999, at 48, 49.

20. *See*, *e.g.*, Mitchell L. Bach & Lee Applebaum, *A History of the Creation and Jurisdiction of Business Courts in the Last Decade*, 60 BUS. LAW. 147 (2004) (discussing the recent expansion of specialized business courts).

21. *See*, *e.g.*, Barbara A. Babb, *Where We Stand: An Analysis of America's Family Law Adjudicatory Systems and the Mandate to Establish Unified Family Courts*, 32 FAM. L.Q. 31, 35 (1998); Gerald W. Hardcastle, *Adversarialism and the Family Court: A Family Court Judge's Perspective*, 9 U.C. DAVIS J. JUV. L. & POL'Y 57, 75 (2005); Jennifer Thompson,

gambling courts,[23] prostitution courts,[24] probate courts,[25] multidisciplinary community courts,[26] admiralty courts,[27] and, in some countries such as Japan and Korea, even patent courts.[28]

Scholars and commentators have also proposed additional types of specialized courts. For instance, one scholar proposed creating a separate criminal court structure in the federal judiciary, including separate U.S. District Criminal Courts, U.S. Courts of Criminal Appeals, and a National Court of Criminal Appeals.[29] In another case, LeRoy Kondo proposed using specialist judges (as well as technical advisors, scientific expert witnesses, and "blue ribbon" expert jury panels) to meet the challenges of more complex technological issues in civil disputes.[30] Finally, the United States has just signed into law a program to create patent specialization at the district court level.[31]

However, while each of these courts is to some degree specialized, the exact meaning of "specialization" may differ from court to court. The influence and utility of any new specialized trial court depends on its structure. Thus, several authors have attempted to classify different courts according to their degree of specialization.

Who's Afraid of Judicial Activism? Reconceptualizing a Traditional Paradigm in the Context of Specialized Domestic Violence Court Programs, 56 ME. L. REV. 407 (2004).

22. *See*, *e.g.*, Gregory L. Acquaviva, Comment, *Mental Health Courts: No Longer Experimental*, 36 SETON HALL L. REV. 971, 971 (2006).

23. *See*, *e.g.*, Corey D. Hinshaw, *Taking a Gamble: Applying Therapeutic Jurisprudence to Compulsive Gambling and Establishing Gambling Treatment Courts*, 9 GAMING L. REV. 333 (2005).

24. *See*, *e.g.*, Mae C. Quinn, *Revising Anna Moscowitz Kross's Critique of New York City's Women's Court: The Continued Problem of Solving the "Problem" of Prostitution with Specialized Criminal Courts*, 33 FORDHAM URB. L.J. 665 (2006).

25. *See*, *e.g.*, Ellen E. Deason, *State Court ADR: Probate, Family, Other Specialized Courts Are a Key Source of Innovation*, DISP. RESOL. MAG, Fall 1999, at. 6.

26. *See*, *e.g.*, Anthony C. Thompson, *Courting Disorder: Some Thoughts on Community Courts*, 10 WASH. U. J.L. & POL'Y 63 (2002); Bruce J. Winick, *Therapeutic Jurisprudence and Problem Solving Courts*, 30 FORDHAM URB. L.J. 1055 (2003).

27. *See*, *e.g.*, Gary T. Sacks & Neal W. Settergren, *Juries Should Not Be Trusted to Decide Admiralty Cases*, 34 J. MAR. L. & COM. 163 (2003).

28. *See generally* Kong-Woong Choe, *The Role of the Korean Patent Court*, 9 FED. CIR. B.J. 473 (2000); Ryan S. Goldstein et al., *Specialized IP Trial Courts Around the World*, INTELL. PROP. & TECH. L.J., October 2006, at 1, 1–3 (discussing various domestic and foreign specialized patent court structures); 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, 200–08 (2009) (comparing the various degrees of patent specialization in the court systems of England, Japan, and China).

29. *See* Victor Williams, *A Constitutional Charge and a Comparative Vision to Substantially Expand and Subject Matter Specialize the Federal Judiciary: A Preliminary Blueprint for Remodeling Our National Houses of Justice and Establishing a Separate System of Federal Criminal Courts*, 37 WM. & MARY L. REV. 535, 543, 642–69 (1996).

30. *See* LeRoy L. Kondo, *Untangling the Tangled Web: Federal Court Reform Through Specialization for Internet Law and Other High Technology Cases*, 2002 UCLA J.L. & TECH. 1.

31. *See supra* note 9 and accompanying text.

B. Typologies of Judicial Specialization

Given the diversity of specialized courts, several authors have attempted to construct typologies capturing the nature and degree of specialization. For example, Lawrence Baum used two dimensions to define judicial specialization: "the extent to which particular kinds of cases dominate a court's work, and the extent to which particular kinds of cases are concentrated in a single court."[32] Baum stated that the first dimension is probably more significant than the second in determining the relative strength of the forces that shape a court's policies.[33] In addition, Thomas Case and Scott Miller described three criteria to be used in determining the degree of a court's specialization: "(1) whether the court hears only cases involving a narrow area of law; (2) whether the court exercises exclusive jurisdiction over that narrow area of law; and (3) how much expertise the court's judges have in that narrow area of law."[34] Richard Revesz expanded on these criteria and developed four variables to characterize specialized courts.[35] Two variables describe the jurisdiction of specialized courts: exclusivity (exclusive courts hear *every* case of a certain type) and limitation (limited courts hear *only a particular type* of case).[36] The other variables include the staffing of the courts (by either specialists or generalist judges)[37] and whether a court is subject to review by a generalist regional appellate court.[38] Using combinations of values for these four variables, Revesz classified existing federal specialized courts into of six types.[39]

Each of the three studies discussed above classify the U.S. system for litigating patent disputes. Case and Miller concluded that the CAFC (1) only partially met their first criterion[40] because it hears

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32. Lawrence Baum, *Specializing the Federal Courts: Neutral Reforms or Efforts to Shape Judicial Policy?*, 74 JUDICATURE 217, 218 (1991).

33. *Id.*

34. Thomas H. Case & Scott R. Miller, *An Appraisal of the Court of Appeals for the Federal Circuit*, 57 S. CAL. L. REV. 301, 306 (1984).

35. *See* Richard L. Revesz, *Specialized Courts and the Administrative Lawmaking System*, 138 U. PA. L. REV. 1111, 1160 (1990).

36. *Id.* at 1121–30.

37. *Id.* at 1130–33.

38. *Id.* at 1133–37.

39. *See id.* at 1137–39 (including chart with examples and description of each of the six types of courts).

40. The CAFC is hardly alone in this regard. *See* Jeffrey W. Stempel, *Two Cheers for Specialization*, 61 BROOK. L. REV. 67, 89 (1995) (disputing whether any specialized court could meet Dreyfuss's standard of "forums of highly limited jurisdiction to which all of the cases of a particular type are channeled" (quoting Rochelle C. Dreyfuss, *Forums of the Future: The Role of Specialized Courts in Resolving Business Disputes*, 61 BROOK. L. REV. 1, 5 (1995))).

more than just patent cases,[41] (2) fully met their second criterion because it has exclusive jurisdiction over patent appeals, and (3) did not meet their third criterion because, at that time of their study, the court's judges were not seen as having sufficient expertise.[42] These authors concluded that the CAFC "rank[ed] near the specialized end of the spectrum."[43] On the other hand, given the fact that the CAFC hears a number of different types of cases, Baum stated that it is much less specialized than other federal specialized courts.[44] Revesz declared that the CAFC is an example of a Type VI court — one that has exclusive, limited jurisdiction; has specialized judges; and is not subject to review by generalist regional circuit courts.[45] However, none of these authors evaluate the entire system of patent litigation in the United States at both the appellate and trial levels. While the federal district courts meet the criteria of exclusivity, since all patent infringement disputes are handled by U.S. District Courts, they clearly do not meet the criteria of subject matter limitation. Moreover, given their broad mandate, U.S. District Courts are staffed by generalist federal judges. They are, however, reviewed by the CAFC, a specialized appellate court.

Regardless of the differences between these three categorical schemes, creation of a specialized patent trial court would increase the level of specialization of the overall U.S. patent adjudication system. The magnitude of this increase depends on the parameters used to define the new court (e.g., whether the new patent trial court is limited to handling patent disputes). Whether such an increase in specialization justifies the creation of specialized courts depends on whether such courts are more useful in specific areas of the law than generalist courts and whether the benefits of having these courts outweigh the problems that they create.

C. Arguments for and Against Specialized Courts

The exclusivity and limitation characteristics of specialized courts create several benefits and costs for various entities in the legal system. This Part addresses the benefits and costs most frequently discussed in the legal community. These benefits and costs can be classified into four main rationales for specialized courts: (a) the de-

41. Only 16% of all CAFC cases are officially designated patent cases. *Id.* at 90. Other authors estimate a higher percentage. *See* Paul R. Michel, *The Court of Appeals for the Federal Circuit Must Evolve to Meet the Challenges Ahead*, 48 AM. U. L. REV. 1177, 1194 (1999) (estimating that about one third of the CAFC's docket is comprised of patent cases).

42. Case & Miller, *supra* note 34, at 306–07.

43. *Id.* at 307.

44. Baum, *supra* note 32, at 218.

45. Revesz, *supra* note 35, at 1138.

velopment of judicial human capital; (b) the creation of uniform and predictable legal doctrine; (c) the impact on and from the political economy of the legal system; and (d) the gains in efficient management of the courts.

1. Development of Judicial Human Capital

In any area of technical expertise, a layman is arguably more likely to make mistakes than an expert. While generalist judges may have more than sufficient expertise for the majority of cases, some areas of the law may involve significant factual or legal complexity.[46] When such cases are distributed across all courts, most judges are unlikely to see enough of them to develop specialized expertise. As Rochelle Dreyfuss notes, in many specialized areas of law, generalist judges, when confronted with a specialized area of law that they deal with infrequently, "decide the occasional case based upon a cursory understanding of policy and receive limited feedback on how well they fared."[47] A specialized court that allows judges to develop expertise — or judicial human capital — may thus be warranted for some complex areas of law. As an aside, there has been some debate in the literature on specialized courts over whether it is more important for the *court* or the *bench* to specialize.[48] This distinction does not detain us; a generalist judge appointed to a specialized court will, shortly thereafter, acquire expertise in the complex cases adjudicated by that court. Since patent cases are generally considered to be complex, the justification for having the human capital and specialized experience will be important in our analysis.

While specialized courts generate benefits with respect to judicial human capital, these courts also have associated costs. Real-world cases frequently cross subject matter boundaries, covering more than

46. *See* Rochelle Cooper Dreyfuss, *Specialized Adjudication*, 1990 BYU L. REV. 377, 409 ("The more intricate the law, the more likely it is that a generalist will get things wrong, confuse matters, and encourage additional litigation. The more complicated the facts of a case, the more the judge must master before the case can be decided at all.") [hereinafter Dreyfuss, *Adjudication*]; Ellen R. Jordan, *Specialized Courts: A Choice?*, 76 NW. U. L. REV. 745, 747 (1981).

47. Dreyfuss, *Adjudication*, *supra* note 46, at 378 (referring to the appellate level); *see also id.* at 409.

48. *See* Rochelle Cooper Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, 64 N.Y.U. L. REV. 1, 24–25 (1989) (arguing that a successful specialized court requires the "right mix of cases," not the "right kind of judges," since "many distinguished opinions have been authored by the judges with the least technical training") [hereinafter Dreyfuss, *Case Study*]; S. Jay Plager, *The United States Courts of Appeals, the Federal Circuit, and the Non-Regional Subject Matter Concept: Reflections on the Search for a Model*, 39 AM. U. L. REV. 853, 858 (1990) ("[I]t does not follow that if a court specializes in one or more areas of the law, the judges appointed to the court should be specialists in those areas.").

one area of law. Boundary problems make it difficult to determine which court should preside over the case and may force the judiciary of a specialized court to deal with areas of the law beyond its expertise.[49] Patent cases often present this issue, as a patent infringement suit can potentially include contract or antitrust issues. Several solutions to the boundary problem are discussed later in this Article.

In addition, there is a widespread fear that positions on specialized courts will be perceived as being less attractive or less prestigious for judges than positions on generalist courts. Such courts may then be unable to attract the best judicial candidates.[50] However, the problem might be mitigated by enhancing the perceived prestige of the court, for example by granting Article III status to its judges.[51]

2. Creation of Uniform and Predictable Legal Doctrine

A specialized court that allows judges to gain an in-depth understanding of existing law may promote uniformity and predictability across jurisdictions in the interpretation of the law and the development of new legal doctrine. Of course, some discord can exist even when judges have a full understanding of the law. Justice Story observed that "[j]udges of equal learning and integrity, in different states, might differently interpret a statute, or a treaty of the United States, or even the constitution itself."[52] However, "concentrating cases into one or a few tribunals should produce a bench small enough to maintain the collegiality necessary to speak with a single voice," which would provide "[g]reater consistency in court opinions," thereby "reducing [the] need for judicial intervention."[53] The sustained involvement of specialized courts with a particular field may also lead

49. *See* Dreyfuss, *Adjudication*, *supra* note 46, at 382; Richard A. Posner, *Will the Federal Courts of Appeals Survive Until 1984? An Essay on Delegation and Specialization of the Judicial Function*, 56 S. CAL. L. REV. 761, 787 (1983) ("Specialization is a source of potentially serious boundary problems.") [hereinafter Posner, *1984*]; *see also* Jordan, *supra* note 46, at 748–49 (discussing the difficulties in drawing jurisdictional boundaries for specialized courts).

50. *See* Harold H. Bruff, *Specialized Courts in Administrative Law*, 43 ADMIN. L. REV. 329, 331 (1991); Dreyfuss, *Adjudication*, *supra* note 46, at 381; Jordan, *supra* note 46, at 748; Daniel J. Meador, *An Appellate Court Dilemma and a Solution Through Subject Matter Organization*, 16 U. MICH. J.L. REFORM 471, 483 (1983) [hereinafter Meador, *Dilemma*]; Posner, *1984*, *supra* note 49, at 779–80 (suggesting that the monotony of specialized courts would not attract the best lawyers). *But see* Stempel, *supra* note 40, at 82 (suggesting that it is relative prestige, not subject matter alone, that draws talent).

51. *See* Stempel, *supra* note 40, at 82–84 (suggesting that the reclassification of CAFC judges as Article III judges has led to improvements in judicial quality); *see also* Michel, *supra* note 41, at 1181–82 (identifying the CAFC as an example of a specialized court that has been discovered by the legal community and that now attracts clerks from the most prestigious law schools).

52. Martin v. Hunter's Lessee, 14 U.S. (1 Wheat.) 304, 347–48 (1816).

53. Dreyfuss, *Adjudication*, *supra* note 46, at 378.

to better decision-making. Specialized courts are "in a better position to understand when it is better to sacrifice accuracy (the 'right' result in every case) for the ease with which bright-line rules can be applied and how to draw the fine distinctions necessary when accuracy is more important than administrative convenience."[54]

The lack of a central voice can have implications for the development of legal doctrine. A single, specialized court can render decisions that over time "create a body of law that is easier to apply uniformly and to predict with certainty."[55] Of course, the need for such a centralized voice may vary across different areas of the law. For instance, a single voice may be important in areas of the law that are seldom reviewed by the United States Supreme Court.[56] The importance of uniformity in the application of law is particularly important when the public interest in question is truly national or international rather than localized in states or regions, such as with some issues of environmental law.[57] Moreover, the legal precedents created by a specialized court can also be important in areas of the law overseen by a single, national administrative agency.[58] Formation of a specialized court could allow for coordination between the agency and the court to integrate the law into a coherent whole.[59]

However, while the philosophical arguments regarding the impact of judicial specialization on the development of legal doctrine are important, there is a more immediate benefit associated with harmonization of the multiple voices of legal interpretations from multiple regional courts. In areas of litigation which frequently involve multiple jurisdictions, the lack of a specialized court can create an incentive for parties to game the system by engaging in forum shopping — that is, filing lawsuits in the jurisdictions whose interpretation of doctrine is most favorable. This practice gives an advantage to larger, multi-jurisdictional parties in comparison to small, local parties and creates "a sense of injustice and [lack of] respect for federal law."[60]

In short, when interests are national, when Supreme Court review is rare, and when parties can game the system through forum shop-

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54. *Id.*

55. Dreyfuss, *Case Study*, *supra* note 48, at 8 (discussing the increased predictability and precision of patent law after the creation of the CAFC).

56. *See id.* at 2 ("[The Supreme Court] cannot hear enough cases to bring stability to many areas of the law on a regular basis.").

57. Daniel J. Meador, *A Challenge to Judicial Architecture: Modifying the Regional Design of the U.S. Courts of Appeals*, 56 U. CHI. L. REV. 603, 619 (1989) [hereinafter Meador, *Challenge*].

58. *Id.* at 617.

59. *See* Dreyfuss, *Case Study*, *supra* note 48, at 21–22 (discussing how the creation of the CAFC has allowed it to coordinate with the Patent & Trademark Office in the formation of patent law).

60. Meador, *Challenge*, *supra* note 57, at 618.

ping, a specialized court can lead to the formation of more sound legal doctrine. As we discuss in Part III, problems with forum shopping and lack of uniformity across districts were among the primary reasons for the creation of the CAFC.

Despite these benefits, specialized courts may also impose costs. These costs include the risk that the area of law covered by a specialized court will become stagnant from lack of contact with other areas of the law — a problem often referred to as "tunnel vision."[61] Intellectually isolated specialized courts, "[l]acking the full panoply of tools for furthering [their] policies . . . may distort the law to achieve the ends [they] deem[] appropriate."[62] Likewise, generalist judges will no longer learn the lessons offered by the evolution of the law in the specialized court's jurisdiction.[63] Once again, boundary problems may exist in the development of legal doctrine if similar new issues arise in multiple areas of the law.[64] To some scholars, the lack of contact between the specialized and generalist courts precludes judicial competition and experimentation among the circuits.[65] As Judge Posner notes, the regional appellate circuit courts are "laboratories for social, including judicial, experimentation, and a judicial monopoly of a field of federal law eliminates competition in that field."[66] However, other scholars dispute whether the existence of multiple judicial authorities actually fosters "percolation and reconsideration of error" and whether specialized courts are indeed as narrow in their thinking or as unwilling to revisit issues as they have been described to be.[67] Sarang Damle addresses judicial specialization by reviewing European — especially German — specialized judges.[68] Damle notes that specialized judges may be more suited to the civil law tradition of European

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61. *See* Case & Miller, *supra* note 34, at 307; *see also* Bruff, *supra* note 50, at 331; Jordan, *supra* note 46, at 748; Meador, *Dilemma*, *supra* note 50, at 483; Rai, *Specialized*, *supra* note 4, at 896; Simon Rifkind, *A Special Court for Patent Litigation? The Danger of a Specialized Judiciary*, 37 A.B.A. J. 425, 425 (1951). *But see* Stempel, *supra* note 40, at 91 (disputing whether the dockets of generalized courts are truly as diverse as they are reputed to be).

62. Dreyfuss, *Adjudication*, *supra* note 46, at 381.

63. See Case & Miller, *supra* note 34, at 314 (discussing the impact of the creation of the CAFC on the other circuits, and stating that "judges of the other circuits will no longer apply the lessons of patent cases to the rest of their cases").

64. *See* Robert Pitofsky, *Challenges of the New Economy: Issues at the Intersection of Antitrust and Intellectual Property*, 68 ANTITRUST L.J. 913, 919–23 (2001) (discussing how new technologies are creating conflicting perspectives in antitrust and intellectual property law).

65. *See* Posner, *1984*, *supra* note 49, at 785–86; Revesz, *supra* note 35, at 1155–61 (pointing out that judicial competition and experimentation are benefits of a system that allows for circuit splits).

66. Posner, *1984*, *supra* note 49, at 786.

67. Stempel, *supra* note 40, at 92–95.

68. *See* Sarang Vijay Damle, Note, *Specialize the Judge, Not the Court: A Lesson from the German Constitutional Court*, 91 VA. L. REV. 1267 (2005).

countries, where judges' roles are more mechanical with less of a lawmaking aspect.[69] Damle then proposes a "rapporteur" system for the U.S. Courts of Appeals, similar to the German Constitutional Court, in which cases are staffed with a mix of expert and non-expert judges.[70]

Critics also argue that the creation of a single specialized appellate court could lead to the loss of a regional view when such a view is in fact warranted.[71] The concentration of judicial power in a smaller number of judges increases the concentration of government power, which undermines the "extremely diffuse" nature of the federal court system and eliminates geographical diversity in the judiciary.[72] With respect to this final point, most federal specialized courts are national courts based in Washington, D.C. These courts are denied the regional perspective that the generalist circuit courts of appeal retain. Case and Miller note that "[j]udges who age, practice law, and ascend to the bench in one region may fruitfully impart their regional experience to the cases they decide."[73] Specialized federal courts, particularly those located exclusively in Washington, D.C., may lack the advantage of diverse regional influence.[74]

However, even if a specialized court does suffer from the lack of cross-fertilization from other areas of the law, administrative adjustments can limit the problem. Judges can be rotated to new subject matter areas,[75] and generalist judges can serve on a part-time basis on the specialized court.[76] These measures can bring fresh perspectives to the specialized court from other geographical and subject areas, though doing so will obviously negate some of the benefits from increased judicial human capital.

Other potential problems created by a specialized appellate court arise from its perceived monopoly power in its area of law. When a specialized court operates in coordination with an administrative agency, there may be a tendency of specialist courts "to identify with the goals of [the] government program" being overseen, and to "enforc[e] the law in a vigorous rather than a temperate fashion."[77] It is

69. *Id.* at 1290–91.

70. *Id.* at 1300–01.

71. *See* Case & Miller, *supra* note 34, at 313–14 (discussing how the CAFC may lose technological specialization in its review of patent cases, since industries tend to be geographically concentrated by technology in the United States).

72. Posner, *1984*, *supra* note 49, at 786; *see also* Case & Miller, *supra* note 34, at 313.

73. Case & Miller, *supra* note 34, at 313.

74. *See id.*

75. *See* Meador, *Dilemma*, *supra* note 50, at 483 (proposing rotating judges to new subject matter areas every three to five years).

76. *See* Dreyfuss, *Adjudication*, *supra* note 46, at 425 (discussing a proposal to allow specialized court judges to serve on a part-time basis).

77. Posner, *1984*, *supra* note 49, at 785.

possible for such a court to lose its sense of independence with respect to both the agency in particular and the other branches of government.[78] Such courts may become extremist both because they come to develop a sense of "mission and lose [their] objectivity" and because of the greater risk of manipulation of appointments for specialized courts relative to generalist courts.[79] Specialization of courts may also lead to volatility in the law due to the tendency of specialists to belong to an ideological camp,[80] particularly in areas such as antitrust and patent law where there may be ideological divisions.[81] Such obvious ideological disputes would undermine the role of the judge as a detached and dispassionate mediator. Therefore, some scholars argue that the use of specialized courts should be limited. That said, the cost of greater volatility in the law due to ideological divisions on a specialized court can be minimized by having the court cover an area of law where there is significant consensus on the objectives of the law in that area and where the major policy choices have already been settled.[82]

Another potential problem is that specialized jurists might come to view themselves as truly special. There is a risk that as a specialized court "becomes more confident of its patent expertise, it will disregard district court findings of fact more often" or discount expert testimony in relevant areas of law at trial.[83] Specialized courts may also suffer from greater risk of error due to the deference that specialized courts often receive,[84] and the lack of review by other regional circuits could lead to poorly written opinions.[85]

In sum, the creation of specialized appellate courts may carry many benefits in terms of the uniformity and predictability of the evolution of doctrine, but there are several potential dangers as well.

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78. *See* Dreyfuss, *Adjudication*, *supra* note 46, at 380 (hypothesizing that, because of "Congress' greater attention to the court's activities" there would be a greater chance "that the court will become an extension of the legislature"); Posner, *1984*, *supra* note 49, at 783–84.

79. Case & Miller, *supra* note 34, at 309.

80. *See* Posner, *1984*, *supra* note 49, at 781 (discussing the inevitability of appointing judges from particular ideological camps who would be "more sensitive to the swings in professional opinion than an outsider, a generalist, would be").

81. *Id.* at 781–82. *Contra* Stempel, *supra* note 40, at 104 (disputing this contention and arguing that a court comprised of specialists is less likely to be volatile, since experts are unlikely to follow "intellectual fads").

82. *See* Dreyfuss, *Adjudication*, *supra* note 46, at 414–18 (explaining that "without public consensus on [the] basic premises, there is no assurance that the public [will] accept [a specialized court's] conclusions"); Jordan, *supra* note 46, at 784.

83. Case & Miller, *supra* note 34, at 311 (discussing this same criticism of the CAFC).

84. *See* Revesz, *supra* note 35, at 1169 (noting that the Tax Court is already given greater deference when compared to district courts).

85. Case & Miller, *supra* note 34, at 311–12 (explaining that judges will not have incentives "to write well-considered opinions" because other circuits will rarely have to resolve the same issues as the specialized courts).

Nonetheless, as we discuss in Part III, the primary rationale for the creation of the CAFC was to increase the uniformity of legal doctrine. The current evidence is that it has been largely successful in attaining this goal.[86]

3. Impact on and from the Political Economy of the Legal System

Our judiciary is part of a government system comprised of agencies, legislative bodies, elected officials, and the political and economic factors influencing them. Many of the arguments against specialized courts are founded on the view that a specialized judiciary, as a small body dedicated to one area of the law, will be more susceptible to political and economic influences than would a large, generalized court. In particular, a specialized court is thought to be more tightly bound to special interests and easier to capture.[87] In a specialized court, "the side that is better heeled or more powerful could capture the court and create a bench more likely to issue one-sided opinions."[88] Generalized courts are not believed to be subject to the same degree of pressure. In the words of Judge Posner, "an independent judiciary will tend on balance to reduce the scope of special interest politics in American life and . . . a generalist judiciary will be more independent than a specialist one."[89] This capture problem is compounded when repeat players appear before the same bench multiple times, since they are likely to get to know the judges involved.[90]

However, many of the administrative measures previously discussed — such as broadening subject matter, having generalist judges serve part-time on specialized courts, or rotating judges to new subject-matter areas every three to five years[91] — are likely to limit the

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86. Rochelle Dreyfuss describes the successful impact of the CAFC on patent law as follows:

> In sum, the CAFC's jurisprudence reveals that the court has begun to make patent law more accurate, precise, and coherent. Its ability to accomplish this task derives largely from the high volume of patent appeals that it hears, which gives the court an overview of the full range of issues and forces it to construct an integrated picture of the law as a whole.

Dreyfuss, *Case Study*, *supra* note 48, at 24.

87. Andrew P. Morriss, *A Public Choice Perspective on the Federal Circuit*, 54 CASE W. RES. L. REV. 811, 816 (2004) ("[W]e would expect the repeat players concerned with [the specialized issue] to invest in the judicial selection process to gain appointments of candidates they thought would favor their position.").

88. *See* Dreyfuss, *Adjudication*, *supra* note 46, at 380.

89. Posner, *1984*, *supra* note 49, at 784. Judge Posner went on to admit that the creation of a specialized court may lessen the role of specialist interests in the drafting of the law since pressure exerted at the time of judicial appointment may counter that exerted on the drafting legislature. *See id.* 783–84.

90. Dreyfuss, *Adjudication*, *supra* note 46, at 380.

91. *See supra* notes 75–76 and accompanying text.

political pressures on a specialized court. These measures can lead to a mix of cases and judges that is not perfectly aligned with an interest group. Additionally, it is not clear that such an alignment of the judiciary and special interests would arise even without such measures. As some authors have pointed out, repeat parties and their attorneys are unlikely to be consistently on one side of an issue.[92] Thus, they have little incentive to influence the specialized bench toward a particular view.

4. Gains in Efficient Management of the Courts

To the extent that a specialized court improves the accuracy of judicial decisions through improvements in judicial human capital and legal uniformity, the creation of a specialized court may reduce both the administrative costs of the court system and the legal costs faced by litigants. Cases can be resolved more quickly when the judge does not have to familiarize herself with an unfamiliar area of law and administrative costs decreased when multiple jurisdictions do not have to hire specialized staff for a small number of cases. This is particularly true in complex areas of law in which an individual case would consume a disproportionately large share of a generalist judge's time as compared to a specialist judge's time.[93] Likewise, when the law must be applied to complex factual situations, a case may be managed more efficiently when it is presided over by a judge with experience in cases having similar issues and features.[94] In either of these circumstances, cases may be administered in a more expeditious and efficient manner if they are concentrated in a single court rather than being spread out across a large number of jurisdictions.[95] Also, if legal doctrine is harmonized across the circuits, forum shopping will be reduced, leading to lower administrative costs.[96]

In general, litigants also benefit from expeditious judicial proceedings. More efficient administration of a case reduces the legal costs to the parties. These costs may decrease further as patent law becomes more uniform and fewer parties choose to litigate or appeal

92. *See* Case & Miller, *supra* note 34, at 310 (discussing how the CAFC has escaped the special interest problem because parties and their attorneys are likely to be plaintiffs as well as defendants in patent suits and are therefore unlikely to take a pro-patent or anti-patent position).

93. *See* Bruff, *supra* note 50, at 330–31; Dreyfuss, *Adjudication*, *supra* note 46, at 377–78.

94. *See* Dreyfuss, *Case Study*, *supra* note 48, at 74.

95. *See* Dreyfuss, *Adjudication*, *supra* note 46, at 418. Of course, the benefit from creation of a specialized court would be less if there were already a high degree of concentration in a district. *See id.*

96. *See* Case & Miller, *supra* note 34, at 320–21.

cases.[97] Such efficiency may be of even greater importance in areas of law where a delay in adjudication is costly.[98]

However, there are limitations to these benefits. Parties may find that instead of pursuing their case in a court close to home, they may have to travel to the site of the specialized court. Moreover, the boundary problems[99] associated with the creation of specialized courts may increase the cost of litigation, since litigants may find that they must pursue their case in more than one jurisdiction if the specialized court can deal only with those portions of a dispute that fall within its area of specialization.[100] Thus, the efficiency gains from creation of a specialized court will depend on the degree to which the boundary problems can be resolved through appropriate and clear definition of the court's jurisdiction.[101] Specialized courts may be given jurisdiction over areas of law that are frequently linked together in disputes[102] and those that can be effectively segregated from other areas of law.[103] Overall, however, solving boundary problems by clearly defining a court's jurisdiction may sometimes conflict with the goal of reducing litigant costs, as the limited jurisdiction may require claims to be segregated and litigated in multiple courts.

III. THE CAFC: JUSTIFICATIONS FOR, AND PERFORMANCE OF, THE U.S. SPECIALIZED PATENT APPELLATE COURT

Currently, patent infringement suits are handled through a system that is specialized at the appellate level but administered by generalized federal district courts (or the International Trade Commission in certain circumstances) at the trial level. Since 1982, a specialized appellate court, the CAFC, has handled patent litigation in the United States The CAFC was formed with several goals in mind, including the promotion of uniformity in patent litigation. Numerous studies have examined the performance of this court — how well it has met its goals and what additional reforms should be contemplated[104] — making the CAFC one of the most-studied specialized courts.

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97. *See id.* at 321.

98. *See* Jordan, *supra* note 46, at 784.

99. *See supra* text accompanying note 49.

100. *See* Case & Miller, *supra* note 34, at 332; Dreyfuss, *Adjudication*, *supra* note 46, at 437.

101. *See* Bruff, *supra* note 50, at 339; Meador, *Challenge*, *supra* note 57, at 620–21.

102. *See* Meador, *Challenge*, *supra* note 57, at 620 ("[C]opyright and unfair competition claims are often linked; it would not be workable to route copyright questions to one appellate court and unfair competition questions to another.").

103. *See* Dreyfuss, *Adjudication*, *supra* note 46, at 412–14.

104. *See, e.g.*, John F. Duffy, *Comment: Experiments After the Federal Circuit*, 54 CASE W. RES. L. REV. 803 (2004); Paul M. Janicke, *Two Unsettled Aspects of the Federal Circuit's Patent Jurisdiction*, 11 VA. J.L. & TECH. 3 (2006); Richard A. Posner, *Reply: The*

In 1982, the Court of Customs and Patent Appeals was combined with the Court of Claims to create the CAFC, and this new court was given sole jurisdiction over appeals of patent cases.[105] The CAFC also retained jurisdiction over the docket previously handled by the earlier two courts, such as civil cases involving the federal government.[106] Thus, the CAFC was intended to have exclusive jurisdiction over cases involving an area of the law concerned with national interests and which is administered by one national agency (the U.S. Patent and Trademark Office),[107] but not to be limited to such cases.[108] It was originally intended that patent cases would comprise only about 20% of the CAFC's docket, but by the late 1990s approximately one third of the cases on the CAFC's docket were patent cases.[109] Because the CAFC was designed to handle multiple types of cases, the new court could meet its specialized function while mitigating the boundary and capture problems that might plague a court limited solely to patent cases. However, as Chief Judge Paul Michel argued, it is possible that patent cases take up a disproportionate amount of the CAFC's time due to their complexity.[110] There is also a growing fear that the jurisdiction of the CAFC could become too broad, particularly given the increasing interaction between antitrust, intellectual property, and competition policy issues.[111]

Institutional Dimension of Statutory and Constitutional Interpretation, 101 MICH. L. REV. 952 (2003); Scott A. Stempel & John F. Terzaken III, *Casting a Long IP Shadow over Antitrust Jurisprudence: The Federal Circuit's Expanding Jurisdictional Reach*, 69 ANTITRUST L.J. 711 (2002); John R. Thomas, *Formalism at the Federal Circuit*, 52 AM. U. L. REV. 771 (2003).

105. *See* Chris J. Katopis, *The Federal Circuit's Forgotten Lessons?: Annealing New Forms of Intellectual Property Through Consolidated Appellate Jurisdiction*, 32 J. MARSHALL L. REV. 581, 604 (1999); Pauline Newman, *The Federal Circuit — a Reminiscence*, 14 GEO. MASON L. REV. 513, 520 (1992) [hereinafter Newman, *Reminiscence*].

106. Newman, *Reminiscence*, *supra* note 105, at 520–21; *see* Katopis, *supra* note 105, at 604–05 (listing the areas of jurisdiction for CAFC, including appeals of IRS cases from district courts and appeals of Patent and Trademark Office decisions).

107. *See* Katopis, *supra* note 105, at 591–96 (examining the uniformity of American IP law); Pauline Newman, *The Federal Circuit: Judicial Stability or Judicial Activism?*, 42 AM. U. L. REV. 683, 686 (1993) ("For the first time in many years, the same law was routinely applied in review of patentability in the Patent and Trademark Office and review of patent validity in litigation, because these appeals now resided in the same court.").

108. Newman, *Reminiscence*, *supra* note 105, at 523.

109. Michel, *supra* note 41, at 1194 ("Out of [the cases the Federal Circuit disposes of each year], only about one third are patent cases.").

110. *See* Michel, *supra* note 41, at 1181.

111. *See* James B. Gambrell, *The Evolving Interplay of Patent Rights and Antitrust Restraints in the Federal Circuit*, 9 TEX. INTELL. PROP. L.J. 137, 139 (2001) ("[T]he fear is that the Federal Circuit will emasculate the patent-antitrust interface by taking too liberal a view of the bundle of rights granted to the patent owner when antitrust principles are involved."); Stempel & Terzaken, *supra* note 104, at 725–26 (discussing CSU, LLC, v. Xerox Corp. (*In re* Independent Service Organizations Antitrust Litigation), 203 F.3d 1322 (Fed. Cir. 2000), and Intergraph Corp. v. Intel Corp., 195 F.3d 1346 (Fed. Cir. 1999), both antitrust cases).

The following two Parts address how well the CAFC has performed according to the criteria set for a specialized court. In particular, Part A discusses the CAFC and patent law and addresses the "uni-"uniformity of legal doctrine" criteria, and Part B discusses the impact of the CAFC on the efficiency of litigation of patent disputes.

A. Effects of the CAFC on Patent Law Decisions

1. The CAFC and the Predictability of Legal Doctrine

One of the primary reasons for the creation of the CAFC was the extreme disparity in the interpretation of patent law across circuits.[112] Multi-district litigants took advantage of these disparities,[113] and forum shopping was rampant. These problems reached the point where, as Judge Pauline Newman put it, "the fate of duly examined and issued patents had become so uncertain in the courts as to place a cloud on patent-based investment."[114] Thus, while there was some resistance from the legal community, the creation of the CAFC was strongly supported by the business community.[115]

To some extent, arguing that the CAFC has succeeded in harmonizing patent law is a tautology; at present, there is now only one appellate court issuing opinions, so by definition there is only one voice. Hence, it is more useful to inquire whether this uniformity has filtered down to the level of the trial courts. Atkinson, Marco, and Turner explore these issues by comparing the rates at which patents were declared "not invalid" across districts before and after the creation of the CAFC.[116] They find that before the creation of the CAFC, the district with the maximum rate of non-valid rulings had a probability of such a ruling that was four times that of the rate in the district with the lowest non-valid rate. After the creation of the CAFC, however, there was less difference across districts.[117] Thus, there is some evidence that the creation of the CAFC has increased the degree of uniformity in the application of patent law across districts. In fact, there is a school of thought that suggests that the creation of the CAFC has changed the nature of patent law, introducing a "pro-patent bias" towards the assumption of patent validity. Apparently, one of the unanticipated con-

112. *See* Newman, *Reminiscence*, *supra* note 105, at 516.

113. *See id.*

114. *Id.*

115. *Id.* at 517.

116. Scott Atkinson et al., *The Economics of a Centralized Judiciary: Uniformity, Forum Shopping and the Federal Circuit*, 52 J.L. & ECON. 411 (2009).

117. *See id.* at 32 (indicating that after the creation of the CAFC the "outcome of patent litigation has been more predictable and the decision of where to litigate has been simpler").

sequences of uniformity may be that the new uniform doctrine could be controversial in the business and legal communities.

Be that as it may, forum shopping does not seem to have disappeared entirely. Judge Kimberly Moore addressed the question of forum shopping in patent cases in the federal district courts. Judge Moore found that forum shopping continued to play a role in patent litigation,[118] with "[t]he top ten jurisdictions combined hav[ing] 44% of all patent cases terminated" between 1995 and 1999.[119] Moreover, she determined that litigants were motivated to select specific districts because of differences in the procedural and substantive law between the districts.[120] Judge Moore proposed several potential solutions for the problem of forum shopping in patent cases, including the creation of a specialized patent trial court or limitation of venue in patent cases by statute.[121] These empirical studies thus suggest that, despite the increased uniformity of patent law and the somewhat decreased degree of forum shopping, the creation of the CAFC has not proven to be the cure-all that some had hoped.

2. The CAFC and the Quality of Legal Doctrine

Another popular argument for creating the CAFC was that specialized judges would formulate better law. For example, Judge Pauline Newman noted that patent law was brought into the mainstream by the abandonment of the "special treatment" patent cases had received in the regional circuits and the increased use of legal devices such as preliminary injunctions.[122] However, it is not completely clear that the opinions produced by the CAFC adequately communicate new case law or fully meet quality expectations.

As a test of the quality of opinions, Craig Nard measured the frequency of the CAFC's citation of legal scholarship in patent cases.[123] Nard found that the Second and Ninth Circuits, when addressing trademark and copyright cases, "cite [legal] scholarship roughly four times as often as the Federal Circuit" does in patent cases.[124] Nard speculated that since the Second and Ninth Circuits' dockets are more

118. *See* Kimberly A. Moore, *Forum Shopping in Patent Cases: Does Geographic Choice Affect Innovation?*, 83 J. PAT. & TRADEMARK OFF. SOC'Y 558, 561 (2001) [hereinafter Moore, *Forum Shopping*].

119. *Id.* at 571.

120. *Id.* at 574–85.

121. *Id.* at 596–98.

122. Newman, *Reminiscence*, *supra* note 105, at 525.

123. *See* Craig Allen Nard, *Toward a Cautious Approach to Obeisance: The Role of Scholarship in Federal Circuit Patent Law Jurisprudence*, 39 HOUS. L. REV. 667 (2002).

124. *Id.* at 683.

diverse than that of the CAFC, these courts may have "greater reliance on secondary authority," leading to higher-quality opinions.[125]

There is also some evidence that the new law developed by the CAFC may not be improving the clarity or predictability of patent law. For instance, there are complaints that the CAFC's decisions are not published with sufficient frequency. Erica Bodwell reviewed all published and unpublished CAFC opinions with regard to patent validity over a 34-month period.[126] Bodwell found that when the CAFC overturned the district court, it was more likely to publish its opinion than when it affirmed the district court.[127] These results suggest that there may be an inadequate volume of written precedent.

While the level of quality and clarity may not have met all expectations, complete predictability in the law is an impossibility. As Judge Michel discusses, a specialized appellate court may not produce a completely "predictable" interpretation of the law because the composition of the panel hearing the case can have an impact on the decision.[128]

B. The CAFC and Efficiency: Impact on Litigants

The impact of the creation of the CAFC on the behavior of patent litigants is less clear. Jon F. Merz and Nicolas M. Pace studied the impact that the CAFC has had on the volume of patent litigation as of the early 1990s, and concluded that its creation may have led to an increase in patent litigation.[129] Some authors have posited that the increase in patent application filings, patent litigation, and appeals of rulings in patent cases indeed derive from the greater certainty and predictability of patent law under the new structure,[130] though this view is not universal.[131]

This sentiment is echoed by the work of William Landes and Richard Posner demonstrating that the CAFC had a "positive and significant impact on the number of patent applications, the number of patents issued, the success rate of patent applications, the amount of patent litigation, and, possibly, the level of research and development

125. *Id.*

126. *See* Erica U. Bodwell, Note, *Published and Unpublished Federal Circuit Patent Decisions: A Comparison*, 30 IDEA 233, 233 (1990).

127. *Id.* at 241.

128. Michel, *supra* note 41, at 1191.

129. *See* Jon F. Merz & Nicolas M. Pace, *Trends in Patent Litigation: The Apparent Influence of Strengthened Patents Attributable to the Court of Appeals for the Federal Circuit*, 76 J. PAT. & TRADEMARK OFF. SOC'Y 579, 587 (1994).

130. Katopis, *supra* note 105, at 603.

131. *See* Duffy, *supra* note 104, at 805–06.

expenditures."[132] Thus, it appears that the creation of the CAFC may indeed have introduced a higher degree of uniformity and certainty in the application of patent law, a change that was sufficient to feed back into the use of patents in the business and inventor community.

IV. THE ARGUMENTS FOR THE CREATION OF A SPECIALIZED PATENT TRIAL COURT IN THE U.S.

Despite the creation of a specialized appellate court and the concomitant benefits to patent adjudication, there is reason to believe that the complexity of patent litigation justifies specialization at the trial court level as well. To quote one recent author: "Most lower courts lack the time, resources and opportunity to appreciate the need for reform, the realities of the patent examination process, or the problems in the patent's validity presumption."[133] This Part briefly explores two topics: (1) dissatisfaction with the current system, and (2) the issue of claim construction.

A. Dissatisfaction with the Current System

There is evidence suggesting dissatisfaction with the performance of district courts in patent cases at the trial level. For instance, approximately 10% of judgments in other areas of the law are appealed, whereas 50% of the judgments in patent cases are appealed.[134]

With respect to the issue of judges versus juries in patent trials, Judge Kimberly Moore's 2000 study examined the results of U.S. patent cases that went to trial from 1983 through 1999 to test popular conceptions of juror bias and incompetence.[135] Judge Moore found that the results validated some of the popular perceptions about judges and juries. Specifically, "[j]uries find for the patent holder more often on validity, infringement, and willfulness issues and they do award higher damages."[136] Judge Moore found that the magnitude of the differences in results between juries and judges was "much smaller than many might have anticipated, however."[137] There were also "no

132. William M. Landes & Richard A. Posner, *An Empirical Analysis of the Patent Court*, 71 U. CHI. L. REV. 111, 112 (2004).

133. Cheryl Lee Johnson, *The Continuing Inability of Judges to Pass Their Markman Tests: Why the Broken System Leaves Judges Behind, Confused and Demoralized*, *in* MARKMAN HEARINGS AND CLAIM CONSTRUCTION IN PATENT LITIGATION 2008, at 65, 153–54 (PLI Patents, Copyrights, Trademarks, and Literary Prop., Course Handbook Ser. No. 941, 2008).

134. Michel, *supra* note 41 at 1193.

135. *See* Kimberly A. Moore, *Judges, Juries, and Patent Cases — An Empirical Peek Inside the Black Box*, 99 MICH. L. REV. 365, 408 (2000) [hereinafter Moore, *Empirical*].

136. *Id.*

137. *Id.* at 402.

significant differences in outcome data . . . on the issue of enforceability of the patents."[138] Judge Moore additionally found that "[j]udges and juries [were] affirmed on appeal with equal frequency."[139] However, as Judge Moore cautions, this could be due to the combination of the "black box" nature of jury verdicts and deferential appellate standards of review.[140] In addition, juries tend to "decide patent cases on an all-or-nothing basis more frequently than judges do."[141] Finally, Judge Moore found that in cases decided by juries, "[t]he patent holder has a significantly greater win rate in actions brought by the patent holder than in declaratory judgment actions brought by the infringer."[142] The general concerns with the performance of judges and juries at the trial level in patent cases raise the question of whether the system can be improved with specialized patent trial judges.

B. The Special Issue of Claim Construction

One central concern with general trial courts handling patent cases is the importance of claim construction. Under *Markman v. Westview Instruments, Inc.*, claim construction must be decided by the court as a matter of law.[143] This process is usually conducted during the pretrial stage in a "*Markman* hearing," where the judge determines the scope of the patent at issue.[144] Claim construction is one of the most important pre-trial procedures in patent litigation. Civil and practical procedures magnify the importance of claim construction rulings because, if there are no remaining issues of material fact after the claims are construed, a case can be resolved on summary judgment or quickly settled as the possible outcomes become more predictable.[145] As Paul M. Shoenhard has noted, "to increase certainty and predictability in patent cases, it is desirable to target the Federal Circuit's reversal rate for claim construction determinations in particular."[146] However, previous scholars have found evidence that the district courts may not be providing a predictable and uniform voice on this issue. Judge Moore addressed the issue of district court judges'

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138. *Id.* at 408.
139. *Id.* at 408–09.
140. *Id.* at 409.
141. *Id.*
142. *Id.*
143. 517 U.S. 370, 371 (1996).
144. *See* Andrew T. Zidel, Comment, *Patent Claim Construction in the Trial Courts: A Study Showing the Need for Clear Guidance from the Federal Circuit*, 33 SETON HALL L. REV. 711, 712 (2003).
145. Michel, *supra* note 41, at 1187–88.
146. Paul M. Schoenhard, *Reversing the Reversal Rate: Using Real Property Principles to Guide Federal Circuit Patent Jurisprudence*, 17 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 299, 300 (2007).

competence to hear patent cases, particularly when issues of claim construction are involved, and she found "that district court judges improperly construed patent claim terms in 33% of the cases appealed to the [CAFC]" from 1996 to 2000.[147] These "errors in district court claim constructions require reversing or vacating judgments in 81% of these cases."[148] Studying the period from January 1998 to April 2000, Christian Chu found that 44% of claim constructions were modified by the CAFC, and sixty-eight of these cases were reversed, making the overall reversal rate of appeals involving express claim constructions 29.6%.[149] David Schwartz and Judge Moore find in separate studies that slightly less than 40% of all appealed claim construction rulings are found to have at least one claim construed in error.[150] Judge Moore concludes that the best way to solve these errors is to allow "expedited appeal [on claim construction] issues to the Federal Circuit in limited circumstances."[151]

The high rate of both claim construction modifications and claim construction-based reversals in CAFC decisions may be unraveling many of the gains in predictability and uniformity resulting from the creation of the CAFC.[152] The CAFC reviews claim construction de novo because the trial court decides construction as a matter of law. Thus, the predictability of the final outcome is decreased since only the decision by the CAFC is "final" as a practical matter.[153] Furthermore, it is not clear that the CAFC speaks with one voice on the issue of claim construction. Analyzing empirical data from the CAFC's claim construction case law, R. Polk Wagner and Lee Petherbridge found the court sharply divided between two distinct methodological approaches to claim construction, each leading to different results.[154] The authors also found that the outcome of claim construction analysis was affected by the composition of the three-judge panel hearing a

147. Kimberly A. Moore, *Are District Court Judges Equipped to Resolve Patent Cases?*, 15 HARV. J.L. & TECH. 1, 2 (2001) [hereinafter Moore, *Judges*].

148. *Id.*

149. Christian A. Chu, *Empirical Analysis of the Federal Circuit's Claim Construction Trends*, 16 BERKELEY TECH. L.J. 1075, 1104 (2001).

150. *See* David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223, 248 (2008) [hereinafter Schwartz, *Practice Makes Perfect*]; Moore, *Judges*, *supra* note 147, at 2.

151. Moore, *Judges*, *supra* note 147, at 4. We will examine reversals of claim construction in our data in Part V.C.6.

152. *See* Chu, *supra* note 149, at 1143 (summarizing the impact of the de novo review standard imposed in Cybor Corp. v. FAS Technologies, Inc., 138 F.3d 1448 (Fed. Cir. 1998)).

153. *See* Michel, *supra* note 41, at 1192–93 (referring to the unpredictability of the outcome of de novo review).

154. *See* R. Polk Wagner & Lee Petherbridge, *Is the Federal Circuit Succeeding? An Empirical Assessment of Judicial Performance*, 152 U. PA. L. REV. 1105, 1111 (2004).

particular case.[155] Arti Rai also raises concerns about the CAFC's de novo appellate review of claim construction issues, which Rai categorizes as "mixed questions of law and fact" that the CAFC treats as pure questions of law.[156] There is no universal agreement that claim construction is particularly subject to appellate reversal. Some scholars argue that claim construction, difficult as it may be, leads to no greater unpredictability than some other judicial interpretations.[157] Nonetheless, the uncertainty and unpredictability of claim construction rulings is one of the most contentious issues in contemporary patent litigation.

Incorrect claim construction in patent cases by generalist district courts, coupled with delayed finality until appellate review, limits the predictability of decisions in the trial courts and increases the administrative costs of litigation due to appealed and remanded decisions. For this reason, as we described in the Introduction, many people throughout the legal community have voiced support for increased specialization at the trial court level in patent cases.[158]

In the next Part, we attempt to empirically validate (or reject) some of the justifications for this proposal and also examine the extent of the benefits of specialized patent adjudication at the trial level.

V. EMPIRICAL ANALYSIS

In Part II.C, we organized the common scholarly justifications for specialized courts into four categories: (1) improvement in judicial human capital; (2) uniformity and predictability in the development of legal doctrine; (3) the impact on the political economy of the judicial system; and (4) the efficiency of the court system. The creation of the CAFC has arguably addressed the second and fourth criteria; patent law is now applied in a more uniform manner across the circuits and forum shopping, though still occurring, is not as widespread as it once was. Nonetheless, there is still a belief that a specialized patent trial court is needed. As noted in Part III.C.1, one of the primary rationales for specialization is that improvement in judicial human capital at the trial level may result in more efficient and accurate patent adjudication.

Many scholars and policy makers believe that the average district court judge hears too few patent cases and may not have the special-

155. *Id.* at 1112.

156. Rai, *Specialized*, *supra* note 4, at 879.

157. *See, e.g.*, Jeffrey A. Lefstin, *The Measure of the Doubt: Dissent, Indeterminacy, and Interpretation at the Federal Circuit*, 58 HASTINGS L.J. 1025, 1092 (2007) ("[T]his study also finds that claim construction has been no less determinate than another interpretive regime, that of contract interpretation.").

158. *See supra* Part I.

ized training needed to adequately and expeditiously rule on complex issues. The link between the complexity of the issues and judicial inefficiencies is not unfounded. Appellate review of claim construction, for example, results in a relatively high reversal rate.[159] Previous empirical work on the case for a specialized patent court in the United States has almost exclusively focused on the impact such an institution would have on this reversal rate.[160] For example, Gitter demonstrates that the rate of reversal of claim construction decisions is lower in the U.K. than in the United States, and she speculates that one reason for this result may be the British specialized patent trial court.[161] However, Olson examines the rate of reversal on appeal on a small dataset of cases involving claim construction across three tiers of judicial patent experience, and she is not able to discern any obvious trends in reversal rates as the level of patent experience increases.[162] Schwartz, using a large and more comprehensive database, also examines trends in reversal of claim construction across levels of judicial experience. He does not observe any relationship between reversals of claim construction and experience.[163] However, Schwartz and Olson did not subject their observations to statistical analysis beyond summary statistics. Further, none of these authors look at reversal rates on patent-related issues other than claim construction. Shartzer expands the scope of such studies somewhat, looking at the relationship between the overall reversal rate on patent case appeals and the number of times a judge's decisions in patent cases had previously been appealed. While he does find that there is a statistically significant relationship, he does not report the actual magnitude of the effect.[164] In addition, he does not examine the relationship between experience at the trial level and the outcome of appeals.

However, it is possible that the methodology employed in these studies could be driving the results they find. None of these authors control for the influence of any omitted factors in their analysis. For

159. *See* Chu, *supra* note 149, at 1104; Moore, *Judges*, *supra* note 147, at 14.

160. *See* 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); David L. Schwartz, *Courting Specialization: An Empirical Study of Claim Construction Comparing Patent Litigation Before Federal District Courts and the International Trade Commission*, 50 WM. & MARY L. REV. 1699 (2009); Schwartz, *Practice Makes Perfect*, *supra* note 150; Shartzer, *supra* note 28, at 191–241; Nancy Olson, Comment, *Does Practice Make Perfect? An Examination of Congress's Proposed District Court Patent Pilot Program*, 55 UCLA L. REV. 745 (2008).

161. *See* Gitter, *supra* note 160, at 183–94 (calculating the rate of reversal of claim construction rulings in the U.K. and discussing the possible reasons for the lower rate in the U.K. compared to the United States).

162. *See* Olson, *supra* note 160, at 771–79.

163. *See* Schwartz, *Practice Makes Perfect*, *supra* note 150, at 254–57.

164. *See* Shartzer, *supra* note 28, at 239–40.

example, if judges with greater patent experience work in judicial districts where most patent technologies are unusually complex, the impact of their greater experience may be obscured by the increased probability of reversed claim construction in complex technologies. Thus, it would appear that experience had no impact, when in fact it may have helped judges deal with these more complex cases.[165] As a consequence, the results of these studies could change if they included other variables measuring factors beyond experience that could influence the reversal rate, such as the nature of the case, judge, or district.[166] It may also be that, despite the importance of claim construction, experience has a different impact on reversals of different issues. Moreover, on the important issue of claim construction, previous research may have used the wrong method for measuring the type of experience that contributes to more accurate claim construction rulings. It may be that neither previous appellate experience (as analyzed by Shartzer) nor patent trial experience (as analyzed by Schwartz) is the appropriate measure, and that it is experience with claim construction itself that matters. It could be that patent experience could have an impact on other aspects of the case, such as the ability of the judge to generate rulings in an efficient manner that saves the litigants both time and money.

We demonstrate the necessity of significantly expanding on these studies to accurately determine the impact of judicial human capital — and the creation of a specialized patent court — on judicial performance. First, we look not only at the rate of reversal on appeal in patent cases, but also at the efficiency with which these cases were resolved at the district court level. Secondly, we include a larger number of potential explanatory variables to control for many of the factors that might lead to biased results that wrongly attribute the impact of district or case characteristics to judicial experience.[167] In studying the appeals of patent cases, we examine a number of issues beyond claim construction and find that a large proportion of appeals in patent cases are based on other legal grounds and that the reversal rates on these other issues might also be affected by the creation of a specialized patent court. We also examine claim construction rulings, using both patent trial experience and experience with claim construction rulings as measures of judicial experience. Finally, we introduce all of this analysis into a formal statistical model, which allows us to discern which variables have a statistically significant impact.

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165. In the statistics literature, this problem is referred to as "omitted variable bias," since the omission of certain variables in the statistical estimation may bias the final result.

166. *See* Shartzer, *supra* note 28, at 228–31.

167. For a discussion of the importance of district-level effects, see Schwartz, *Practice Makes Perfect*, *supra* note 150, at 241–44.

In sum, we examine the importance of judicial human capital, and hence the validity of the human capital argument for a specialized patent trial court, by exploring the following questions:

(1) How is patent litigation concentrated, both across districts and across judges? To what degree is there already a de facto "specialized patent court," in which a significant number of judges already have a high degree of patent experience? We demonstrate that while patent litigation is indeed highly concentrated, most patent cases are still presided over by judges with little or no patent experience.

(2) How is judicial experience, either patent-specific experience or general experience on the bench, related to the efficiency (i.e., case duration) with which patent cases are handled? We demonstrate that judicial experience does indeed seem to reduce case duration, thereby increasing the efficiency with which patent cases are adjudicated.

(3) How are patent-specific judicial experience and general judicial experience related to the accuracy of rulings in patent cases, as measured by the rate of reversal on appeal, of both claim construction and other legal issues? We show that, on average, increased specialized experience does increase the accuracy of rulings in patent cases. This result includes the important issue of claim construction, where, unlike previous authors, we find evidence supporting the hypothesis that judges with greater patent or claim construction experience are less likely to have their claim construction rulings overturned.

A. Concentration of Patent Litigation

Some scholars have argued that a specialized patent trial court would be redundant.[168] According to this argument, the current distribution of patent cases is already sufficiently concentrated such that the vast majority of patent cases are presided over by judges who have significant patent experience. Thus, the current system has already achieved de facto specialization without the boundary and capture problems that would accompany a true specialized patent trial court.

To measure the degree of concentration of patent cases under the current system, we measured both the geographical concentration of patent cases across the district courts and the distribution of cases among judges. We compiled a list of all cases identified as patent cases by the Administrative Office of the District Courts ("AO") between 1995 and 2003, available through the Inter-University Consortium for Political and Social Research ("ICPSR").[169] The range studied was

168. *See* Moore, *Forum Shopping*, *supra* note 118, at 561 (implying that there may already be de facto specialization in patent litigation based on the forum selection choices of litigants).

169. ICPSR, http://www.icpsr.umich.edu (last visited May 6, 2011).

deliberately selected since the management of patent cases changed significantly with the *Markman* ruling in 1995. On the other hand, it was important to select cases that were resolved completely or had generated final rulings reviewed on appeal. Thus, the years selected are sufficiently recent to reflect the current legal environment for patent cases but sufficiently old to supply information about the entire "life cycle" of a patent case.

The total breakdown of cases is given by year of filing in Table I and by year of termination in Table II. These results are represented graphically in Figures 1 and 2. In general, the number of cases filed per year has been increasing, from 1300 in 1995 to 1900 in 2003.[170] Given the lag between case filing and termination, the year of termination for these cases stretches from 1995 to 2009 or later. From 1998 to 2003, approximately 1300 to 2000 cases were resolved each year. As of this analysis, 168 cases had not been resolved.

On one level, the data support the conclusion that there is already a de facto specialized court because there is a fairly high degree of concentration by both district and individual judges. Figure 3 gives the breakdown of the cases in our period of study across districts.[171] As can be seen, the top ten districts[172] cover almost half of the cases filed during our sample period. The next ten districts[173] covered nearly a third of all cases, with each district averaging 3% of the total volume of patent cases. The remaining seventy districts covered approximately 20% of all cases.[174] As might be expected, there is movement in and out of the top group on an annual basis.[175] The distribution of

170. Once again, this is after elimination of cases that were transferred, consolidated or found to not truly be a patent case after review of the docket.

171. We did not explore the issue of why certain districts should be more important than others in patent litigation since our concern was solely how the costs and benefits of specialization might be realized under the current system. For a discussion of how forum shopping, even after the creation of the Federal Circuit, may be a factor in the geographical distribution of cases, see Moore, *Forum Shopping*, *supra* note 118.

172. These are: Central District of California, Northern District of California, Northern District of Illinois, Southern District of New York, District of Delaware, District of New Jersey, District of Minnesota, District of Massachusetts, Eastern District of Michigan, and Southern District of California.

173. These are: Southern District of Florida, Eastern District of Pennsylvania, Northern District of Texas, Eastern District of Virginia, Eastern District of New York, Southern District of Texas, Northern District of Ohio, Western District of Washington, Middle District of Florida, and District of Colorado.

174. No patent cases were filed during the period we studied in Alaska, the Northern Mariana Islands, and the Virgin Islands.

175. For example, Southern Florida was among the top ten districts in 1995, 1996, 1999, and 2003, and Eastern Virginia was in the top ten in 1996 and 1997. Southern Texas made the top ten in 1998, and Eastern Pennsylvania made the list in 2003.

cases across all districts over the entire period from 1995 to 2003 is given in Table AI.[176]

However, while the concentration of patent cases in certain judicial districts is of interest, we examined the concentration of patent cases among federal district court judges to explore the human capital aspect. To gather this information, we examined the docket report for each patent case identified by the AO and collected the name of the presiding judge according to the docket heading. Then, we consulted the Federal Judges Biographical Database,[177] compiled by the Federal Judicial Center ("FJC"), to determine when a particular judge was appointed to or left the bench and to verify the district of appointment.[178]

From the case docket files, we found 1189 judges[179] who presided over patent cases filed between 1995 and 2003. Again, there is a high degree of concentration of patent cases across these individuals, with a small group of judges presiding over a large number of cases and a large number of judges presiding over very few.[180] Table III gives the breakdown of judges by number of cases managed. Four judges — one half of one percent of all judges — presided over more than one hundred cases each over the eight years studied, which represents over 4% of all patent cases. The top 20% of all judges presided over 60% of all cases. Forty percent of all judges presided over only about one patent case a year between 1995 and 2003.

Figure 4 demonstrates the highly skewed distribution of cases across judges in graphical format. As this figure demonstrates, the top ten judges presided over approximately 1100 cases, while the next ten presided over about 650. Therefore, a small number of judges have substantial experience dealing with patent cases.

However, despite this level of concentration across judges, it does not seem that the majority of cases are managed by judges with substantial patent experience. The data in Table III indicates that 80% of cases are managed by judges who administered fifty or fewer patent cases over the eight-year period. On average, these judges presided over eleven cases over the eight-year period — a little more than one

176. Tables AI through AV may be found on the online appendix, http://jolt.law.harvard.edu/articles/pdf/v24/KesanBallAppendix.pdf.

177. *Judges of the United States Courts*, FED. JUD. CENTER, http://www.fjc.gov/public/home.nsf/hisj (last visited May 6, 2011).

178. On rare occasions, judges may visit another judicial district and preside over a small number of cases. This did not occur frequently enough to influence the distribution of cases across districts or judges. The case was assigned to the judge in question, who was still considered to be from the district of appointment, with the case assigned to the district in which it was filed.

179. On occasion, the presiding judge listed in the docket was a magistrate judge.

180. As might be expected, the judges with the most patent cases usually came from districts with the largest patent activity.

per year. Furthermore, 40% of all patent disputes were managed by judges who saw fewer than twenty cases over the entire period, and 16% were presided over by judges who saw fewer than ten cases over the eight years. This number should be compared with the level of experience of judges serving on the CAFC, who see, on average, forty patent cases each year.[181]

There does seem to be some degree of de facto specialization in patent litigation in the sense that cases are concentrated in certain judicial districts and a small number of judges preside over a large number of patent disputes. However, judges with very little patent experience manage the vast majority of cases. Under these circumstances, a specialized patent trial court might be warranted if we conclude that specialized patent experience substantially increases the efficiency and accuracy with which a judge hears patent cases.

B. Judicial Experience and Efficiency

One of the principal arguments for the creation of a patent trial court is that it would resolve cases more efficiently, thereby saving time and money for both litigants and the court system. Judges with significant patent experience who would already be familiar with the intricacies of patent law would staff such a court. Thus, in evaluating the case for the creation of such a court, it is important to test whether judicial patent experience translates into more rapid resolution of cases. To that end, we tested the correlation between judicial experience — both general and patent-specific experience — and the duration of patent cases.

1. Judicial Experience and Efficiency: Variables

To determine general experience, we calculated the number of years a judge had served on the bench[182] as of a case's filing date using the FJC biographical database.[183] Measuring specialized experience required additional steps beyond filtering out cases covering issues other than patent law. We compensated for the substantial changes caused by the *Markman* decision by including only cases resolved thereafter.[184] We defined our variables to reflect two differ-

181. *See* S. Jay Plager, *Challenges for Intellectual Property Law in the Twenty-First Century: Indeterminacy and Other Problems*, 2001 U. ILL. L. REV. 69, 78.

182. In measuring the time on the bench, we included any time spent as a magistrate judge. Case management is frequently conducted by magistrate judges on a day-to-day basis, so such experience should be relevant.

183. *See supra* notes 177–78 and accompanying text.

184. To the extent that post-*Markman* patent cases were substantially different than pre-*Markman* cases, this is not an issue. However, even with that assumption, there is a question

ent views of how experience could contribute to understanding of patent law[185]: (1) experience is cumulative,[186] and (2) recent experience matters most.[187] Thus, we measured the total number of patent cases a judge had presided over in her career as of the filing of a patent case, and the number she had presided over in the three years prior to the filing of the case.

In addition to the measures of general and specialized judicial experience, several other variables were included in the estimation. In particular, various judicial district-level variables were employed. Within any district, patent cases were, with slight exception, randomly distributed amongst judges. However, patent cases were not randomly distributed across judicial districts. As shown in Table AI, the share of patent cases among all civil cases ranged from 6.75% in Delaware to practically zero in districts such as the Southern District of Mississippi. As a consequence, the number of patent cases per judge varied from 17.61 in Delaware to 0.04 in New Mexico. Thus, judges in some districts had a higher probability of drawing a patent case than those in others, and the judges with high patent experience tended to come from the districts with the most patent cases; nine of the ten most experienced judges came from the top ten districts in terms of patent cases. An unfortunate consequence of this fact was that the level of patent experience may have inadvertently picked up characteristics of the judicial district in which a judge worked.

To control for any influence of the district's characteristics on case duration, several judicial district-level variables were included. First, the weighted average of all case filings per judge was included to measure the possible impact of court congestion on the duration of

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of whether the impact of the *Markman* decision had filtered down to the courts by late 1995. As a consequence, we conducted our estimation both with and without the 1995 data. There was no discernable difference in the results.

185. A third view would postulate that experience may accumulate in a "non-linear" fashion, not showing any effect until a minimum threshold is reached and/or tapering off at high levels where seeing one more case does little to increase the judge's knowledge. This additional approach is included in Gwendolyn G. Ball and Jay P. Kesan, Judges, Courts and Economic Development: The Impact of Judicial Human Capital on the Efficiency and Accuracy of the Court System (Apr. 30, 2010) (unpublished manuscript), *available at* https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=ALEA2010&paper_id=380.

186. As judges handle more patent cases, their facility with patent law and the details of patent litigation should increase. Such knowledge is assumed to be permanent and to increase with every additional case managed. Variables measuring cumulative knowledge include the number of patent cases since 1995 over which a judge has presided.

187. Variables measuring recent experience include the number of patent cases handled by a judge in some range of time immediately prior to the filing of a case — for example, the three years prior to a case filing. To control for the *Markman* consequences, we conducted our estimation both starting in 1995 and starting in 1998 to preserve a full three-year range.

cases. The source for this variable was the AO's calculation of weighted case filings for the court management system.[188]

Second, as demonstrated in Table AIII, it is not only the distribution of all patent cases per se which varied across judicial districts. The distribution of the patents at issue across technology categories also varied across judicial districts, most likely reflecting differences in the natures of local economies.[189] Case duration may vary depending on the technology of the patent and its relative complexity. As a consequence, the technology categories defined by the National Bureau of Economic Research ("NBER") were used to represent the technology of the patent at issue.[190] Details on the NBER technological categories are provided in Table IV.[191]

In addition to these differences in observable effects between districts, there may be unobservable differences. Access to resources may vary, and there may be managerial decisions that influence the duration of cases.[192] Unfortunately, there is no easily identifiable variable that can be included in the estimation process to catch all these factors. Thus, individual district court dummy variables were used to control for these possible effects. [193]

Finally, in addition to district-level effects, there may be a time-varying effect. Case duration may vary over time because of changes in patent law. Evolving economic conditions may have an impact on case duration. To account for these possible effects, a variable measuring the number of years between 1995 and the year in which the case was filed was included.

A full list of the variables employed in the analysis of case duration is given in Table IV.[194]

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188. *Federal Court Management Statistics*, U.S. COURTS, http://www.uscourts.gov/cgi-bin/cms.pl (last visited May 6, 2011).

189. This variable may also pick up any differences in the difficulty of deciding cases for different technologies.

190. It is common for more than one patent to be at issue in a single case. However, it was exceedingly rare for there to be any variation in technology among patents in a case at the level of the NBER classification. In these rare cases, we used the most common category.

191. *See* Bronwyn Hall et al., *The NBER Patent Citations Data File: Lessons, Insights, and Methodological Tools*, (Nat'l Bureau of Econ. Research, Working Paper No. 8498, 2001) (discussing the technology categories devised for classifying patents). In addition to the six categories outlined by NBER, we have added a "category zero" for mechanical patents which is used as the base case.

192. Managerial decisions can include the decision of certain districts to operate as "rocket dockets" — a decision that has an obvious impact on case duration.

193. Dummy variables take on only the values one (when the condition is met) or zero (when it is not). For example, the dummy variable for the District of Massachusetts equals one for cases filed in that district and zero for cases filed in any other district.

194. There is also reason to control for unobservable characteristics of the judges, such as innate abilities, managerial preferences, etc. This issue is typically dealt with through statistical modeling, which is discussed in the next Part.

2. Judicial Experience and Efficiency: Model

To evaluate the impact of experience on efficiency, we analyzed case duration using a Cox Proportional Hazard duration model.[195] Duration models are a technique for statistically analyzing the time until some event — for example, the time from the filing of a patent case to its termination. Thus, this model provides a mechanism for statistically analyzing the length of time from filing to case termination. Moreover, the Cox Proportional Hazard Model is a commonly used form of duration analysis that easily incorporates the impact of the type of characteristics described by our variables.[196] Use of such a model allows us to determine the impact of judicial experience on the duration of the case.

To be precise, the Cox Model estimates the impact of a variable like judicial experience on the hazard rate, which is the probability of an event occurring in any given period, given that the event has not already occurred. Using the probability of the case ending in each period, the impact of the variables on the duration of the case can be estimated; if the probability of the case ending in early periods is low, the duration will be longer. Thus, if the estimated coefficient associated with a variable is negative, the hazard rate decreases as the variable increases. As the probability of the event occurring in any one period declines, the probable number of periods until the event occurs increases, which results in an increase in the probable duration of a case. That is, if the coefficient associated with judicial experience is negative, the duration of the case increases as experience increases.

Our model is adjusted for one further consideration: the possibility that there are unobserved characteristics of the judges. One particular judge may have a stronger preference for resolving cases quickly. He may also have innate abilities which aid him in the courtroom but which cannot be measured by any one variable. All the cases presided over by that judge may benefit from his abilities and preferences, independent of his experience level. Thus, we would expect the duration of cases presided over by that judge to be correlated in a way that the other variables cannot account for. Fortunately, there are statistical techniques that control for such correlations. In this Article, we report results for a technique that clusters observations for the same judge.[197]

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195. *See* JOHN P. KLEIN & MELVIN L. MOESCHBERGER, SURVIVAL ANALYSIS (2003) (describing duration models in general and, in Chapter Eight, the Cox Proportional Hazard Model in particular).

196. *See* Ball & Kesan, *supra* note 185 at 15–16 (evaluating the appropriateness of the Proportional Hazard Model for this particular dataset).

197. To be precise, the results here employ clustered standard errors, which treat all the cases presided over by one judge as belonging to a cluster relating to that judge. *See id.* at

3. Judicial Experience and Efficiency: Results

The results from our analyses are given in Table V. Both the coefficients estimated by the model and the impact on the hazard rate are given.[198] The standard errors for each coefficient are given in parentheses below the estimated coefficient.[199]

The results show that experience — both general and specialized — does seem to have an impact on the speed with which a patent case is resolved. The estimated coefficient of cumulative experience is 0.0019 and is statistically significant at the 5% level. The estimated coefficient for experience in the last three years is 0.0036 and is significant at the 10% level. Thus, a case that a judge has seen in the last three years has about twice the impact on case duration compared to one seen less recently. The estimated hazard rates are 1.002 and 1.003 respectively, both of which are greater than one, indicating that increasing specialized patent experience increases the probability of a case terminating in any period, given that it has not already terminated — i.e., increasing specialized patent experience decreases the probable duration of the case.

The coefficient for a presiding judge's number of years on the bench is positive and significant at the 1% level in every model formulation, with a value of 0.0094 in the model employing cumulative experience and 0.0098 in the model employing recent patent experience. The corresponding hazard rates are both above one (1.0094 and 1.0098, respectively). Thus, as the hazard rate of a case ending in a given period increases, the duration of the case should fall with general judicial experience.

The estimates for our other control variables have differing results. The number of weighted case filings per judge does not have a statistically significant impact on the hazard rate in any formulation of

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15 (discussing the use of clustered standard error and other more advanced techniques — such as frailty models — to control for unobserved heterogeneity among judges). In general, clustering increases the standard errors for the estimated effects and thereby reduces the significance of the coefficients. Therefore, the technique we employ here reduces any inadvertent bias that supports our hypothesis about the relationship between experience and case duration and subjects our hypothesis to a more stringent statistical test.

198. We follow the convention of reporting the estimated impact on the hazard rate for each variable as a multiplicative factor. Thus, holding all other variables constant, the reported hazard is multiplied by what the hazard rate would have been without that variable. That is, if the estimated hazard is 0.7, the impact of that variable on the overall hazard rate is 0.7 times what it otherwise would have been.

199. The standard error is a measure of the accuracy or precision of the estimated coefficient. If the standard error is large relative to the coefficient, then the estimate is subject to a high degree of error and the variable probably has no real impact. If the standard error is low relative to the estimated coefficient, the estimated coefficient is highly accurate and meets the standards for statistical significance at the 1%, 5%, or 10% degree of significance (in decreasing order of precision).

the model.[200] Some of the estimated coefficients for the technology categories are less than zero, indicating that patents in those categories — chemical, computer, and drug and medical patents — will take more time to resolve than when the patent at issue is in the base category (mechanical patents).[201] Cases in which a design patent is disputed will probably take less time, since that variable has a coefficient of approximately 0.4 in both the cumulative and recent models. Cases involving electrical patents and patents falling in the "other" category are not statistically significant and cannot be distinguished from the base category.[202] Likewise, some of the district dummy variables have positive coefficients and some have negative coefficients relative to the base judicial district (Massachusetts).

However, despite their positive sign and statistical significance, neither the coefficient for cumulative experience nor that of recent experience is exceptionally large. As shown in Figure 5, the percentage of cases expected to be on-going over time (also known as the "survival curves"[203]) calculated for a hypothetical case managed by a judge with twenty-one previous patent cases in the last three years (the ninetieth percentile) drops off somewhat more quickly than that of a patent case whose judge has overseen only one case in the last three years (the twenty-fifth percentile) at about one hundred days. However, there is not a large difference between the two curves. In quantitative terms, the difference in the expected duration of the case between a judge at the twenty-fifth percentile level of recent patent experience and one at the ninetieth percentile is approximately one month. This is not a large difference in absolute terms. However, previous work has shown that the median patent case during the same time period lasted for approximately nine to ten months,[204] and so this increase in experience level leads to a reduction in expected case length equal to about 10% of the duration of the median patent case. Since cumulative experience has a smaller coefficient, the impact on case duration will be even less. Therefore, increasing the level of spe-

200. This means that the standard error is too large relative to the estimated coefficient, so the coefficient is effectively zero.

201. These variables have approximate coefficients (respectively) of –0.19, –0.13, and –0.23 in both the cumulative and recent experience models.

202. By mathematical necessity, whenever a variable is categorized in an estimation, one category must be designated the "base" category, and the coefficients of all other categories are estimated relative to the base. Mechanical patents (NBER category 5) were the base category in the logit analysis since they are, in some ways, the simplest technology.

203. These survival curves estimate the probability that the case will not have terminated as time progresses. Thus, if one curve is steeper than another, the probability that it will not have terminated drops off more quickly, and the average case should have a shorter duration.

204. *See* Jay P. Kesan & Gwendolyn G. Ball, *How Are Patent Cases Resolved? An Empirical Examination of the Adjudication and Settlement of Patent Disputes*, 84 WASH. U. L. REV. 237, 281–85 (2006) (discussing the lengths of patent cases).

cialized patent experience may have a moderate impact on the duration of patent cases at the district court level, especially if there is an increase in the judge's recent experience with patent litigation.

4. Experience and the Probability of Ending in a Judgment

The judicial human capital hypothesis posits that the decrease in the duration of patent cases demonstrated by our results derives from the ability of experienced judges to manage their dockets more effectively and make decisions regarding patent law more efficiently. However, an alternative explanation is that cases with experienced judges tend to have shorter durations because those judges are better able to push the parties to settle their differences. If this is the case, then experienced judges might actually provide fewer rulings on the merits, which are an important feature of the patent system.[205]

To test whether this might be the case, we used a logit model[206] to estimate the impact of experience on the probability of a case being resolved through a judgment on the merits versus a settlement.[207] Logit models estimate the impact of the variables of interest on the probability that some event will occur, in this case, on the probability that a case will actually terminate in a ruling. A positive coefficient for a variable means that as that variable increases, the probability of the event increases. A negative coefficient means that as that variable increases, the probability of the event decreases. That is, we estimate the impact of the variables, including the experience variables, on the probability that the case will end in a judgment. The results are given in Table VI. In the model using cumulative judicial experience, that variable had a coefficient of 0.0053, which was significant at the 5% level. Thus, increasing cumulative specialized patent experience increases the probability of a patent case ending in a ruling on the merits. On the other hand, general experience in the same model has a coefficient of –0.0109 and is significant at the 10% level. In other words, increasing general judicial experience decreases the probability that the case will end in a ruling as opposed to a settlement. However, these results should not be overstated. Neither form of experience has a statistically significant impact on the probability that a case will end in a ruling on the merits in the model employing recent experience. Nonetheless, there is some weak evidence that specialized patent experience increases the probability that a patent case will end

205. *See id.* at 298–309 (discussing the important role played in the patent system by rulings on the merits such as summary judgments in patent disputes).

206. *See* William H. Greene, ECONOMETRIC ANALYSIS, 142–45 (3d ed. 1997) (describing the logit or logistic regression model).

207. We dropped cases with non-merit dispositions from the logistic regression model since they do not fall in either the "ruling" or "settlement" category.

in a ruling on the merits, and equally weak evidence that general experience decreases the probability that a patent case will end in a ruling.

These results draw a distinction between our two concepts of experience. General experience, which we hypothesized would be related to the judge's general management skills and exposure to civil litigation, may increase the probability that the case will terminate through a settlement. However, there is no evidence that specialized patent experience, which reflects knowledge of patent law and specialized patent procedure, causes judges to push the parties to a settlement. If anything, the alternative may be true: judges with greater specialized patent experience are more inclined to allow cases to continue to a ruling on the merits, though the support for such a conclusion is not strong and should therefore be understood with this caveat.

C. Judicial Experience and Accuracy

The previous section explored the impact of experience — both general and specialized — on the efficiency with which patent infringement suits were managed. However, it can be argued that it is more important that the decisions are rendered accurately rather than that they be rendered quickly. Unfortunately, it is nearly impossible to directly measure whether more experienced judges are more likely to make the "right" decision in their rulings in patent cases. There is no easy way to quantitatively evaluate the outcome of a trial based on correctness of the application of the law, reflections of truth, or positive impact on society. However, it is possible to measure whether higher courts agree with a judge's decision based on the outcomes of appeals.

To this end, we collected data on all appeals generated by our database of patent cases filed between 1998 and 2003 using the CAFC website available through the PACER system.[208] A summary of all 1700 appeals identified in this fashion is given by year of filing of the patent district court case in Table VII and by year of filing of the appeal in Table VIII. We filtered out the data of 447 dismissed and dropped appeals.[209] This left us with 1253 appeals in which some form of appellate ruling could be analyzed.

We also took into account cross appeals (where both parties disagree over the same ruling). Including both appeals would result in

208. PACER, http://www.pacer.gov (last visited May 6, 2011). This website allows for searches based on the docket number of the original patent case in the district courts.

209. We chose not to look at the rate with which rulings are appealed since filing an appeal is often a strategic move by the parties in the case. We also eliminated thirty-five filings for a writ of mandamus and 135 appeals that are still on-going.

"double counting" the original district court decision. To avoid this problem, we examined the opinions expressing the appellate court's ruling on these appeals.[210] Since a single opinion typically covers more than one appeal, this exercise generated 925 opinions generated by the patent cases under study.[211]

From these opinions we were able to reach our final level of analysis: the district court decision and the appellate ruling affirming or reversing that decision. From the CAFC opinions, we extracted 1054 observations on disputed and appealed rulings.[212] As is discussed in the next Part, some of these rulings were based on legal issues that were not related to patent law, such as contract issues, issues regarding the enforcement of settlements, copyright, trademark, and others. In a limited number of cases, neither the opinion nor the brief could be obtained and the issue could not be identified. After dropping such observations, we were left with 809 observations. Thus, each observation in our appellate database reflects a questioned district court ruling on a patent law specific issue in which an appellate decision was rendered. In this manner, we were able to avoid double counting and determine how "accurate" the district court rulings were on the actual patent issues (each issue being treated separately), rather than trying to condense all the issues in a case into one appellate ruling.

1. Judicial Experience and Accuracy: Variables

Many of the variables included in the analysis of efficiency were also employed in our analysis of accuracy.[213] Regardless of their experience level, judges in districts with crowded dockets may not have sufficient time to consider their decisions. Thus, we included the district-level average weighted caseload as a variable in evaluating accuracy. The technology category of the patent in dispute may also reflect district-level characteristics, as well as possible difficulty of rulings across technology categories. In addition, some authors have speculated that there may be a non-random distribution across districts of the characteristics of the parties in the case and/or the complexity of the case.[214] Once again, to account for these possible unobservable

210. The decisions rendered by the CAFC are available through the CTAF database on Westlaw, and opinions can be found by searching by the Federal Circuit docket number.

211. These opinions excluded the 135 appeals that were still ongoing as of July 15, 2007.

212. For summary affirmances, we examined the original appellate brief to determine what issues were in question and considered them all "affirmed." In most cases, these briefs were available, even if there was no formal opinion.

213. *See infra* Part V.B.1.

214. *See* Schwartz, *Practice Makes Perfect*, *supra* note 150, at 241–44 (discussing how the characteristics of cases may not be randomly distributed across districts).

district factors, we followed the same procedure as in the efficiency analysis and included a dummy variable for each district court.[215]

Other variables are analogous to those employed in the efficiency analysis, but calculated in a manner more suitable to analysis of accuracy using appellate data. For example, instead of calculating a district court judge's general and specialized experience at the time of the filing of the original patent case, we calculated it as of the filing of the appeal. Appeals must be filed within a short time after the district court ruling has been rendered. Thus, experience at the time of the filing of the appeal gives a better picture of the district court judge's experience at the time of ruling than does experience at the time the original patent case was filed, which may be years before the ruling in question is rendered.

However, we also included several new variables, listed in Table IV, unique to the study of the appellate process that could be extracted from the opinions. First, we included a variable indicating the presence of a dissenting opinion in the appellate decision: appellate rulings in which a member of the panel issued a dissenting opinion are likely to involve questions where the "correct" ruling is not so clear-cut. The issuance of a dissent is a proxy for the complexity of the issue(s) at hand and allowed us to control for the difficulty of the decision.

Second, we included an appellate variable that describes the legal issue raised on appeal. From the opinions, we determined whether the parties in a case were questioning a ruling on whether or not to grant a preliminary injunction, claim construction,[216] patent validity, patent enforceability, infringement (and whether infringement was willful), jurisdictional issues, remedies, inventorship, standing, or whether that opinion referred only to non-patent issues. When we could not adequately determine the issue in question,[217] or when that issue was not specifically related to patent law,[218] the observation was dropped. This left us with a dataset of 809 clearly identified patent rulings on the issues listed above. The breakdown of observations by legal issue/question is given in Table IX. The type of legal issue in question in the appeal across districts is given in Table AIV.

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215. We employed the same "clustering" model techniques to account for unobserved characteristics of the judges.

216. The appellate ruling regarding a decision on invalidity or infringement was based on a de novo review of the trial court's claim construction. Claim construction is used as the base case against which all other types of legal issues are compared in the analysis in Table XII.

217. This occurred in cases with a summary affirmance where the brief was not available.

218. These issues include the enforcement of settlement agreements, sanctions, rulings on fees, proper procedure, as well as cases that were remanded to state court involving trademark, copyright, or contract law issues.

Table IX highlights a difference between our analysis of the impact of judicial experience on appeals and that of previous scholars. Most previous work on this topic focuses on the issue of claim construction because of its inherent difficulties and importance in modern patent litigation.[219] However, our data shows that issues other than claim construction are still vigorously pursued at the appellate level. In our data, claim construction appeals account for only about 25% of the rulings examined in patent cases. Almost an equal number of appeals cover rulings of infringement (based on grounds unrelated to claim construction). Rulings on patent invalidity (based on grounds unrelated to claim construction) are not far behind. Of course, if we were to count each patent or individual patent claim construed de novo by the CAFC, the share of claim construction observations would increase substantially. More importantly, our data only covers appeals generated by patent cases filed between 1995 and 2003. The earliest cases in this cohort generated relatively few claim construction appeals compared to more recent years. Thus, our percentages almost certainly understate the percentage that reviews of claim construction would constitute if the data were collected for a later period. Nonetheless, Table IX demonstrates that traditional issues such as infringement and invalidity (based on grounds unrelated to claim construction) are important in the appeals of patent cases and should not be excluded from the analysis of the impact of judicial experience on reversal rates.

2. Classifying Appellate Rulings

The variables described above were used as the explanatory variables in our statistical procedure. In order to perform that procedure, we needed to devise a system to classify the outcome of the appeal. For each observation — i.e., an appellate decision on a ruling regarding infringement, validity, or claim construction — we recorded whether the final decision was affirmed; affirmed and vacated; affirmed, vacated, and reversed; affirmed and reversed; vacated; vacated and reversed; or reversed. In general, these rulings form a continuum describing the appellate view of the "accuracy" of the original district court ruling on a particular issue.

For analytical purposes, we employed two binary classification systems. First, we distinguished appellate rulings as either fully affirming a district court's decision ("fully affirmed") or not ("somewrong"). Thus, this system distinguishes between cases where the district court judge got everything "right" versus cases where he got at

219. *See, e.g.*, Schwartz, *Practice Makes Perfect*, *supra* note 150.

least something "wrong." Second, and separately, we distinguished appellate rulings on issues as either affirmed "fully or in part" or found to be completely in error ("allwrong"). This system distinguishes between appellate rulings where the district court judge got everything "wrong" versus cases where he at least got something "right."

Table X shows how cases fell into these categories when filtered by legal issue. Under either classification scheme, the most commonly reversed legal issues were claim construction, judgment as a matter of law, and other patent issues. Table AV breaks down the ruling/reversal tallies at the district level. Finally, Table XI extends the analysis under the same two classification systems ("allwrong" and "somewrong") by tabulating the decisions from judges in each tier[220] of judicial experience.

For the most part, the breakdown between affirmances and reversals was consistent with previous studies of CAFC decisions across all patent issues. Our reversal rate across all issues ranges from 30% (using "allwrong") to 40% (using "somewrong"). This figure is consistent with previous findings of a reversal rate for all patent cases of 30–53%.[221] We found a fairly high range of reversal rates across individual legal issues. The reversal rates for enforceability, infringement, and preliminary injunction rulings were all low by both the "somewrong" and "allwrong" measures, falling at less than 30%. The remedies assigned in the cases were the most likely legal issues to be reversed, with 50–60% of rulings being reversed. Invalidity and claim construction rulings fall between the extremes. However, care should be used in comparing the reversal rates for specific issues. Our tabulations find the rulings on the issue of infringement are affirmed 70–80% of the time, a result that is slightly different but not inconsistent.

For claim construction, we found a slightly higher proportion of rulings to be partly or totally in error (40–50%) than Schwartz and Moore, who found in separate studies that slightly less than 40% of all appealed claim construction rulings have at least one claim construed in error.[222] However, Chu finds that 44% of all appealed claim constructions are found to be in error.[223] There are several possible explanations for these discrepancies. It is possible that we found a higher rate of error in claim construction because of our interpretation that a ruling in which the CAFC finds any error should be classified as "somewrong." On the other hand, our higher "reversal" rate of claim

220. *See* Table III.

221. *See* Gitter, *supra* note 160 at 180–81.

222. *See* Schwartz, *Practice Makes Perfect*, *supra* note 150, at 234–35, 249.

223. *See supra* note 149 and accompanying text. Schwartz speculates that Chu's differing results may be due to the exclusion of data from another source. *See* Schwartz, *Practice Makes Perfect*, *supra* note 150, at 235.

construction rulings may have resulted from the fact that Schwartz and Moore use the actual ground for reversal, and the CAFC may have found an error in claim construction but decided that it was irrelevant and ruled on other grounds. In general, despite the differences on reversal rates in specific areas of patent law, our calculations of reversal rates are largely consistent with those of previous studies. However, these authors found no relationship between judicial experience and reversals on claim construction. As we will show in Part V.C.6, we find that increased experience may lower the probability that a ruling on claim construction will be reversed on appeal.

A cursory examination of these numbers does not reveal any clear relationship between reversal rate and experience — the top five judges in terms of patent experience are slightly worse than the average of the top one hundred judges in terms of being fully affirmed (61% versus 62%) but perform slightly better in terms of being affirmed fully or in part (76% versus 72%). However, these numbers must be included in a full statistical model that controls for the other variables cited above. To give an example of how these other variables may be confounding, judges with more experience tend to come from the districts with the most patent cases. Thus, merely linking experience to outcome may give an erroneous result that reflects the characteristics of the district and not the judge. Only a formal statistical model controlling for all the district and patent characteristics can discern the effects of judicial experience.

3. Judicial Experience and Accuracy: Model

We formalized the tabulations in Tables X and AIV and further explored relationships between the various combinations of judicial experience types ("recent" and "total"; "specialized" and "general") and both classification systems ("allwrong" and "somewrong") by using the classifications of appellate outcomes as dependent variables in a logistic regression. Fewer judges appear as repeat observations, so the clustering of cases across judges is less of an issue than in the efficiency analysis.[224] However, it is still worth controlling for any common unobserved effects across judges.[225]

Specialized patent experience was treated in two ways in the regressions. First, experience was used as a variable across all legal issues, and a separate variable was used for the legal issue on appeal.

224. Eight judges had ten or more appeals; however, the other 226 judges with appeals had only one to three each. Since there are fewer judges with repeated observations, clustering observations by the presiding judge has less of an impact.

225. The technique of clustering observations and its impact on the results of the estimation are discussed in Part V.B.2, *supra*.

The results of this estimation are reported in Table XII and discussed in Part V.C.4. These results tell us the average impact of specialized experience across all issues in patent law. However, there is reason to believe that specialized experience might have a different impact on a judge's ability to make accurate rulings on different patent law issues (e.g., claim construction versus infringement). It is possible to estimate this differential impact by "interacting" the specialized patent experience and legal issue variables. Thus, using interacted variables, we can test whether specialized patent experience has a different impact on the probability of a reversal on appeal based on the legal issue under consideration. This allowed us to test whether the creation of a specialized patent trial court would have a different impact on the reversal rate in different areas of patent law. Table XIII gives the results when experience and legal issue were interacted;[226] the discussion of the results is shown in Part V.C.5.

Finally, we concentrate solely on the issue of claim construction and relate the probability of being reversed to the amount of claim construction experience the judge had at the time the claim construction ruling was made. These results are reported in Table XIV and discussed in Part V.C.6.

4. Judicial Experience and Accuracy: Results

Table XII gives the results when the average impact of specialized experience is estimated across all types of legal issues. In this model, most of the variables that were influential in the analysis of efficiency are no longer statistically significant. Very few of the district dummy variables are significant, indicating that there is no particular difference across districts in being overruled on appeal.[227] Likewise, very few of the patent technological categories are significant. The estimated coefficients for the Category 4 (Electrical and Electronic Devices) variables are negative in comparison to the base Category 5 (Mechanical) variables, with an estimated coefficient of about –1.2 in the "somewrong" model and –1.4 in the "allwrong" model. The coefficients are significant at the 1% level in both models.

226. Technically, seven new variables were created by multiplying the experience variable by the seven binary variables for the legal issue categories. Thus, there is a "experience×claim construction" variable which is zero for all other legal categories but equals the experience variable for claim construction; an "experience×validity" variable which is zero for all other categories, etc. The coefficients estimated for these variables therefore reflect the impact of experience solely for that type of issue.

227. While a very large number of district dummy variables were significant in the case duration analysis, only "Texas-North," "Tennessee-Middle," "Iowa-North," "Iowa-South," "California-Central," and "Kansas" were significant in any of the reversal regressions — indicating that only these districts had a significantly different reversal rate than did the base district of "Massachusetts."

Thus, appeals in cases involving electrical patents are less likely to be reversed than are appeals in cases with mechanical patents. Cases involving patents in the "other" category are also negative and significant, with estimated coefficients of approximately –0.5 and –0.8 in the "somewrong" and "allwrong" models, respectively. However, neither caseload nor the time trend (years since 1995) is statistically significant, so these variables do not have any statistical impact on the probability of reversal.

The appeal-specific variables had much more explanatory power. The complexity of issues (as measured by presence of a dissenting opinion) is positive and highly significant in both the "somewrong" and "allwrong" models, with coefficients of approximately 1.0 to 1.2 across all formulations. Thus, as expected, the probability of reversal is higher when a dissenting opinion is issued. Among the legal issue categories, only the "preliminary injunction," "enforceability," and "infringement" (based on grounds other than claim construction) variables have significant coefficients. All of the coefficients are negative, indicating that there is a lower probability of a reversal for these issues than for claim construction.[228]

The results from our statistical analysis of the impact of experience on accuracy also differ from the previous findings on experience to efficiency. Unlike the results for efficiency, general experience does not seem to have any impact on the probability of being overruled on appeal. The number of years the judge had served on the bench at the time the appeal was filed had no statistically significant impact on the probability of being reversed in either the "somewrong" or "allwrong" models. However, there is some evidence that specialized patent experience increases the accuracy of district court decisions.[229] In the "somewrong" model, cumulative experience has a coefficient of –0.008 (significant at the 5% level) and recent patent experience has a coefficient of –0.0247 (significant at the 1% level). Thus, increasing specialized patent experience decreases the probability of reversal in this model. However, neither measure of specialized patent experience was significant in the "allwrong" model.

To put these results in perspective, we plugged the estimated coefficients back into the logit formula to find the probability of a rever-

228. Specifically, the "preliminary injunction" category has a coefficient of about –1 in both the "somewrong" and "allwrong" models, "enforceability" has a coefficient of about –1.1 in the "somewrong" model and –0.8 in the "allwrong" model, and "infringement" has a coefficient of about –1 in both models.

229. We attempted to use the accuracy of claim construction rulings as the dependent variable, where an accurate construction was one that was affirmed on appeal and an inaccurate construction was one found to be in error. However, none of these models was significant at any level according to a likelihood ratio test. We hypothesize that this result may be due to the reduction in sample size; it is also possible that accuracy of claim construction is too complex to fit into a simple categorical variable.

sal. For example, a hypothetical ruling on infringement of a patent that was not in a statistically significant technology category (i.e., not in Category 4, Electrical and Electronic Devices), had no dissenting opinion, and was not in one of the small number of statistically significant districts, would have a 26% probability of being at least partially reversed if the judge had presided over only eleven cases[230] at the time of appeal. In contrast, the same hypothetical case would have a reversal rate of 19% if the presiding judge had heard sixty patent cases[231] at the time of the appeal. That is, a judge with a high cumulative level of patent experience would have a reversal rate almost 30% lower than that of a judge with low cumulative experience. A similar result is seen for recent experience: If the same hypothetical judge in the same hypothetical case has seen three patent cases in the last three years,[232] the calculated reversal probability would be 26%. That probability would fall to 16% if the judge had seen twenty-eight patent cases in the same period[233] — a drop in the reversal rate of nearly 40%. These results support the conclusion that a specialized patent court would likely have an impact on reversal rate. Highly experienced judges, as would be seen in a specialized court, have a lower average reversal rate than judges with little patent experience — the norm under the current system. These calculations (1) give an indication of the magnitude of the relative impact of specialized patent experience on the probability of being overruled on appeal, and (2) suggest that creation of a specialized patent trial court might have an impact on the accuracy of decisions in patent cases. However, we would caution the reader not to use these calculations to predict the probability of reversal since the "Pseudo R^2" — which indicates the amount of variation in the reversal rate our model explains — is modest for all our models. In other words, we are not able to explain most of the variation in reversal rates across cases because other factors, including complete randomness, are at play.

5. Differentiating the Impact of Specialized Patent Experience Across Legal Issues

As discussed above, previous authors studying experience and reversal rates have focused almost exclusively on claim construction rulings and found no relationship between experience and the probability of reversal. To compare our results with theirs, we repeated the

230. A judge who has heard eleven cases is in the tenth percentile of experience level at the time of appeal.

231. This judge would be in the ninetieth percentile of experience.

232. This corresponds to the twenty-fifth percentile of recent experience among appealed cases.

233. This corresponds to the ninetieth percentile.

analysis, this time separating the patent experience variables by legal issue or type of legal ruling. Thus, we can estimate the impact of experience on appealed rulings of claim construction and separately study the impact of specialized patent experience on appealed rulings of other legal issues, such as infringement, rather than just the impact of specialized patent experience on the average reversal rate over all types of rulings.[234] These results are reported in Table XIII.

In general, the estimates for the district court case and appellate variables are similar to those in Table XII. Once again, general experience is not statistically significant in any model. However, our results for patent-specific experience are more interesting. We find that increasing patent-specific experience decreases the probability of being reversed for appeals of rulings on infringement (based on grounds other than claim construction), preliminary injunctions,[235] and judgments as a matter of law.[236] This result is robust for both cumulative and recent patent-specific experience and for the two ways of measuring reversals ("somewrong" and "allwrong"). For infringement, the coefficient for recent patent experience is about –0.06, significant at the 1% level. Thus, the probability of an appealed ruling of infringement being overruled for a judge with a low level of recent experience (i.e., experience in the three preceding years) is 45% and for a judge with a high level of patent experience is 15%, a drop of about 60% in the reversal rate. These results are particularly important since our tallies suggest that appeals of infringement rulings represent about 25% of all patent appeals at the time our data was collected. Thus, appeals of infringement rulings were nearly as important as claim construction at the time of our data. However, we acknowledge that our data starts immediately after the *Markman* ruling and appeals lag behind such a change, so the rate of claim construction rulings and appeals has undoubtedly increased since the time our data was collected.

However, there is considerable interest in the patent community in reversal rates of claim construction rulings. Cumulative patent-specific experience has no impact on the probability of a reversal of the district court's claim construction decision — the variable testing the impact of patent experience on reversal of such rulings is not significant for either method of classifying reversals. However, there is evidence that recent experience may have an impact. The variable indicating the impact of recent experience in the "somewrong" model

234. This is referred to as "interacting" the two variables. *See supra* note 226.

235. This variable has a coefficient of –0.03 for cumulative experience and –0.06 for recent experience, both significant at the 1% level.

236. This variable has coefficients of –0.02 to –0.03 for cumulative experience in the "somewrong" and "allwrong" models, respectively, and –0.04 to –0.07 for recent experience in the two models, respectively (all significant).

has a value of –0.0251 (significant at the 5% level) and –0.0108 (significant at the 5% level) in the "allwrong" model — considerably smaller coefficients than found for infringement. For a claim construction ruling in a similar benchmark case such as that analyzed in the previous section (i.e., not in a statistically significant district or technology category and with no dissenting opinion), the probability of reversal falls from 48% to 33% under the "somewrong" accuracy standard, a drop of about a third. Since we are measuring the impact of patent experience in cases where there was an appeal of a claim construction ruling, this methodology most closely resembles that employed in the studies focused only on claim construction rulings.[237] However, our results suggest that patent experience may have some impact on reversal rates, while the other studies do not.

Previous studies discussed two reasons for why their data showed no effect of judicial patent experience on reversal rates for appeals on the issue of claim construction. First, claim construction rulings may be so idiosyncratic that previous patent experience confers no benefits; every judge in every case has to start from scratch with each new claim construction exercise.[238] Another possibility is that we are simply measuring experience in the wrong way for this legal issue. It may be that prior experience with claim construction is what increases the ability of judges to better perform this exercise, not prior experience with patent cases generally.[239] This hypothesis is explored further in the next Part.

6. Trial Level Claim Construction Experience and the Accuracy of Claim Construction Rulings

As stated in the previous Part, there is some dispute about whether general patent experience is the appropriate variable for measuring the impact of experience on the accuracy of claim construction rulings. There is a dispute over whether the prevalence, difficulty, and high reversal rate of such rulings makes a strong case for a specialized patent trial court. Patent experience may not provide the judge with any additional skill in the specific activity of accurately construing patent claims; rather, it may be previous experience with claim construction that increases the judge's skill in construing claims in other cases. To determine whether this is the case, we performed a similar form of analysis, using the number of cumulative and recent claim

237. *See* Schwartz, *Practice Makes Perfect*, *supra* note 150 at 237 (discussing Moore and Chu's methodologies).

238. *See id.* at 234–35 (discussing Moore's speculation that judges are not able to apply experience from past claim construction exercises in future cases).

239. *See id.*

construction rulings issued by the judge as the measure of experience rather than the total number of patent cases over which the judge presided.

Measuring previous claim construction experience is a somewhat more difficult exercise than simply measuring previous experience with patent cases. First, we must decide what constitutes "claim construction experience," and then we must determine who has such experience and measure how much experience he has. We take the view that the appropriate trial-level measure of claim construction experience is actual issuance of a claim construction ruling. Every time a judge issues a claim construction ruling, she gains additional skill that can be applied to future rulings. Simply participating in the claim construction process — for example, by receiving briefs from the two parties or presiding over a *Markman* hearing — does not increase the experience level unless the judge has actually evaluated the arguments and issued an actual ruling.

The second issue is how to determine which judges have issued such rulings in which cases. In theory, this information could be obtained simply from examining the dockets for all cases and recording the issuance of claim construction rulings. However, in some cases, the ruling may be issued as part of a summary judgment ruling and therefore may not be a separate document in the case file.[240] Even if a claim construction ruling is issued separately, and not as part of a summary judgment ruling, we are dependent on the notation of that ruling in the online docket. If the ruling is recorded in some way that does not make it clear that it is a claim construction ruling, it would not be coded as such. All these factors could lead to undercounting of claim construction rulings.

Nonetheless, we attempted to collect data on claim construction rulings in the cases in our 1995–2003 dataset. We searched the docket for each case to determine whether there had been a claim construction ruling. Whenever possible, we examined the summary judgment rulings to see if they included a claim construction ruling. We acknowledge that we are probably missing a number of claim construction rulings and thereby undercounting the level of previous claim construction experience. However, we believe that this is probably the limit to what can be determined without examination of all the documents in the case file.

We then calculated the cumulative number of claim construction rulings the judge had issued before the appealed ruling, as well as the number in the preceding three years. These measures of claim construction experience were then included as independent variables in

240. The Eastern District of Virginia, for example, has a reputation for combining the claim construction and summary judgment procedures.

the logistic regression of the probability of being "allwrong" or "somewrong" on appeal, along with the technological category of the patent, general experience, weighted case filings, and a time trend variable.[241]

The results of this regression are shown in Table XIV. The results for technology category, general experience, and dissenting opinions were consistent with the previous estimation models. Only the "electrical" and "other" technology categories were significantly different from the "mechanical" category. General courtroom experience had no impact on the probability of being reversed. "Dissenting opinion" was positive, indicating increasing probability of reversal, and was highly significant. The coefficient of "cumulative claim construction experience" was –0.01 and that of "recent claim construction experience" was slightly more than –0.02. Thus, our results showed that both "cumulative claim construction experience" and "recent claim construction experience" have a negative and statistically significant impact on the probability of being reversed on appeal.

Once again we can calculate a rough estimate of the impact of claim construction experience on the probability of being reversed in our benchmark case.[242] If a judge has only issued five claim construction rulings during her time on the bench, the probability of her being at least partially reversed is approximately 48%; if her experience increases to twenty claim construction rulings, the probability of partial reversal falls to 44% — a relatively minor decrease. With five claim construction rulings in the last three years, her predicted probability of being found completely in error is 47%, which falls to 38% if she has issued twenty claim construction rulings recently. Thus, recent experience with claim construction seems to have a much greater impact on the accuracy of such rulings than cumulative experience.

Once again, our results tend to support the hypothesis that the accuracy of claim construction rulings increases with the amount of experience judges have in issuing such rulings. In other words, there is no support for the hypothesis that the claim construction exercise is so idiosyncratic that judges gain no knowledge that can be applied in the future. However, we must emphasize that there are major deficiencies in the data used to calculate these estimates. Our results are based on

241. We drop the district dummy variable because attempting to classify approximately two hundred observations in ninety-two categories leaves a significant number of observations in districts where they are one of a few or the only case in that district. With a small number of cases in each district, frequently all the cases in a district received the same appellate ruling. Thus, the district itself perfectly predicts the outcome of the case, and the standard statistical procedure is to drop all observations in the category as a consequence. At this point, we were losing nearly 30% of the observations because of this problem — a significant proportion of all observations. Dropping the district dummies eliminated this problem.

242. See *supra* text accompanying note 230.

counts of claim construction rulings that undoubtedly undercount the degree of judicial experience with such activities. Moreover, we were forced to drop some variables due to the much smaller number of observations of claim construction appeals such as the district dummy variables from the analysis. Since underreporting of claim construction rulings may vary by district, dropping the variables could have influenced our results. Nonetheless, these estimates do provide some support for the contention that a specialized patent trial court will, by giving judges in patent trials more specialized experience, increase the accuracy of decisions in such cases.

VI. CONCLUSION

There is currently much discussion about whether the U.S. court system should be modified to include a specialized patent trial court. In large part, this dialogue derives from the view that we need to invest more in judicial human capital at the trial level in patent cases, since most judges have too little experience to efficiently and accurately analyze patent cases — particularly given the emphasis on claim construction in the post-*Markman* era. We have attempted to test this hypothesis by empirically examining the impact of both general and patent-specific judicial experience on the efficiency and accuracy of patent adjudication.

We find evidence that both general experience, gained by time on the bench, and specialized patent experience does shorten the duration of patent disputes. Recent specialized patent experience (within the three years prior to the filing of the case) has a bigger impact than total patent experience. However, even the impact of recent patent experience is moderate. For example, increasing the amount of recent patent experience from the twenty-fifth percentile level among all judges to the ninetieth percentile level shortens the expected duration of the case by about 10% of the median patent case length.

We also explored the relationship between experience and the accuracy of rulings in patent cases, as measured by the probability of being overturned on appeal. Overall, we find that the probability that a case will be at least partially reversed is related to the specialized patent experience of the district court judge. However, general judicial experience has no impact on the reversal rate. When we estimate the impact of experience separately on individual patent law issues, we find that specialized experience, whether recent or cumulative, reduces the probability of being reversed on appeal on rulings of preliminary injunction, judgment as a matter of law, or infringement (based on grounds other than claim construction). There is also evidence that recent experience reduces the probability that a claim construction ruling will be reversed. Our results for cumulative experience are con-

sistent with those of previous scholars: that the district court judge's previous patent experience has no impact on the probability that a claim construction ruling will be found to be in error.

Finally, we examined the impact of experience in claim construction rather than overall experience in patent cases on the probability of a claim construction ruling being overturned on appeal. In this instance, we found that such highly specialized experience in this difficult patent procedure did increase the accuracy of rulings, whether measured as recent or as cumulative experience. However, once again, the magnitude of the impact appeared to be moderate.

These results have implications for the debate over a specialized patent court. Increasing judicial human capital appears to have the potential to decrease the duration of patent cases, thereby allowing for more efficient use of both private and court resources. However, the magnitude of this effect is moderate. There is a similar impact on the accuracy of rulings. Judges with higher patent experience have a lower probability of being overruled on their rulings of infringement, and judges with significant recent patent experience or significant claim construction experience have a lower probability of being overruled on claim construction. Once again, the magnitude of these effects is moderate. These results suggest that the impact on the efficiency and accuracy of patent adjudication provides a real but modest case for the development of patent-specific judicial human capital at the trial level through the establishment of a specialized patent trial court.

APPENDIX ONE: TABLES

Table I. Cases Studied by Year of Filing, 1995-2003[243]

District Court Filing Year	Cases Analyzed	Percent of Cases Analyzed
1995	1,271	8.33
1996	951	6.23
1997	1,718	11.26
1998	1,775	11.63
1999	1,802	11.81
2000	1,927	11.81
2001	1,918	12.62
2002	1,994	13,06
2003	1,908	12.50
Total	*15,264*	*100.00*

243. The total number of cases is adjusted to eliminate cases improperly coded as patent cases, transfers, and consolidations. However, the totals for 1995, 1997, and 2000 are slightly less than the figures cited in that paper due to a small number of cases which were, for example, re-classified as being consolidated into another case and were therefore dropped from the final tallies.

Table II. Cases Studied by Year of Termination, 1995 to 2007

Year of Termination	**Cases Analyzed**	**Percent of Cases Analyzed**
1995	392	2.57
1996	962	6.30
1997	1,225	8.03
1998	1,335	8.75
1999	1,581	10.36
2000	1,734	11.36
2001	1,896	12.42
2002	1,953	12.79
2003	2,046	13.40
2004	1,244	8.15
2005	221	1.45
2006	260	1.70
2007	127	0.83
2008	70	0.46
2009	50	0.33
Total:		
Terminated Cases	*15,096*	*98.90*
On-going as of 9/1/2009	*168*	*1.10*

Table III. Categories of Judges by Patent Cases Heard, 1995 to 2003[244]

Number of Patent Cases Heard	Judges		Total Patent Cases	
	Number	Percentage	Number	Percentage
More than 100	4	0.34	624	4.09
51 to 100	34	2.86	2182	14.30
21 to 50	215	18.08	6423	42.08
10 to 20	254	21.36	3613	23.67
5 to 9	215	18.08	1469	9.62
Less than 5	467	39.28	953	6.24
Total	*1189*	*100.00*	*15,264*	*100.00*
Average per judge:	13			
Median among judges:	7			

244. This table does not include forty-three cases for which the presiding judge was listed as being "unassigned" or "vacant" in the docket.

Table IV. Variables Used in Efficiency and Accuracy Analysis

Variables Used in Both Efficiency And Accuracy Analyses		
Name	**Definition**	**Type**
Measure of Cumulative Experience.		
Casetot	Number of Other Patent Cases Judge had Presided as of Filing Date	Numerical
Measure of Recent Experience.		
Three	Other Patent Cases Judge had Presided over in Three Year Window before Filing Date.	Numerical
Measures of General Experience.		
Yearsbench	Years on bench as of time of case filing.	Numerical
Other Variables.		
Time	# of years since 1995.	Numerical
wtfilings	Per judge case load, weighted by complexity of case.	Numerical
NBER 0	NBER Technology Category 0: Design Patents.	Binary
NBER 1	NBER Technology Category 1: Chemical.	Binary
NBER 2	NBER Technology Category 2: Computers.	Binary
NBER 3	NBER Technology Category 3: Drugs, Medical.	Binary
NBER 4	NBER Technology Category 4: Electrical.	Binary
NBER 5	NBER Technology Category 5: Mechanical (base category).	Binary
NBER 6	NBER Technology Category 6: Other.	Binary
dis-trictdummy#	Dummy for Each Federal District Court	Binary

Table IV (Continued)

Variables Used Only in Accuracy Analysis		
Name	**Definition**	**Type**
Specialized Experience at time of Filing of Appeal.		
appcasetot	Number of Other Patent Cases Judge had Presided over since 1995 as of Filing of Appeal.	Numerical
Appthree	Number of Cases Judge Presided over in the Three Years Preceding Appeal.	Numerical
General Experience of the Judge at the Time of Filing of the Appeal.		
appbenchyears	Number of years on bench as of filing of appeal.	Numerical
Legal Issue in the Appeal.		
claimcons	Claim Construction (Base Category).	Binary
preliminj	Preliminary Injunction.	Binary
Validity	Validity of Patent (Non Claim Construction).	Binary
enforceability	Enforceability of Patent.	Binary
infringement	Infringement of Patent (Non Claim Construction).	Binary
remedies	Remedies (damages, injunction, etc.).	Binary
Jmol	Judgment as a Matter of Law.	Binary
Other ruling	Other Legal Issues.	Binary
Dissenting	Dissenting Opinion Filed by Member of Appellate Court.	Binary
Specialized Experience by Legal Issue (i.e., Interaction of Specialized Experience and Legal Issue).		
Claim Construction	Cumulative (or recent experience) amongst cases where issue was claim construction	Numerical
Preliminary Inj.	Cumulative (or recent experience) amongst cases where issue was a preliminary injunction.	Numerical
Validity	Cumulative (or recent experience) amongst cases where issue was patent validity (non claims construction).	Numerical
Enforceability	Cumulative (or recent experience) amongst cases where issue was enforceability of the patent.	Numerical
Infringement	Cumulative (or recent experience) amongst cases where issue was Infringement of Patent (Non Claim Construction).	Numerical
Remedies	Cumulative (or recent experience) amongst cases where issue was Remedies (damages, injunction, etc.).	Numerical
JMOL	Cumulative (or recent experience) amongst cases where issue was Judgment as a Matter of Law	Numerical
Other Ruling	Cumulative (or recent experience) amongst cases where issue was Other Legal Issues	

Table V. Results from Model on Impact of Judicial Experience on Efficiency[245]

Variable	Model 1. Cumulative Experience		Model 2. Recent Experience	
	1.a Coefficient	1.b Hazard Rate	2.a Coefficient	2.b Hazard Rate
Specialized Experience (casetot)	0.0019** (0.0009)	1.0019		
Specialized Experience (Three)			0.0036* (0.0020)	1.0036
General Experience (yearsbench)	0.0094*** (0.0019)	1.0094	0.0098*** (0.0019)	1.0098
Years Since 1995 (Time)	-0.0198*** (0.0059)	0.9999	-0.0177*** (0.0056)	0.9824
Weighted Average Case Load (perjdgwtload)	-0.0000 (0.0001)	1.4935	-0.0000 (0.0001)	1.0000
Technology Category[246]				
NBER 0: Design Patents	0.4011** (0.0468)	0.8299	0.4007** (0.0467)	1.4928
NBER 1: Chemical	-0.1878*** (0.0469)	0.8800	-0.1862*** (0.0478)	0.8301
NBER 2: Computers	-0.1278*** (0.0416)	0.7949	-0.1269*** (0.0419)	0.8808
NBER 3: Drugs, Medical	-0.2295*** (0.0444)	0.9483	-0.2308*** (0.0444)	0.7939
NBER 4: Electrical	-0.0530 (0.0414)	1.0541	-0.0532 (0.0414)	0.9488
NBER 6: Other	0.0528 (0.0351)	1.0019	0.0563 (0.0351)	1.0546
Results				
N[247]	10402		10402	
Log Pseudo Likelihood	-84814.26		-84814.14	
Wald Chi Sq.(97)	40493.28		40270.31	
Prob > Chi Sq.	0.0000		0.0000	

245. * indicates significance at the 10% level; ** indicates significance at the 5% level; *** denotes significance at the 1% level (the highest level of statistical significance).

246. Base technology category is NBER 5: Mechanical. Cases for which the patent, and hence its technology category, are missing are dropped.

247. Does not include cases administered by magistrate judges.

Table V (Continued)

Significant District Dummies[248]	District Number	Model 1		Model 2	
		Coefficient	Hazard	Coefficient	Hazard
Puerto Rico	4	-0.4964***	0.6087	-0.4841***	0.6162
New York-north	6	0.3724*	1.4512	0.3745*	1.4542
New York-east	7	0.2750**	1.3164	0.2786**	1.3212
New York-south	8	0.3237**	1.3821	0.3253**	1.3844
Pennsylvania-east	13	0.7462***	2.1088	0.7503***	2.1176
Pennsylvania-west	15	0.3078*	1.3604	0.3112*	1.3650
Maryland	16	0.4676***	1.5960	0.4726***	1.6041
Virginia-east	22	1.0260***	1.6396	1.0224***	1.6495
Alabama-middle	27	0.9344***	1.4133	0.9334***	1.4220
Florida-north	29	0.4945*	1.7551	0.5005**	1.7433
Louisiana-west	36	0.3460**	1.4673	0.3521**	1.4705
Mississippi-south	38	0.5625**	1.4452	0.5558**	1.4479
Texas-north	39	0.3835***	2.1178	0.3856***	2.1220
Texas-south	41	0.3683***	1.4963	0.3701***	1.5023
Kentucky-east	43	0.7504***	1.4948	0.7524***	1.4948
Michigan-west	46	0.4030***	1.7525	0.4070***	1.7710
Ohio-north	47	0.3693*	1.6928	0.3752***	1.6980
Illinois-north	52	0.4020***	2.5265	0.4020***	2.5349
Illinois-south	54	0.5611*	1.5782	0.5716*	1.5854
Indiana-north	55	0.5264***	2.5034	0.5299***	2.516
Wisconsin-west	58	0.9269***	1.2606	0.9302***	1.2621
Arkansas-east	60	0.4563*	1.5189	0.4609*	1.5209
Arkansas-west	61	0.9177*	2.0325	0.9227***	2.0332
Minnesota	64	0.2316*	1.7833	0.2328***	1.7894
Missouri-east	65	0.4180***	1.6629	0.4194***	1.6662
Nebraska	67	0.7093***	1.5390	0.7096***	1.5296
North Dakota	68	0.5785***	1.7021	0.5819*	1.7013
California-east	72	0.5086***	0.5073	0.5106***	0.5093
California-central	73	0.4312***	0.6237	0.4250***	0.6251
California-south	74	0.5320***	1.4218	0.5314***	1.4172
Hawaii	75	-0.6786***	1.1726	-0.6746***	1.1776
Montana	77	-0.4720***	1.7140	-0.4698***	1.7088
Nevada	78	0.3520**	1.4050	0.3487**	1.4091
Washington-west	81	0.5389***	1.8090	0.5358***	1.8153
Kansas	83	0.3401*	1.9407	0.3430*	1.9356
Oklahoma-east	86	2.7140***	1.8010	2.7211***	1.8050
Oklahoma-west	87	0.5928***	1.7610	0.5963***	1.7684
Utah	88	0.4202***	1.3025	0.4214***	1.3069
Wyoming	89	0.6631*	1.8239	0.6605*	1.8313
Florida-middle	3A	0.5884***	0.6087	0.5906***	1.4542
Florida-southern	3C	0.5659***	1.4512	0.5702***	1.3212
Georgia-Northern	3E	0.2644**	1.3164	0.2677**	1.3844
Louisiana-Eastern	3L	0.6010***	1.3821	0.6051***	2.1176

248. Base judicial district is the District of Massachusetts.

Table VI**.** Results from Model on Impact of Judicial Experience on the Propensity for a Case to End in a Judgment[249]

		Model 1 Cumulative Experience	**Model 2 Recent Experience**
Specialized Experience	Casetot	0.0053** (0.0025)	
	Three		0.0069 (0.0043)
General Experience	Yearsbench	-0.0109* (0.0059)	-0.0093 (0.0057)
Years Since 1995	Time	-0.0760*** (0.0171)	-0.0668*** (0.0160)
Weighted Average Case Load	Perjdgwtload	-0.0002 (0.0004)	-0.0002 (0.0004)
Technology Categories[250]	NBER 0: Design Patents	-0.7384*** (0.1897)	-0.7417*** (0.1902)
	NBER 1: Chemical	0.2142 (0.1436)	0.2097 (0.1437)
	NBER 2: Computers	0.0638 (0.1273)	0.0642 (0.1276)
	NBER 3: Drugs, Medical	0.3367*** (0.1232)	0.3356*** (0.1236)
	NBER 4: Electrical	-0.0695 (0.1376)	-0.0688 (0.1379)
	NBER 6: Other	-0.0790 (0.1112)	-0.0790 (0.1113)
	Constant	-1.0128*** (0.2957)	-1.0668*** (0.2934)
	N[251]	8014	
	Log Pseudo Like-lihood	-3188.94	-3190.14
	Wald $chi^2(82)$	266.69	283.55
	Prob > chi^2	0.00	0.00
	Pseudo R^2	0.0340	0.0336

249. 1 indicates the case ended with a ruling; 0 indicates the case ended in a settlement. * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level.

250. Base category is NBER 5: Mechanical. Cases for which the patent, and hence its technology category, are missing are dropped.

251. Does not include cases administered by magistrate judges.

Table VI (Continued)

Significant District Dummies		**Model 1 Cumulative Experience**	**Model 2 Recent Experience**
District 7	New York-east	-1.3619**	-1.3691**
District 13	Pennsylvania-east	-0.8123**	-0.8162**
District 18	North Carolina-middle	-0.7303***	-0.7283***
District 47	Ohio-north	-0.5807*	-0.5748*
District 50	Tennessee-middle	1.4980**	1.4820**
District 51	Tennessee-west	0.9176**	0.8941**
District 52	Illinois-north	-0.5307**	-0.5330***
District 57	Wisconsin-east	-0.9440*	-0.9389*
District 61	Arkansas-west	1.4746*	1.4637*
District 64	Minnesota	-0.6153**	-0.5979*
District 65	Missouri-east	-0.6527*	-0.6600*
District 74	California-south	-0.7805*	-0.7935*
District 80	Washington-east	-1.5518*	-1.5659*
District 88	Utah	-1.1299***	-1.1151***
District 3A	Florida-middle	-1.0154**	-1.0219**
District 3E	Georgia-Northern	-1.1057**	-1.1138***

Table VII. Appeals Categorized by District Filing Year and Status

Year Case Filed	Number of Appeals			Writ of Mandamus		Ongoing Appeals
	Dismissed	Analyzed, Final Ruling	Total	Granted	Denied	
1995	1	5	6	0	0	0
1996	2	10	12	0	1	0
1997	2	19	21	0	0	1
1998	91	237	328	1	7	7
1999[252]	86	224	310	3	6	8
2000[253]	76	215	291	2	7	14
2001	82	249	331	0	3	15
2002[254]	68	150	218	0	0	33
2003[255]	39	144	183	2	3	57
Total	*447*	*1253*	*1700*	*8*	*27*	*135*

252. One case from 1999 was affirmed in part and dismissed in part. It was classified as affirmed.

253. One case from 2000 dismissed in part and remanded in part. It was classified as remanded.

254. One case from 2002 dismissed in part and remanded in part. It was classified as remanded.

255. One case from 2003 dismissed in part and remanded in part. It was classified as remanded.

Table VIII. Appeals Categorized by Appellate Filing Year and Status

Year Appeal Filed	Number of Appeals			Writ of Mandamus		On-going Appeals
	Dismissed	Analyzed with Final Ruling	Total	Granted	Denied	
1998	4	7	11	1	1	0
1999	33	46	79	0	3	0
2000	48	109	157	0	1	0
2001	63	141	204	2	6	0
2002	61	204	265	0	6	0
2003	86	216	302	0	4	0
2004	72	224	296	0	1	4
2005	44	121	165	3	3	14
2006	33	157	190	1	1	91
2007	3	28	31	1	1	26
Total	*447*	*1253*	*1,700*	*8*	*27*	*135*

Table IX. Appellate Decisions on Patent Cases Categorized by Legal Question

Year Appeal Filed	Legal Question[256]								
	Claim Construction	**Preliminary Injunction**	**Invalidity**	**Enforceability**	**Infringement**	**Remedies**	**Judgment as a Matter of Law**	**Other[257] Patent**	***Total Observations[258]***
1998	1	1	2	0	0	0	0	0	4
1999	5	6	4	0	13	2	0	1	31
2000	27	4	20	3	22	4	9	4	93
2001	24	8	21	4	34	6	2	4	103
2002	55	8	25	2	37	8	0	4	139
2003	47	5	26	3	35	11	1	6	134
2004	44	5	28	7	49	17	1	10	161
2005	19	0	15	5	25	6	0	2	72
2006	14	1	22	6	22	3	0	3	72
Total	*236*	*38*	*163*	*30*	*237*	*57*	*13*	*34*	*809*

256. Each observation represents an appellate decision on a particular legal issue; individual opinions may include more than one issue.
257. This category includes issues such as standing, jurisdiction, inventorship, and other patent law issues that did not fit in the other categories.
258. Does not include decisions on issues that could not be clearly identified or classified as strictly patent law.

Table X. Appellate Rulings by Legal Issue

Legal Issue[259]	Analysis One				Analysis Two			
	"Somewrong[260]"		Fully Affirmed		"Allwrong[261]"		Affirmed Fully or in Part	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Claim Construction	118	50.00	118	50.00	93	39.41	143	60.59
Preliminary Injunction	11	28.95	27	71.05	10	26.32	28	73.68
Invalidity	66	40.49	97	59.51	52	31.90	111	68.10
Enforceability	8	26.67	22	73.33	8	26.67	22	73.33
Infringement	65	27.43	172	72.57	48	20.25	189	79.75
Remedies	35	61.40	22	38.60	29	50.88	28	49.12
Judgment as a Matter of Law	5	38.46	8	61.54	4	30.77	9	69.23
Other Patent[262]	19	55.88	15	44.12	17	50.00	17	50.00
Total[263]	*328*	*40.54*	*481*	*59.46*	*262*	*32.39*	*547*	*67.61*

259. Each observation represents an appellate decision on a particular legal issue; individual opinions may include more than one issue.
260. "Somewrong" represents appellate decisions that were reversed fully or in part
261. "Allwrong" represents appellate decisions that were reversed fully.
262. This category includes issues such as standing, jurisdiction, inventorship, and other patent law issues that did not fit in the other categories.
263. Does not include 137 rulings that could not be classified.

Table XI. Appellate Rulings by Tier of Specialized Experience

Tier of Judges	Analysis One					Analysis Two			
	"Somewrong[264]"		Fully Affirmed			"Allwrong[265]"		Affirmed Fully or in Part	
	Number	Percent	Number	Percent		Number	Percent	Number	Percent
Top 5 Judge	22	40.74	32	59.26		13	24.07	41	75.93
Top 10 Judge	26	40.63	38	59.38		15	23.44	49	76.56
Top 20 Judge	43	43.00	57	57.00		28	28.00	72	72.00
Top 50 Judge	88	43.56	114	56.44		61	30.20	141	69.80
Top 100 Judge	118	38.56	188	61.44		87	28.43	219	71.57
All Judges[266]	*328*	*40.54*	*481*	*59.46*		*262*	*32.39*	*547*	*67.61*

264. "Somewrong" represents appellate decisions that were reversed fully or in part.
265. "Allwrong" represents appellate decisions that were reversed fully.
266. Does not include 137 rulings that could not be classified.

Table XII. Estimation Results, Judicial Experience and Reversal on Appeal[267]

Variable	"Somewrong"		"Allwrong"	
	Model 1. Cumulative Experience	Model 2. Recent Experience	Model 1. Cumulative Experience	Model 2. Recent Experience
Specialized Experience (appcasetot)	-0.0079** (0.0038)		-0.0057 (0.0044)	
Specialized Experience (appthree)		-0.0247*** (0.0083)		-0.0149* 0.0088
General Experience: Years on Bench	0.01803 (0.01322)	0.0146 (0.0124)	0.0216 (0.0137)	0.0190 (0.0129)
Years Since 1995	0.0234 (0.0585)	0.0212 (0.0607)	0.0635 (0.0640)	0.0603 (0.0665)
Weighted Average per Judge Case Load	0.0005 (0.0010)	0.0006 (0.0010)	0.0013 (0.0011)	0.0013 (0.0011)
Technology Category				
NBER 0: Design Patents	-0.7793 (0.6031)	-0.7512 (0.5956)	-0.5266 (0.6808)	-0.5132 (0.6788)
NBER 1: Chemical.	0.0126 (0.3853)	0.0276 (0.3869)	-0.3161 (0.4321)	-0.3115 (0.4333)
NBER 2: Computers.	-0.1375 (0.2905)	-0.1259 (0.2890)	-0.3522 (0.3334)	-0.3466 (0.3332)
NBER 3: Drugs, Medical	-0.3161 (0.2902)	-0.3274 (0.2888)	-0.4794 (0.3347)	-0.4896 (0.3311)
NBER 4: Electrical.	-1.2617*** (0.3729)	-1.2371*** (0.3823)	-1.4146*** (0.4051)	-1.3953*** (0.4093)
NBER 6: Other	-0.4881* (0.2767)	-0.4818* (0.2788)	-0.7728** (0.3141)	-0.7711** (0.3131)
Legal Category of Ruling[268]				
Preliminary Injunction	-1.1798*** (0.4569)	-1.1133** (0.4426)	-1.0832** (0.4923)	-1.0407** (0.4815)
Validity	-0.3428 (0.2694)	-0.3161 (0.2691)	-0.3408 (0.2742)	-0.3279 (0.2747)
Enforceability	-1.0453** (0.5134)	-1.0148* (0.5198)	-0.5957 (0.5791)	-0.5835 (0.5819)
Infringement	-0.9508*** (0.2347)	-0.9474*** (0.2382)	-0.9380*** (0.2609)	-0.9396*** 0.2622
Remedies	0.5936 (0.4042)	0.6161 (0.4098)	0.6610 (0.4089)	0.6636 (0.4130)
Judgment as Matter of Law	-.3054 (0.6743)	-0.2254 (0.6611)	0.3258 (0.8683)	0.3635 (0.8650)
Other rulings	0.0214 (0.5198)	0.0387 (0.5147)	0.3053 (0.5434)	0.3128 (0.5395)
Dissenting Opinion	1.0077*** (0.3124)	1.0599*** (0.3153)	1.1677*** (0.3382)	1.1986*** (0.3415)

267. 1 indicates that the lower court ruling was reversed; 0 indicates that the lower court ruling was affirmed. * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level.

268. Claim construction is the base category. All other legal issue categories are exclusive of claim construction.

Table XII (Continued)

Significant District Dummies	**District Number**	**"Somewrong"**		**"Allwrong"**	
		Model 1. Cumulative Experience	Model 2. Recent Experience	Model 1. Cumulative Experience	Model 2. Recent Experience
	11		0.6730*		
Florida-north	29			-1.5721***	0.5546***
Texas-north	39				
Tennessee-middle	50				
Wisconsin-west	58			-0.9929**	-0.9069*
Iowa-north	62	0.5269*	0.5132**		
Iowa-south	63	0.5488*	0.5451*		
California-central	73	0.5687*	0.5576*		0.8878*
California-south	74				
Oregon	79				
Kansas	83	0.7719*	0.7441**	-1.3855*	0.7851*
Results					
Constant		-0.1986 (0.7258)	-0.1251 (0.7256)	-0.8541 (0.7702)	-0.8055 (0.7737)
N[269]		690	690	683	683
Log Pseudo likelihood		-412.15	-410.42	-375.93	-375.55
Pseudo R^2		0.11	0.12	0.13	0.13

269. Information on the judge or the patent was not available for all cases. In addition, some observations are dropped by the estimation procedure because membership in that district perfectly predicts the outcome (i.e., all cases are 1 or 0) and that observation cannot contribute to the estimation of any coefficient.

Table XIII. Results from Model on Judicial Experience by Legal Issue and Reversal on Appeal[270]

		"Somewrong"		"Allwrong"	
		Model 1. Cumulative Experience	Model 2. Recent Experience	Model 1. Cumulative Experience	Model 2. Recent Experience
Interaction of Cumulative Experience and Legal Issue	Claim Construction *Cumulative	-0.0083 (0.0057)		-0.0050 (0.0067)	
	Preliminary Injunction *Cumulative	-0.0312*** (0.0113)		-0.0310*** (0.0121)	
	Validity *Cumulative	-0.0033 (0.0050)		-0.0074 (0.0060)	
	Enforceability *Cumulative	-0.0132 (0.0095)		-0.0046 (0.0098)	
	Infringement *Cumulative	-0.0265*** (0.0081)		-0.0288* (0.0102)	
	Remedies *Cumulative	0.0142 (0.0109)		0.0165* (0.0085)	
	Judgment as a Matter of Law *Cumulative	-0.0192*** (0.0070)		-0.0311** (0.0153)	
	Other rulings *Cumulative	-0.0051 (0.0096)		0.0028 (0.0101)	
Interaction ofRecent Experience and Legal Issue[271]	Claim Construction *Three		-0.0251** (0.0124)		-0.0108** (0.0142)
	Preliminary Injunction *Three		-0.0611*** (0.0200)		-0.0571*** (0.0217)
	Validity *Three		-0.0138 (0.0112)		-0.0111 (0.0119)
	Enforceability *Three		-0.0337 (0.0217)		-0.0089 (0.0213)
	Infringement *Three		-0.0604*** (0.0160)		-0.0586*** (0.0202)
	Remedies *Three		0.0108 (0.0165)		0.0229 (0.0157)
	Judgment as a Matter of Law *Three		-0.0384*** (0.0119)		-0.0729*** (0.0249)
	Other rulings *Three		-0.0246 (0.0223)		0.0012 (0.0243)
General Experience: Years on Bench		0.0223* (0.0136)	0.0173 (0.0125)	0.0228* (0.0138)	0.0185 (0.0128)

270. 1 indicates that the lower court ruling was reversed; 0 indicates that the lower court ruling was affirmed. * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level.

271. These variables are interaction variables — that is, we multiply the dummy variable of the legal issue by the level of experience to get the level of experience relevant to that issue. See supra note 226.

		"Somewrong"		"Allwrong"	
		Model 1. Cumulative Experience	Model 2. Recent Experience	Model 1. Cumulative Experience	Model 2. Recent Experience
Years Since 1995		-0.0131 (0.0570)	-0.0254 (0.0588)	0.0323 (0.0634)	0.0122 (0.0649)
Weighted Average per Judge Case Load		-0.0001 (0.0010)	-0.0000 (0.0010)	0.0005 (0.0010)	0.0005 (0.0010)
Technology Category	NBER 0: Design Patents	-0.5077 (0.6197)	-0.4017 (0.6336)	-0.0437 (0.7600)	0.0418 (0.7686)
	NBER 1: Chemical	-0.1760 (0.3999)	-0.0766 (0.3972)	-0.5385 (0.4846)	-0.4571 (0.4687)
	NBER 2: Computers	-0.0497 (0.3045)	0.0130 (0.3036)	-0.1646 (0.3619)	-0.1057 (0.3580)
	NBER 3: Drugs, Medical	-0.3891 (0.3062)	-0.3814 (0.3061)	-0.5110 (0.3568)	-0.5210 (0.3540)
	NBER 4: Electrical	-1.4330*** (0.3785)	-1.3921*** (0.3890)	-1.5542*** (0.4224)	-1.5416*** (0.4321)
	NBER 6: Other	-0.7325** (0.2974)	-0.7096** (0.3014)	-1.0505*** (0.3460)	-1.0292*** (0.3394)
Dissenting Opinion		0.9162*** (0.3181)	0.9479*** (0.3277)	1.0931*** (0.3623)	1.1245*** (0.3710)
Significant District Dummies	District 29 Florida-north			-0.9306*	-0.9679*
	District 39 Texas-north	-1.6553*	-1.8014**		
	District 50 Tennessee-middle				
	District 58 Wisconsin-west				
	District 62 Iowa-north				
	District 63 Iowa-south	1.1040*	1.0201*		
	District 73 California-central	1.1857*	1.2968**	1.0388*	1.0639*
	District 74 California-south				
	District 79 Oregon				
	District 83 Kansas	-1.2185*	-1.5153**		-1.1957*
Constant		0.0446 (0.7738)	0.1692 (0.7793)	-0.4710 (0.7932)	-0.3412 (0.7997)
N[272]		623	623	601	601
Log Pseudo Likelihood		-367.31	-368.55	-327.43	-329.51
Pseudo R^2		0.12	0.12	0.14	0.13

272. Some observations are dropped by the estimation procedure because membership in that district perfectly predicts the outcome (i.e., all cases are 1 or 0).

Table XIV. Judicial Experience with Claim Construction and Reversal of Claim Construction Rulings

Variable	"Somewrong"		"Allwrong"	
	Model 1. Cumulative Experience	Model 2. Recent Experience	Model 1. Cumulative Experience	Model 2. Recent Experience
Total No. of Claim Construction Rulings	-0.0121* (0.0068)		-0.0137* (0.0079)	
Rulings in Last Three Years		-0.0209* 0.0121)		-0.0252** (0.0127)
General Experience: Years on Bench	-0.0074 0.0205	-0.0132 (0.0204)	0.0026 (0.0220)	-0.0037 (0.0220)
Years Since 1995	-0.0292 0.0851	-0.0353 (0.0842)	0.0634 (0.0927)	0.0581 (0.0915)
Weighted Average per Judge Case Load	0.0017* (0.0010)	0.0016 (0.0010)	0.0018 (0.0012)	0.0016 (0.0012)
NBER Technology Category				
NBER 0: Design Patents[273]				
NBER 1: Chemical.	-0.6783 0.5253	-0.6331 (0.5292)	-0.6990 (0.5568)	-0.6533 (0.5619)
NBER 2: Computers.	0.2731 0.5089	0.3022 (0.5118)	0.0066 (0.4946)	0.0451 (0.4943)
NBER 3: Drugs, Medical	-0.3680 (0.5128)	-0.3707 (0.5152)	-0.5187 (0.5180)	-0.5121 (0.5188)
NBER 4: Electrical.	-1.4227** 0.6303	-1.3983** (0.6257)	-1.7637** (0.7006)	-1.7403** (0.6988)
NBER 6: Other	-0.6606 (0.4568)	-0.6560 (0.4561)	-0.9026** (0.4605)	-0.9010** (0.4583)
Dissenting Opinion	1.7685*** (0.8996)	1.7054** (0.8405)	1.1693* (0.6455)	1.1620* (0.6152)
Constant	0.0313 (0.7478)	0.1121 (0.7527)	-0.7715 (0.8713)	-0.6621 (0.8702)
Results				
N[274]	213	213	213	213
Number of Clusters	149	149	149	149
Log Pseudo Likeli-hood	-136.72	-137.20	-132.64	-132.91
Pseudo R^2	0.07	0.07	0.07	0.07
Wald Chi Sq.	13.09	12.88	16.50	17.58
Prob > Chi Sq.	0.2185	0.2302	0.08	0.06

273. The one observation falling in this category was dropped for being "perfectly predicted."

274. Information on the judge or the patent was not available for all cases. In addition, some observations are dropped by the estimation procedure because membership in that district perfectly predicts the outcome (i.e., all cases are 1 or 0) and that observation cannot contribute to the estimation of any coefficient.

APPENDIX TWO: FIGURES

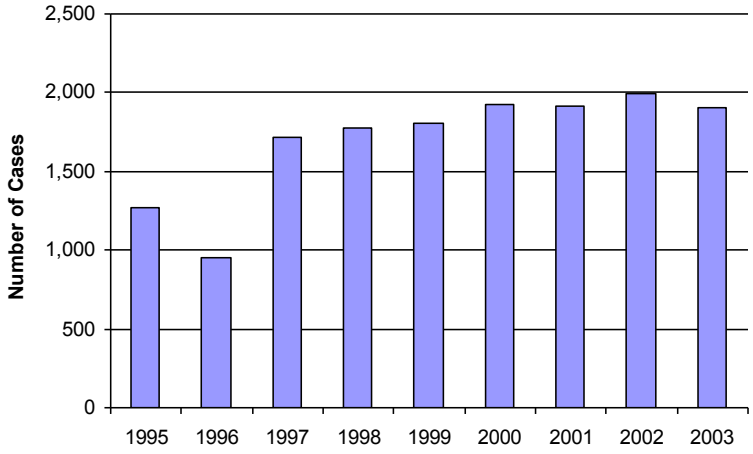

Figure 1: Cases, by year of filing.

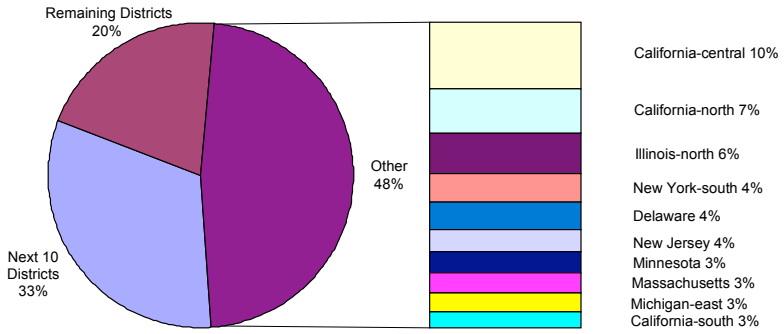

Figure 2: Patent cases studied by district, 1995-2003.

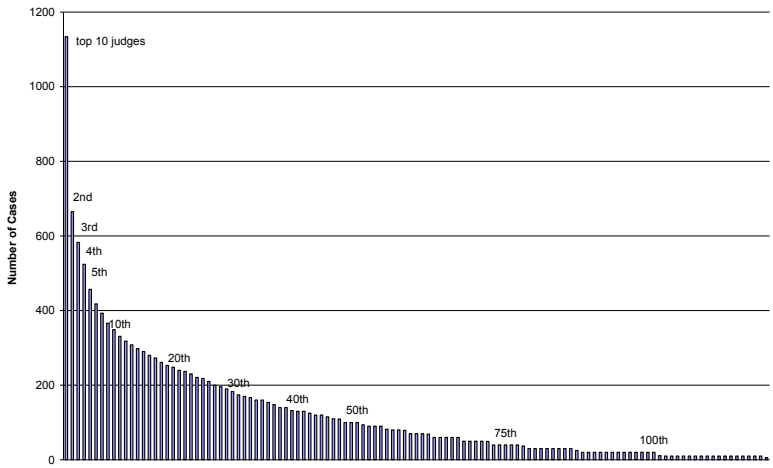

Figure 3: Concentration of patent cases among judges.

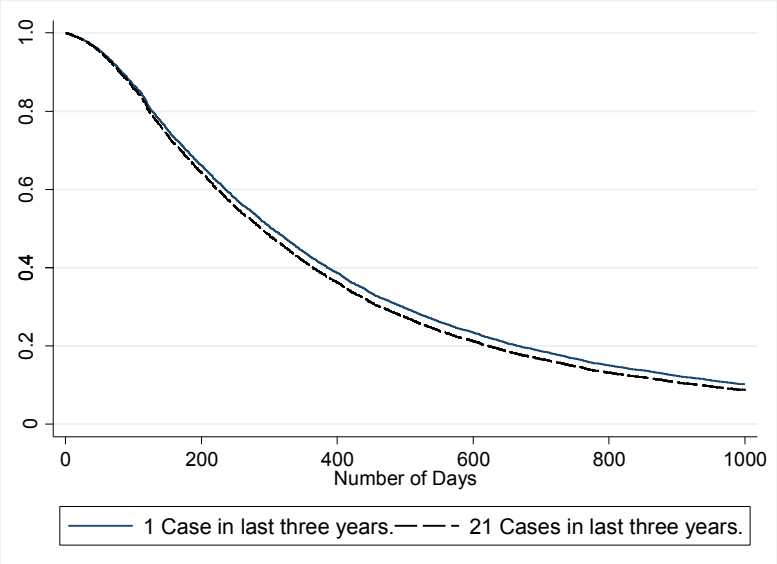

Figure 4: Percentage of cases remaining over time.