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The Federal Circuit as an Institution

Ryan G. Vacca



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The Federal Circuit as an Institution

Ryan Vacca

Associate Professor of Law; Director of the Center for Intellectual
Property Law & Technology

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THE FEDERAL CIRCUIT AS AN INSTITUTION

Ryan Vacca

The University of Akron School of Law

RESEARCH HANDBOOK ON THE ECONOMICS OF INTELLECTUAL PROPERTY LAW (Peter S. Menell, David L. Schwartz, and Ben Depoorter, eds., Edward Elgar Publishing, forthcoming 2016)

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I. Introduction

The Court of Appeals for the Federal Circuit is a unique institution. Unlike other circuit courts, the Federal Circuit’s jurisdiction is bound by subject area rather than geography, and it was created to address a unique set of problems specific to patent law. These characteristics have affected its institutional development and made the court one of the most frequently studied

appellate courts. This chapter examines this development and describes the evolving qualities that have helped the Federal Circuit distinguish itself, for better or worse, as an institution.

This chapter begins with an overview of the concerns existing before creation of the Federal Circuit and then discusses the Federal Court Improvements Act of 1982, including what Congress was trying to achieve with the Federal Circuit and how the court was structured in terms of subject matter jurisdiction and the courts it replaced.

Next, this chapter will describe the problem of not having a uniform patent law and how the Federal Circuit has impacted uniformity. It will describe how forum shopping was influenced and whether uniformity has affected the diversity and percolation of ideas related to patent law.

This chapter then discusses how the Federal Circuit has impacted certainty and predictability of patent law. It begins by looking at where the pressure for certainty comes from. It then focuses on the Federal Circuit's treatment of a few representative issues to determine whether the court has succeeded in providing it.

Next, this chapter explores the quality of the Federal Circuit's patent jurisprudence, including whether the Federal Circuit is too formalistic in its decisionmaking and if it pays enough attention to policy and technological considerations and scholarship.

Given the focus on the Federal Circuit as an institution, this chapter will describe how the Federal Circuit is structured, the makeup of the individual judges on the court, and how these qualities affect the court as such. The role of individual judges and types of judges on the Federal Circuit are examined as well as how internal dynamics and en banc hearings play a role in the decisionmaking process.

This chapter then explores the Federal Circuit's interactions with other institutions and examines which institutions are and should be performing what role in the development of patent law. This section notes the interesting and dynamic interactions the Federal Circuit has had with the Supreme Court, the United States Patent and Trademark Office, district courts, the Solicitor General, and Congress. Finally, this chapter closes with concluding thoughts about empirical research on the Federal Circuit and suggests further areas of exploration.

II. Creation of the Federal Circuit

Before delving into the studies analyzing whether the Federal Circuit has been successful, we must know what problems existed prior to the court's creation and what Congress hoped to achieve by establishing the Federal Circuit. This section begins by laying out the concerns and inadequacies that existed and the failed attempts to resolve those problems. It then turns to Congress's creation of the Federal Circuit and describes what goals it sought to achieve.

A. Concerns & Inadequacies

The antecedent to the creation of the Federal Circuit was the Senate's Commission on Revision of the Federal Court Appellate System in the early 1970s (Dunner, 2010, p. 776). This commission, also known as the Hruska Commission, was formed to evaluate the systemic strains posed on the federal appellate system and how to efficiently and effectively resolve them (Commission on Revision of the Federal Court Appellate System, 1975, p. 208). As part of this evaluation, several problems with respect to patent litigation were brought to the attention of the commission, including great disparities between the regional circuits' treatments of patents; some were hostile to patents, while others were friendlier (Commission on Revision of the

Federal Court Appellate System, 1975, p. 220; Dunner, 2010, p. 777). As a result, patent litigators strategically raced to the courthouses to make sure their clients' interests would be protected on appeal (Dunner, 2010, p. 777). As some believed, forum shopping led to an unfair administration of justice and created an unpredictable patent jurisprudence, which led to increasing difficulty in advising technology developers and users (Commission on Revision of the Federal Court Appellate System, 1975, p. 220; Dreyfuss, 1989, p. 7; Dunner, 2010, p. 777). The Hruska Commission's consultants conducted a survey of patent litigators to determine whether it would be worthwhile to recommend creation of a specialized appellate court for patents, but the respondents were evenly divided (Dunner, 2010, p. 777).

The Hruska Commission concluded that it would not be desirable to have a specialized court of patent appeals to solve the problems of a disharmonious national law (Commission on Revision of the Federal Court Appellate System, 1975, p. 234). Part of the reason was a concern that specialized judges would suffer from tunnel vision and see the cases without the influence of exposure to legal problems in other fields (Commission on Revision of the Federal Court Appellate System, 1975, pp. 234-235). The other concerns included (1) judges imposing their own views of policy, (2) judges not writing thorough and persuasive opinions, (3) depriving the other circuit courts of a broad exposure to cases, and (4) finding capable judges that were not captured by particular interest groups (Commission on Revision of the Federal Court Appellate System, 1975, p. 235; Dreyfuss, 1989, p. 25).

Instead, the Hruska Commission ultimately recommended creating a National Court of Appeals, which would adjudicate issues of national law so as to provide consistency and uniformity by avoiding and resolving circuit splits (Commission on Revision of the Federal Court Appellate System, 1975, pp. 208-209). Although the National Court of Appeals would hear a variety of types of cases, it was expected that this court would appropriately monitor the patent decisions in the regional circuits and consequently reduce the forum shopping problem (Commission on Revision of the Federal Court Appellate System, 1975, p. 236). Congress never adopted this recommendation.

B. A Court with a Mission

Although Congress and the Hruska Commission rejected the National Court of Appeals and a court of patent appeals respectively, the Federal Circuit originated from these proposals (Dreyfuss, 1989, p. 6). Over the next several years, Congress drafted bills and held hearings to solve the problems of lack of uniformity in and poor administration of the patent law (S. Rep. 97-275, 97th Cong., 1st Sess. 1981, 1982 U.S.C.C.A.N. 11; H.R. Rep. 97-312, 97th Cong., 1st Sess. 1981). Around the same time, President Carter convened a Domestic Policy Review, which was aimed at remedying the recession by spurring technology-based innovation (Newman, 2002, pp. 541-542). A committee was charged with examining the role of the patent system in supporting technological innovation and concluded, in relevant part, that the judiciary was compromising innovation and economic development (Newman, 2002, p. 542). The Congressional hearings and the political need for increased innovation, lead to the creation of the Federal Circuit in 1982 (Federal Court Improvements Act of 1982, P.L. 97-164, April 2, 1982, 96 Stat. 25; Dunner, 2010, pp. 777-778; Gugliuzza, 2012, p. 1454).

The Federal Court Improvements Act of 1982 merged the Court of Customs and Patent Appeals (CCPA) and the Court of Claims into the Federal Circuit, which would hear, *inter alia*, patent appeals from the district courts and from the U.S. Patent and Trademark Office (Dreyfuss, 1989, pp. 3-4). Congress thought that creating the Federal Circuit and eliminating the number of

decisionmakers in the patent system would largely eradicate the pervasive inconsistency plaguing patent law and provide predictability to stakeholders through uniformity (S. Rep. 97-275, 97th Cong., 1st Sess. 1981, 1982 U.S.C.C.A.N. 11; H.R. Rep. 97-312, 97th Cong., 1st Sess. 1981). Moreover, by forcing appellate jurisdiction into one court, Congress believed this would reduce forum shopping (S. Rep. 97-275, 97th Cong., 1st Sess. 1981, 1982 U.S.C.C.A.N. 11; H.R. Rep. 97-312, 97th Cong., 1st Sess. 1981). As described below, much ink has been spilled analyzing whether and how Congressional goals for the Federal Circuit have influenced the Federal Circuit's decisionmaking.

But Congress was not just focused on defining the Federal Circuit's mission. It was also well-aware of the potential problems of creating a "specialized" court (S. Rep. 97-275, 97th Cong., 1st Sess. 1981, 1982 U.S.C.C.A.N. 11). To avoid or minimize these problems, Congress did not limit the Federal Circuit's jurisdiction to patent appeals (S. Rep. 97-275, 97th Cong., 1st Sess. 1981, 1982 U.S.C.C.A.N. 11). Instead, Congress made sure the Federal Circuit would hear a variety of types of cases (S. Rep. 97-275, 97th Cong., 1st Sess. 1981, 1982 U.S.C.C.A.N. 11), including veterans' benefits, government-employment disputes, government contracts, customs and tariff issues, tax refunds, and trademark registration appeals from the PTO (Gugliuzza, 2012, p. 1453). Congress believed this exposure to non-patent cases would keep the judges from developing tunnel vision and avoid special interest groups from dominating the court's development (S. Rep. 97-275, 97th Cong., 1st Sess. 1981, 1982 U.S.C.C.A.N. 11). Like Congress's goals for the Federal Circuit, the accompanying concerns and the effectiveness of a diverse caseload have also been studied in depth to determine if the Federal Circuit experiment has succeeded.

III. Uniformity

Before creation of the Federal Circuit, patent law differed throughout the country and this lack of uniformity was of paramount concern. One cause of this lack of uniformity flowed from the PTO and CCPA interpreting and developing patent law with respect to patentability, but not having the ability to bind the federal courts who regularly resolved these issues in the context of infringement litigation (Dreyfuss, 1989, p. 6). The other cause of the lack of uniformity was that there were pronounced differences amongst the regional circuits' understanding and application of patent law (Dreyfuss, 1989, p. 7; Dreyfuss, 2010, p. 828). Statistics from the 1940s and 1950s showed that "a patent was twice as likely to be held valid and infringed in the Fifth Circuit than in the Seventh Circuit, and almost four times more likely to be enforced in the Seventh Circuit than in the Second Circuit" (Dreyfuss, 1989, p. 7). As a result, forum shopping became widespread (Dreyfuss, 1989, p. 7; Dreyfuss, 2010, p. 828).

In theory, the Supreme Court can serve as the tribunal that unifies patent law throughout the nation (Dreyfuss, 1989, p. 2). But as a practical matter, this is impossible given how few cases the Supreme Court hears each term (Dreyfuss, 1989, p. 2; Cotropia, 2010, p. 804). Although the Supreme Court has taken much more interest in patent cases over the last ten or fifteen years, the total number of patent cases and issues it resolves is relatively insignificant in the grand scheme of patent litigation (Dreyfuss, 2010, pp. 829-830, 839).

The Federal Circuit was created, in large part, to solve the lack of uniformity problems plaguing patent law (Atkinson, Marco, and Turner, 2009, p. 411). In short, the different interpretations of patent law by the regional circuits and the CCPA would cease to exist once a single court was tasked with interpreting patent law for the entire country (Dreyfuss, 2010, p. 828). This, in turn, would eliminate the rampant forum shopping (Dreyfuss, 1989, p. 7).

Despite the perceived benefits provided by having the Federal Circuit serve as the unifier of patent law, there were, and continue to be, risks associated with a single circuit hearing all patent appeals. The major risk commentators have identified is a lack of diversity in the development of patent jurisprudence (Nard & Duffy, 2007, p. 1623). The diversity concern comes in two flavors – inter-circuit percolation and entrenchment. The remainder of this section examines the Federal Circuit’s impact on forum shopping and whether centralization has resulted in a dearth of diversity.

A. Forum Shopping

The Federal Circuit has been keenly aware of its mission to achieve uniformity. As Howard Markey (1992), former Chief Judge of the Federal Circuit, noted, “[f]rom its very first case, the Federal Circuit set out to meet Congress’ express intent that it contribute to increased uniformity and reliability in the fields of national law assigned” (Markey, 1992, p. 577). Not only did Judge Markey believe the Federal Circuit had purposefully undertaken this task, he believed the Federal Circuit had achieved it. In his words, “the Federal Circuit met the desire of its congressional creators for increased uniformity and elimination of forum shopping in its assigned areas of national law” (Markey, 1992, p. 577). And to the extent forum shopping was a major problem in and of itself, Judge Markey is correct that forum shopping has been completely resolved if the concern was forum shopping based on appellate court jurisdiction (Dreyfuss, 2008, p. 788-789).¹ By eliminating every other circuit’s appellate jurisdiction over patent cases, litigants have no other appellate fora to shop for.

Despite this seemingly banal conclusion about uniformity and elimination of forum shopping, there was little to no empirical evidence supporting the underlying assumption that forum shopping was widespread and problematic. Congress’s belief that forum shopping was a problem was based on the 240 survey responses conducted during the Hruska Commission’s study (Atkinson, Marco, and Turner, 2009, pp. 414-415). To determine if forum shopping was prevalent, and to what extent, Atkinson, Marco, and Turner (2009) performed an econometric study of nonuniformity and forum shopping before and after creation of the Federal Circuit.

In this study, they concluded that when the patentee was the plaintiff, significant forum shopping existed before creation of the Federal Circuit (Atkinson, Marco, & Turner, 2009, p. 441). This corresponded to a showing of significant nonuniformity in validity outcomes across the circuits during that same time period (Atkinson, Marco, & Turner, 2009, p. 441). In contrast, when the patentee was the defendant (i.e. a declaratory judgment action), the authors found no evidence of systematic nonuniformity during the pre-Federal Circuit period nor strong evidence of forum shopping (Atkinson, Marco, & Turner, 2009, p. 441).

The authors also concluded that forum shopping during the period after creation of the Federal Circuit had been mitigated (Atkinson, Marco, & Turner, 2009, p. 441). This, unsurprisingly, corresponded to a finding that nonuniformity across district courts within the

¹ Until passage of the America Invents Act (AIA), forum shopping at the appellate court level was possible in limited circumstances because of *Christianson v. Colt Industries Operating Corp.*, 486 U.S. 800 (1988) and *Holmes Group, Inc. v. Vornado Air Circulation Systems, Inc.*, 535 U.S. 826 (2002), which limited the Federal Circuit’s jurisdiction to those cases “arising under any Act of Congress relating to patents” under the well-pleaded complaint rule. *Holmes Group, Inc. v. Vornado Air Circulation Systems, Inc.*, 535 U.S. 826, 834 (2002). The AIA amended the Federal Circuit’s jurisdiction so that it has exclusive jurisdiction “in any civil action arising under, or in any civil action in which a party has asserted a compulsory counterclaim arising under, any Act of Congress relating to patents” 28 U.S.C. § 1295(a)(1) (2012).

regional circuits remains, but has been greatly reduced by the presence of the Federal Circuit (Atkinson, Marco, & Turner, 2009, p. 441). Interestingly, the authors estimate that systemic forum shopping ended by 1978, four years prior to creation of the Federal Circuit (Atkinson, Marco, & Turner, 2009, pp. 412, 441). They suspect that patentees saw the writing on the wall and anticipated the impact of the Federal Circuit several years before its creation (Atkinson, Marco, & Turner, 2009, p. 413).

Even though the extent of forum shopping may have been exaggerated and the Federal Circuit seems to have eliminated forum shopping based on appellate court jurisdiction, this does not necessarily mean the forum shopping problem has been solved. Instead, studies suggest that forum shopping has remained prevalent and the focus has simply shifted to the district court level (Moore, 2001, p. 892; Sichelman, 2010, p. 1165). For example, then-Professor Moore (2001) conducted an empirical study of patent litigation in district courts after creation of the Federal Circuit. Examining the population of patent cases that went to trial from 1983 to 1999 and all patent cases that were terminated by any means from 1995 to 1999, she demonstrates that patent litigation at the district court level was not evenly dispersed throughout the country nor was it dispersed according to the district courts' civil docket size. (Moore, 2001, pp. 892, 903-904). Instead, patent litigation was concentrated in a few select jurisdictions. (Moore, 2001, pp. 892, 903-904).² Jeanne Fromer's (2010) study of forum selection refines Moore's analysis by analyzing forum selection vis à vis the underlying technology (Fromer, 2010, pp. 1499, 1502, 1512, 1514, 1516-1520). Moore's results also illustrate that district courts have procedural and substantive variation in adjudicating patent cases and, although it is a multi-dimensional inquiry, this creates an environment hospitable to forum shopping. (Moore, 2001, pp. 892, 907-919). At the end of the day, Moore concludes that the differences in win rates in infringement and declaratory judgment suits are likely attributable to the choice of forum (Moore, 2001, p. 923).

And though one may posit that these differences between districts will be resolved at the Federal Circuit on appeal and uniformity will ensue, most patent cases settle before judgment and before appeal to the Federal Circuit (Sichelman, 2010, p. 1165; Gruner, 2010, pp. 1024, 1029-1033). Until the Federal Circuit makes a broad pronouncement to resolve district court variances, it is thought that parties will settle based on forum considerations rather than just how a uniform law applies to the facts of the case (Sichelman, 2010, p. 1169).

Although the Federal Circuit may have been created, in part, to eliminate forum shopping, its success is certainly questionable. Scholars have declared forum shopping to be "alive and well" (Moore, 2001, p. 937) and that it "remains a pernicious feature of the patent litigation landscape" (Sichelman, 2010, p. 1171). Although there is hope that the Federal Circuit will exercise more oversight regarding motions to transfer venue and that this will reduce forum shopping, it is a pessimistic case for hope – significant forum shopping in patent litigation is likely unavoidable (Sichelman, 2010, p. 1171).

B. Diversity & Percolation

As noted above, a major risk of centralization is a dearth of diversity in patent jurisprudence due to a lack of inter-circuit percolation and because of entrenchment or path

² These jurisdictions have varied somewhat over time. In Moore's study, the Eastern District of Texas was not a favorite district, but as Sichelman (2010) notes, "[o]ver the last decade plaintiffs have increasingly chosen the remote Eastern District of Texas with 860 percent more cases filed there in 2009 than in 2000, while the background growth of total cases filed nationwide was only 15 percent."

dependency. That is, the risk is that the Federal Circuit has become too successful in producing uniformity (Cotropia, 2010, p. 806).

Percolation “is based on the notion that law evolves through interchange among the regional circuits and experimentation within their territories [and that e]ventually, experience demonstrates which rules work best” (Dreyfuss, 2010, p. 829). It was thought that centralizing all patent appeals in the Federal Circuit would make percolation impossible and the best rules would not necessarily come to fruition (Nard and Duffy, 2007, pp. 1627-1637; Dreyfuss, 2010, p. 829).

Entrenchment, or path dependency, is related to percolation. But entrenchment is concerned with later panels of the Federal Circuit being required to follow the precedent of a prior panel decisions (Nard and Duffy, 2007, pp. 1645-1646; Petherbridge, 2009, p. 424). Because of court rules binding subsequent panels, the concern is that attorneys are less likely to challenge precedent and subsequent panels are less likely to revisit and reconsider existing rules (Nard and Duffy, 2007, pp.1645-1646; Petherbridge, 2009, p. 424). As a result, the Federal Circuit’s patent jurisprudence becomes homogenous, irretrievably entrenched, and “compromises the efficient evolution of the law through common law mechanisms” (Petherbridge, 2009, p. 425).

Professors Nard and Duffy (2007), in a thought-provoking article, suggested that the Federal Circuit be stripped of its exclusive appellate jurisdiction over patent appeals and that at least one additional regional circuit be given jurisdiction to hear patent appeals from district courts and that the DC Circuit also be given jurisdiction over appeals from the PTO (Nard & Duffy, 2007, pp. 1623-1625).³ They argued that adding a limited number of circuit courts to hear patent appeals would inject “an ongoing, lively jurisprudential debate at the circuit court level” (Nard & Duffy, 2007, pp. 1623-1624). This diversity of views, they argue, enhances competition between circuits, but also sparks more creative lawyering, both of which lead to better incremental innovation in patent law – that is, the law is allowed to percolate (Nard & Duffy, 2007, pp. 1623-1624, 1633). As to entrenchment, they argue that the antidote is having more than one circuit hearing appeals so that when circuit splits arise, lawyers and the Supreme Court can step up to develop the best arguments and resolve the circuit split (Nard & Duffy, 2007, pp. 1645-1646). Judge Diane Wood (2014) of the Seventh Circuit has recently echoed these sentiments and suggested a variation of Nard and Duffy’s (2007) proposal (Wood, 2014, pp. 9-10).

The claim that the Federal Circuit yields a lack of diversity has been disputed and the proposed solution has been critiqued (Plager & Pettigrew, 2007; Golden, 2009; Petherbridge, 2009; Cotropia, 2010). For example, Cotropia (2010) asserts that creation of the Federal Circuit has not resulted in stagnant decisionmaking nor impeded the common law development of patent law (Cotropia, 2010, p. 803). In support of this claim, Cotropia (2010) measured diversity by comparing rates of dissents and en banc review in the Federal Circuit with those of selected regional circuits (Cotropia, 2010, p. 803).

Looking at the proportion of dissents to written decisions is useful because, it is argued, the dissents are usually disagreements about the law or application of the law, not about facts (Cotropia, 2010, p. 810). As a result, dissents show that a court is not of one mind (Cotropia, 2010, p. 810). Dissents also signal and communicate new ideas or approaches to those outside of

³ Nard and Duffy (2007) recognize that such a solution has the potential to exacerbate the forum shopping problem Congress tried to address. To minimize forum shopping, they suggest randomizing assignment of the appellate court (Nard & Duffy, 2007, pp. 1668-1669).

the specific panel – future litigants, Congress, future panels, or the court sitting en banc (Cotropia, 2010, p. 810).

The results of this study show that the Federal Circuit has a dissent in 3.51% of its opinions (Cotropia, 2010, p. 815). The only selected circuit with a higher dissent rate was the Ninth Circuit at 4.56% (Cotropia, 2010, p. 815). When limiting the Federal Circuit opinions to just patent cases, the dissent rate climbed to 9.28% (Cotropia, 2010, p. 816). Even when taking a circuit's total caseload, caseload per judge, and outlier judges within the Federal Circuit into account, the Federal Circuit's comparatively high dissent rate persisted (Cotropia, 2010, pp. 818-820). A similar analysis undertaken by Petherbridge (2009) focuses on dissenting and concurring opinions in the areas of the doctrine of equivalents, claim construction, and obviousness (Petherbridge, 2009, p. 455). This study shows a substantial rate of alternative writings (Petherbridge, 2009, p. 456). These results challenge the belief that there is a lack of diversity within the Federal Circuit; there appears to be a fair amount of discord within the court (Petherbridge, 2009, pp. 456-457; Cotropia, 2010, p. 818). From these analyses, it has been reasoned that the high rate of disagreement at the Federal Circuit flows from repeated exposure to a small set of subject matters and that over time, the judges develop deeper and more nuanced perspectives on those subject matters (Cotropia, 2010, p. 820).

With respect to examining the proportion of en banc cases to written decisions, it was reasoned that dissenting opinions were a significant trigger for en banc review and that if there was a high degree of uniformity on an issue, then there would be little intracircuit conflict and dissent and hence, no need for en banc review (Cotropia, 2010, pp. 813-814). Likewise, en banc review may suggest "how willing a court is to innovate new legal rules, percolate these concepts, and then eventually adopt them in future decisions" (Cotropia, 2010, p. 822). Cotropia's results show that the Federal Circuit decided cases en banc 0.18% of the time (Cotropia, 2010, p. 817). This was the lowest of the selected circuits, but not much lower than the next two lowest regional circuits (Cotropia, 2010, p. 817). Unlike Cotropia's (2010) study, which examined all en banc decisions from 1998 through 2009 and included all subject matters as a function of the total number of opinions, Vacca (2011) measured only en banc patent cases as a function of the court's total patent cases. Vacca (2011) shows that from 2001 through 2009, the Federal Circuit decided patent cases en banc 0.23% of the time (Vacca, 2011, p. 738). When compared to the general en banc rates of all other circuits, these results show that the Federal Circuit had the highest rate of en banc decisionmaking (Vacca, 2011, p. 738).

In explaining how these results explain or impact percolation and entrenchment, Cotropia (2010) offers a few explanations. One is simply that although there is not uniformity within the court, the law remains entrenched (Cotropia, 2010, p. 822). Another explanation could be that the disputes provoking dissenting opinions are minor and not sufficiently important for en banc review (Cotropia, 2010, pp. 822-823). The final explanation is that the Federal Circuit could be harmonizing the law without using the transparent en banc procedure, but instead uses the eight-day comment period on precedential opinions to resolve potential conflicts (Cotropia, 2010, p. 823). As a result, the law does not become entrenched; instead it evolves, but does so in a less transparent way than en banc review provides (Cotropia, 2010, p. 823). In contrast, Vacca (2011) shows that the Federal Circuit's high en banc rate and practices are illustrative of an exceedingly transparent form of jurisprudential development (Vacca, 2011, pp. 757-758).

Assuming Cotropia's dissent and en banc rates are accurate and his comparisons to other selected circuits are correct, there has been disagreement with his conclusions that the Federal Circuit's jurisprudential diversity is no worse than the other circuits and that it may have more

diversity given the frequent dissents (Dreyfuss, 2010, pp. 832-834). First, a simple comparison of dissent and en banc rates does not take into account the traditions and heritage of each circuit nor does it consider that different areas of the law develop differently (Dreyfuss, 2010, p. 832). Second, merely comparing the rates of dissent and en banc decisionmaking does not tell us whether this compensates for a lack of inter-circuit percolation (Dreyfuss, 2010, p. 832). To be meaningful and answer these questions, the substance of those dissents and en banc issues must be examined (Dreyfuss, 2010, p. 832). If the topics of dissent are insubstantial and not related to key issues suffering from ossification, then the high degree of diversity based on dissent rates does not adequately address the entrenchment concern (Dreyfuss, 2010, p. 832). Finally, the concern about a lack of diversity is not just that the law becomes entrenched, but that the law is suboptimal – “that the ‘group’ is not engaged in serious thinking at all” (Dreyfuss, 2010, p. 833). It could be that the large high and low en banc rates show that the judges regularly disagree, but “fail to frame their disagreements in ways that make en banc review fruitful enough to identify optimal rules on which to converge” (Dreyfuss, 2010, p. 834). Of course, Vacca’s (2011) study showing the Federal Circuit has a high en banc rate for patent cases suggests this may not be the case (Vacca, 2011, p. 738).

In another challenge to the claim that the Federal Circuit has yielded too much uniformity, Petherbridge (2009) demonstrates that, at least with respect to the doctrine of equivalents, the Federal Circuit does not lack jurisprudential diversity (Petherbridge, 2009, p. 427). Using a dataset consisting of all Federal Circuit doctrine of equivalents analyses from 1992 through 2007, Petherbridge (2009) shows that the major response variables – (1) patentee success at the Federal Circuit on a doctrine of equivalents issue, (2) whether that ruling was dispositive of the case in favor of the patentee, and (3) whether the Federal Circuit affirmed the lower tribunal’s decision – varied greatly between each other at any particular moment and greatly shifted over time (Petherbridge, 2009, p. 442). Looking at the average rates of success for two of the response variables in this study shows that there is great volatility between the first and second half of the dataset (Petherbridge, 2009, pp. 442-443). Looking closer at the specific issues within the doctrine of equivalents yields similar results – different components of the doctrine have been on the rise while others have declined (Petherbridge, 2009, p. 459).

When examined as a whole, the results do not suggest a stagnating jurisprudence (Petherbridge, 2009, p. 459). Based on these results, the study suggests that the law concerning the doctrine of equivalents is fairly dynamic and that the law “is becoming more uncertain and unpredictable than uniform” (Petherbridge, 2009, p. 444). Having a wide degree of uncertainty and hence little uniformity suggests a lack of entrenchment, but does not directly address whether ideas percolate (Dreyfuss, 2010, p. 833). Nonetheless, the study concludes that the results provide evidence contradicting the notion that the Federal Circuit’s patent jurisprudence is uniform and entrenched (Petherbridge, 2009, p. 457). Nor, it concludes, has the Federal Circuit’s decisions become path-dependent so that debate is foreclosed, a variety of views are suppressed, and refinements through traditional common law processes are retarded (Petherbridge, 2009, p. 457). These conclusions are modest; the study makes clear that it cannot address the question of whether the Federal Circuit develops its patent jurisprudence at an optimal rate (Petherbridge, 2009, p. 464).

Recall that Nard and Duffy’s (2007) proposed solution to the lack of diversity in patent jurisprudence was to give at least two additional circuits jurisdiction over patent appeals (Nard & Duffy, 2007, pp. 1623-1625). Like their predicate belief that there is a lack of diversity, the proposed solution too has been challenged (Plager & Pettigrew, 2007; Golden, 2009, p. 661).

One objection questions whether Nard and Duffy's proposed solution begets better results (Plager & Pettigrew, 2007, p. 1756). That is, has it been adequately proven that multiple circuits disagreeing about what the law is will provide better decisions than the Federal Circuit currently provides (Plager & Pettigrew, 2007, p. 1756)?

The other objection concerns not *whether* another tribunal should play a role in the percolation process, but *which* tribunal should play that role (Golden, 2009). Rather than sacrificing the benefits of a single appellate court for an unknown benefit of percolation, an alternative solution is to urge the Supreme Court and Federal Circuit to work together to ensure the percolation of patent law (Golden, 2009, p. 662). The suggestion is to have the Supreme Court view itself as the "prime percolator" of patent law rather than the "final law sayer" (Golden, 2009, p. 662). Specifically, the Supreme Court would hear patent cases "to combat undesirable ossification of legal doctrine" and do so in an effort to spur subsequent development of the patent law (Golden, 2009, p. 662). This would occur by the Supreme Court only providing partial direction in its opinions and letting the lower courts and PTO flesh out the details and allow for continued growth (Golden, 2009, p. 663).

In conjunction with the Supreme Court taking this role, the Federal Circuit itself could undertake responsibility to foster percolation (Golden, 2009, p. 717). First, the Federal Circuit should hesitate to write or read opinions unnecessarily broadly (Golden, 2009, p. 717). This would limit entrenchment and allow subsequent panels to develop more nuanced and considered interpretations of the law (Golden, 2009, p. 717). Second, the Federal Circuit could promote percolation by hearing cases en banc when there is a risk of entrenchment on a substantive question and there is reason to believe the settled approach is substantially inferior to the alternative approach (Golden, 2009, p. 717). Given the Supreme Court's revived interest in patent law (Dreyfuss, 2010, pp. 829-830) and the Federal Circuit's high en banc rate in patent cases (Vacca, 2011, p. 738), it might be that this solution is being implemented. Another suggestion to assist in the percolation process is to use advisory panels (Pedraza-Fariña, 2015, pp. 154-159). These advisory panels, with a mixture of technological, economic, and sociological expertise, could advise the Federal Circuit on areas of the law in need of clarification and provide input on how a decision may impact innovation in particular fields (Pedraza-Fariña, 2015, pp. 154-155). Further research is warranted.

As noted in the beginning of this section, the Federal Circuit's creation spawned concern that there would be a lack of diversity in the development of patent jurisprudence (Nard & Duffy, 2007, p. 1623). Much ink has been spilled over whether this dearth of diversity exists and what, if anything, should be done to compensate for it. Novel approaches to evaluating the issues have been suggested and implemented, and although we have more data to analyze based on over thirty years of experimentation at the Federal Circuit, the role and impact of uniformity is still ripe for exploration.

IV. Certainty & Predictability

Closely related to, and sometimes intertwined with, uniformity is a concern over certainty. Certainty comes in two varieties. The first is certainty with respect to having clear rules as opposed to vague standards. The second variety of certainty, sometimes referred to as panel-dependency, is consistently applying the same legal rule or standard to a given scenario. Despite the differences in the types of certainty, both are aimed at the same goal – predictability – being able to accurately forecast the outcome of application of the law to a new set of facts (Michel, 1994, p. 1233). Predictability, of course, was one of the major problems Congress

sought to overcome by creation of the Federal Circuit, although the proposed route to solving this problem was uniformity (S. Rep. 97-275, 97th Cong., 1st Sess. 1981, 1982 U.S.C.C.A.N. 11; H.R. Rep. 97-312, 97th Cong., 1st Sess. 1981; Wagner & Petherbridge, 2004, p. 1108). As it turns out, uncertainty can exist despite uniformity. This section begins by exploring the pressures the Federal Circuit faces to foster certainty and uncertainty. Then, this section examines reversal rates and indeterminacy involving validity, claim construction, and infringement to see whether patent law and litigation have become more or less certain under the Federal Circuit's stewardship.

A. Pressure for and Undermining Certainty

The benefits of certainty and the risks of uncertainty in patent law abound. Uncertainty harms not only individual litigants coming before the court, but also negatively affects competitors, potential licensees, follow-on inventors, and the consuming public (Michel, 1994, pp. 1234, 1241; Mullally, 2010, pp. 1112-1114). For litigants, uncertainty increases the costs of litigation (Michel, 1994, p. 1234; Mullally, 2010, pp. 1112-1113). Certainty gives the parties the ability to decide their futures, and as argued by Paul Michel (1994), former Chief Judge of the Federal Circuit, parties resolving their disputes is superior to judges doing so and would result in fewer lawsuits altogether (Michel, 1994, p. 1234). More generally, uncertainty as to patentability may cause inventors and businesses to elect for trade secrecy rather than patent protection or may even result in failure to engage in the relevant research and development (Dreyfuss, 1989, p. 7; Michel, 1994, p. 1241; Mullally, 2010, pp. 1112-1113). As a result, the benefit of innovation and disclosure, along with the foundation for further innovation, may be lost (Michel, 1994, p. 1241; Mullally, 2010, pp. 1112-1113). Uncertainty regarding the patent's validity can also result in the patentee being unable to obtain financing to bring their innovation to market (Mullally, 2010, pp. 1112-1113). For competitors, and consequently the consuming public, uncertainty with respect to claim construction and the doctrine of equivalents plagues their ability to effectively compete by improving the patented technology (Michel, 1994, p. 1241; Mullally, 2010, pp. 1113-1114).

The pressure for certainty and uncertainty in patent law stems from a variety of sources. One such source is the patent bar (Thomas, 2003, p. 794). The patent bar was outspoken before creation of the Federal Circuit about the need for certainty and has continued down the path by seeking more rules and less standards from the Federal Circuit (Thomas, 2003, p. 794). Despite this claim, it has been suggested that the patent bar could be the source of pressure for uncertainty in an attempt to enhance their value as lawyers (Mullally, 2010, pp. 1142-1145).

Another source of pressure comes from district courts (Thomas, 2003, p. 795). District court judges' general inexperience with cutting-edge technology and patent law, coupled with complaints about the Federal Circuit's high rates of reversal, have caused them to seek more certain rules to apply in their cases to help compensate for this lack of expertise (Thomas, 2003, p. 795; Mullally, 2010, pp. 1128-1130; O'Malley, Saris, & Whyte, 2004, p. 682; Lee, 2010, pp. 9-20). The complexity of patent law itself also contributes to this problem (Thomas, 2003, pp. 794-795). It has been suggested that the Federal Circuit has tried to provide clear rules in an attempt to "provid[e] a well-meaning judiciary with a thread through the labyrinth" (Thomas, 2003, pp. 794-795).

Another source of pressure for increased certainty flows from the PTO (Thomas, 2003, pp. 795-796; Mullally, 2010, pp. 1126-1128). The PTO, because of its structure and employment of technical agents, many of whom are not lawyers, must synthesize Federal Circuit

case law in a way that is suitable for examiners to implement at the prosecution stage (Mullally, 2010, pp. 1126-1128). As a result, there is pressure from the PTO for the Federal Circuit to provide clear rules that can easily be translated into the Manual of Patent Examining Procedure and guidelines used by patent examiners (Mullally, 2010, pp. 1126-1128). But this is not always the case; sometimes the PTO has openly criticized the Federal Circuit for not allowing the PTO to exercise its discretion (Nard, 1995, pp. 1421-1422).

Despite these pressures for increased certainty, the Supreme Court, as of late, has been a consistent counter-pressure encouraging or mandating that the Federal Circuit take a less rule-like approach and adopt more flexible standards (Mullally, 2010, p. 1130; Pedraza-Fariña, 2015, pp. 105-107). Recent examples include *eBay*, *Festo*, *KSR*, and *Bilski*. In sum, the Federal Circuit has strived to provide predictability, but is caught between competing stakeholders and actors within the patent ecosystem that exert upward and downward pressure for more or less certainty (Mullally, 2010, p. 1126). To what extent the Federal Circuit has provided certainty is a separate question to which we now turn.

B. Reversal Rates, Panel Dependency, & Indeterminacy

An oft-examined method of measuring uncertainty caused by the Federal Circuit is to observe and compare the Federal Circuit's reversal rates over various aspects of district court litigation and how the makeup of the panel affects outcomes. Patent litigation before the Federal Circuit has been analogized to deciding the case by coin flip or dice roll (Hill & Cote, 2002, p. 2). The argument is that as the reversal rate increases, this makes it increasingly difficult for the parties and lower courts to have much confidence in the accuracy of their decisionmaking process (Mullally, 2010, pp. 1113-1114; O'Malley, Saris, & Whyte, 2004, p. 682). To the extent outcomes are based on the makeup of the panel, this also undermines certainty and predictability as the panels are not known until just before the case is argued (Wagner & Petherbridge, 2004, p. 1174). Beyond the quantitative analyses of reversal rates and panel-dependence, another source of uncertainty is the indeterminacy of the law because of the use of vague rules or standards as opposed to clearly defined rules. The following subsections explore how reversal rates, panel dependence, and unclear rules affect the most frequently examined areas of patent law – validity, claim construction, and infringement.

1. Validity

In a study claiming to be the first to examine data from decisions from both before and after creation of the Federal Circuit, Henry and Turner (2006) constructed a dataset of approximately five thousand patent cases from 1953 through 2002. In this study, the authors look at the affirmation rate of invalidity decisions in the pre-Federal Circuit era and Federal Circuit era (Henry & Turner, 2006, pp. 100-101). During the Federal Circuit era, the affirmation rate for invalidity was .573, nearly .28 points less than the pre-Federal Circuit era affirmation rate of .850 (Henry & Turner, 2006, p. 100). As a result, they found the Federal Circuit to be nearly three times more likely to reverse an invalidity decision than the regional circuits were (Henry & Turner, 2006, p. 100). Yet, when a district court held the patent to be valid and infringed, the Federal Circuit's affirmation rate was .723, .12 points higher than the pre-Federal Circuit era (Henry & Turner, 2006, pp. 100-103). The authors noted that several factors complicate their interpretation of these descriptive statistics and advised using a time-series analysis (Henry & Turner, 2006, p. 103). These results illustrate that the Federal Circuit has

been three times more likely to reverse an invalidity decision (Henry & Turner, 2006, p. 108). Unsurprisingly, patentees have appealed invalidity findings more frequently since the Federal Circuit's creation (Henry & Turner, 2006, p. 112). With respect to district court decisions, where the patent was held to be valid and infringed, the authors concluded that there was a short-lived initial surge in the affirmation rate, but this rate returned to the pre-Federal Circuit era rate in the 1990s (Henry & Turner, 2006, p. 112).

Although the Henry and Turner (2006) study provides interesting general results, it is not terribly specific with respect to the grounds of invalidity. There could, in fact, be variation within the Federal Circuit on the various requirements for a valid patent (Barnes, 2013, p. 973). Barnes (2013) conducted a study that examined, *inter alia*, reversal rates for invalidity based on section 112's enablement and written description requirements (Barnes, 2013, p. 983). The results show that the Federal Circuit reversed on enablement grounds 28.1% of the time, reversed on written description grounds 32.1% of the time, and had an overall reversal rate of 32.9% when combined (Barnes, 2013, pp. 991-992). When viewed as a three-year moving average from 1997 through 2011, there was substantial variation in reversal rates; in 2006-2008, the reversal rate for written description and enablement was at its lowest point of 18.9%, but from 2000 through 2002, the rate was at a high of 46.0% (Barnes, 2013, pp. 1004-1006). One major limitation of Barnes's (2013) study was that it excluded Rule 36 cases (Barnes, 2013, p. 989). If these cases were included, the reversal rates would necessarily drop (Barnes, 2013, p. 989).

In comparison, Sichelman (2010) analyzed reversal rates from 2000 through 2007 on several validity issues and included Rule 36 affirmances (Sichelman, 2010, pp. 1174-1175). These results show reversal rates of approximately 10-15% for written description and enablement (Sichelman, 2010, p. 1175). In comparison to other invalidity issues, such as anticipation, indefiniteness, obviousness, and statutory bars, the reversal rates for written description and enablement are relatively low (Sichelman, 2010, p. 1175). These data is further broken down to see whether the reversal stems from the patentee or accused infringer prevailing at the district court (Sichelman, 2010, pp. 1177-1178). For some validity issues, the disparity in reversal rates is substantial, such as for on-sale bar issues, where the reversal rate is 30% for prevailing patentees and only 9% for prevailing accused infringers (Sichelman, 2010, p. 1178). But for some areas, the disparity is negligible, such as the public use bar, which is 19% and 20%, respectively (Sichelman, 2010, p. 1178). Although there may be low reversal rates for one type of litigant versus another, the contrasting high reversal rates still inject uncertainty and unpredictability into the process.

Of course, appeals to the Federal Circuit come from district courts and the PTO. There could be some difference in reversal rates based on where the appeal stems from. Barnes's (2013) study breaks the data down into appeals from district courts and from the BPAI and shows that for section 112 reversals, the reversal rate for district courts was 38.0%, but only 17.5% for the BPAI (Barnes, 2013, pp. 993-994). Based on these results, one could conclude that the Federal Circuit is uncertain when it comes to appeals from district courts, but relatively certain when appealed from the BPAI. But as Barnes (2013) notes, selection bias could play a larger role in explaining what BPAI decisions are appealed as opposed to district court litigation (Barnes, 2013, p. 994).

Despite the results of these studies involving reversal rates, we should be hesitant to blindly follow them to the conclusion that this proves a high level of uncertainty and unpredictability. High reversal rates could be a result of extremely certain doctrine; specifically, parties may be more likely to appeal a particular issue when the correct result is certain and the

lower tribunal clearly erred (Rantanen & Petherbridge, 2015, p. 2013). In such situations, we would expect the reversal rates to be high, but the cause of the high reversal rate is inversely proportional to uncertainty (Rantanen & Petherbridge, 2015, p. 2013).

Panel dependence is another source of uncertainty and unpredictability. As Judge Paul Michel (1994) has noted, although there will always be some circumstances where outcomes are unpredictable, the worst scenario is when the legal borderline shifts based on the composition of the appellate panel (Michel, 1994, p. 1243).

In an early study, John Allison and Mark Lemley (2000) studied patent validity decisions from 1989 through 1996 (Allison & Lemley, 2000, pp. 745-746). Despite the firm belief of patent litigators that validity outcomes are panel-dependent, the results of this study did not provide strong empirical evidence for such a belief (Allison & Lemley, 2000, pp. 746, 753). After noting several limitations of the study, including subject matter bias by excluding appeals from the PTO, excluding remands, an inability to account for multiple causative case-specific facts, and the exclusion of Rule 36 affirmances, the authors describe their results (Allison & Lemley, 2000, pp. 748-749). Their results show that “validity votes were remarkably consistent” (Allison & Lemley, 2000, p. 754).

There did not seem to be any substantial differences between judges appointed before and after creation of the Federal Circuit (52.5% versus 55.0%) or between those with and without prior patent experience (57.9% versus 52.1%) (Allison & Lemley, 2000, p. 754). Using the Chi-squared test to apply their population data to the superpopulation, the authors come to similar conclusions – they could not confidently predict that the time of appointment or prior patent experience influenced validity voting (Allison & Lemley, 2000, pp. 754-755). When examining individual judges, the authors conclude that “the overwhelming majority of [Federal Circuit] judges show no leaning whatsoever for or against the validity of the patent” (Allison & Lemley, 2000, p. 757).

When looking at affirmance rates (rather than validity and invalidity rates), Allison and Lemley (2000) similarly concluded that the time of appointment and prior patent experience could not confidently be used to predict reversal rates for invalidity (Allison & Lemley, 2000, pp. 758-759). To be sure, there were some differences between judges with and without patent experience, but these differences were rather modest (Allison & Lemley, 2000, p. 759). When examining individual judges, most were close to the overall affirmation rate and even the outliers were close to the norm (Allison & Lemley, 2000, p. 759). Using the Chi-squared test to apply their population data to the superpopulation, the authors could only weakly reject the hypothesis that “there is no difference in the likelihood that [the various judges of the Federal Circuit] will vote to affirm the district court” (with a p-value of 0.069) (Allison & Lemley, 2000, pp. 759-760).

Finally, Allison and Lemley (2000) briefly explore specific validity issues and whether the outcomes are dependent on the judge (Allison & Lemley, 2000, p. 764). For best mode, judges with prior patent experience rejected best mode invalidity challenges 74.1% of the time whereas judges without prior patent experience rejected such challenges 61.5% of the time (Allison & Lemley, 2000, p. 764). They conclude that this difference is modest (Allison & Lemley, 2000, p. 764). A similar conclusion was drawn with respect to obviousness challenges (Allison & Lemley, 2000, pp. 764-765). For section 102 prior art challenges, judges appointed prior to creation of the Federal Circuit rejected these challenges 87.0% of the time whereas judges appointed after creation of the Federal Circuit rejected these challenges only 50.0% of the time (Allison & Lemley, 2000, p. 764). This result was surprising and it is unclear why such a

difference exists (Allison & Lemley, 2000, p. 764). In sum, Allison and Lemley (2000) conclude that, with respect to validity, there is little variation between the judges on the Federal Circuit and that validity cases “depend[] on the facts of the case, and not on the composition of the panel” (Allison & Lemley, 2000, p. 766). Because this study is now fifteen years old and many limitations existed, the time may be ripe for an updated study on panel dependency and patent validity.

Turning now to how vague rules or the use of standards affect certainty and predictability with respect to validity issues, Paul Michel (1994), before becoming Chief Judge, argued that the Federal Circuit had failed to increase predictability (Michel, 1994, p. 1233). Judge Michel (1994) argued that the Supreme Court’s four-part test from *Graham v. John Deere Co.* bewilders judges and that determining whether the person having ordinary skill in the art could have invented without undue experimentation becomes subjective and elusive (Michel, 1994, pp. 1240-1241). After initially using the CCPA’s test from *In re Winslow*, the Federal Circuit acknowledged the limitations of the *Winslow* tableau and, in terms of certainty, seemed to “[leave] too much discretion to the decision maker, [and] rendered the results of the nonobviousness uncertain” (Thomas, 2003, pp. 790-791). As a result, the Federal Circuit began to stress the importance of the prior art references teaching, motivating, or suggesting their combination (Thomas, 2003, p. 791; Petherbridge, 2010, pp. 910-911). Judge Michel’s comments concerning the uncertainty of obviousness were during the Federal Circuit’s TSM period and before the Supreme Court’s *KSR* decision. *KSR* relaxed the standard for proving obviousness by rejecting the rigid TSM test as the sole test for obviousness (*KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007)). If certainty and predictability were difficult under the Federal Circuit’s TSM test, *KSR*’s more fluid approach to obviousness introduces additional uncertainty to the mix.

Similarly, John Thomas (2003) reviewed the developments of other patent validity doctrines and concluded that the Federal Circuit has been moving from standards to rules (Thomas, 2003, pp. 773-774). As Thomas (2003) argued, the origin of this shift from standards to rules is *Pfaff v. Wells Electronics*. Prior to *Pfaff*, the Federal Circuit used a totality of the circumstances test for the on-sale bar trigger (Thomas, 2003, pp. 778-779). The Supreme Court rejected this test in *Pfaff* and, Thomas (2003) argues, caused the Federal Circuit to take a more rule-oriented approach (Thomas, 2003, pp. 779).

We have seen similar movements towards clear and definite rules in determining patentable subject matter. The judge-made exceptions to patentable subject matter muddied the waters of the broad categories capable of being patentable (Thomas, 2003, pp. 786-787). The Federal Circuit’s decision in *State Street* was a move toward simplicity (Thomas, 2003, pp. 787-788). The existing exceptions had formed a “Gordian knot” and the Federal Circuit’s decision in *State Street* severed, rather than untied, this knot and adopted a test that simply required that the process produce a “useful, concrete, and tangible result” (Thomas, 2003, pp. 788-789). Later, the Federal Circuit, sitting en banc in *In re Bilski*, addressed the patentable subject matter test for processes. In *Bilski*, the court rejected *State Street*’s test, but replaced it with the “machine or transformation” test (In re Bilski, 545 F.3d 943 (Fed. Cir. 2008) (en banc)). This seemed to be a limited retreat from certainty, but the Federal Circuit did limit this test as the *only* one to be used (In re Bilski, 545 F.3d 943, 964 (Fed. Cir. 2008) (en banc)). But again, like with obviousness, the Supreme Court rejected this approach in favor of a more flexible standard (*Bilski v. Kappos*, 561 U.S. 593, 604 (2010)). This lack of clear rules has continued on in the rest of patentable

subject matter jurisprudence, and has “created more legal conflict than [it] resolve[d]” (Rantanen & Petherbridge, 2015, pp. 2027-2028).

Regardless of whether it is because of or despite the Supreme Court’s interventions in cases such as *Pfaff* and *KSR*, there is a strong basis for believing that the Federal Circuit has been trying to increase certainty and predictability by providing clear and definite rules. Patent law’s current lack of certainty and predictability stemming from the use of standards and vague rules is not likely solely attributable to the Federal Circuit. Instead, the Supreme Court may be the major proponent of this type of uncertainty. Of course, as discussed with respect to uniformity, perhaps these are examples of the Supreme Court serving as the prime percolator.

2. Claim Construction⁴

Of all the areas of patent law, claim construction has received the most scrutiny from scholars, and reversal rates have been the central focus of these studies (Schwartz, 2010, p. 1075; Gruner, 2010, pp. 994-996). The Federal Circuit’s decisions in *Markman v. Westview Instruments* and *Cybor Corp. v. FAS Technologies, Inc.* and the Supreme Court’s decision in *Markman v. Westview Instruments* were partially motivated to enhance predictability of the claim construction process (Schwartz, 2010, p. 1075). The question scholars have wrestled with is whether this goal has been achieved (Schwartz, 2010, p. 1075).

Early studies examining claim construction report reversal rates ranging from 27% to 53.5% (Gruner, 2010, p. 995). Some included Rule 36 affirmances and some did not and the time periods varied as well (Gruner, 2010, pp. 995-1001). Many of the authors of these studies concluded that the Federal Circuit’s claim construction reversal rates “are excessive and indicative of major flaws in claim construction standards and processes” (Gruner, 2010, p. 1001).

In a study of claim construction appeals from 1996 through 2007, Schwartz (2008) found that 29.7% of appeals from district courts were reversed, vacated, or remanded in a way to vacate the judgment (Schwartz, 2008, p. 249). That study further showed that more experience with patent cases did not affect the reversal rate (Schwartz, 2008, pp. 255-256). Other studies show that judges with relatively recent patent experience are less likely to be reversed (Kesan & Ball, 2011, pp. 442-443; Stiernberg, 2013, pp. 294-295). Schwartz (2008) hypothesized that possible explanations for this have included trial judges being unable to master claim construction unless they have a technical background, the Federal Circuit’s caselaw on claim construction being unclear, and claim construction being inherently indeterminate because of the limitations of language (Schwartz, 2008, p. 267). Yet the Kesan and Ball (2011) and Stiernberg (2013) studies show no support for the theory that claim construction is inherently indeterminate so that district judges cannot learn from prior experience (Kesan & Ball, 2011, p. 442; Stiernberg, 2013, pp. 294-295).

In a comprehensive study of Federal Circuit claim construction opinions from 1991 through 2008, Schwartz (2010) reports the reversal rates of district courts before and after *Markman* and *Cybor* to see if these cases improved the certainty of claim construction and consequently reduced the reversal rates (Schwartz, 2010, p. 1076). Importantly, Schwartz (2010) included Rule 36 affirmances in his dataset, which gives a more accurate look at reversal rates (Schwartz, 2010, pp. 1090-1091).

⁴ Because another chapter of this book is dedicated to claim construction, this subsection only provides a cursory overview of claim construction studies. For a more detailed analysis of claim construction studies, see Volume II, chapter B.2.d.

Schwartz's (2010) results show that the reversal rate from January 1, 1991 through the Federal Circuit's April 1995 *Markman* decision was 20.8% (Schwartz, 2010, p. 1093). Between the Federal Circuit's *Markman* decision and the Supreme Court's *Markman* decision in April 1996, the reversal rate dropped to 17.7% (Schwartz, 2010, p. 1093). Between the Supreme Court's *Markman* decision and the Federal Circuit's March 1998 decision in *Cybor*, which held that the claim construction was reviewed de novo, the reversal rate rose to 26.2% (Schwartz, 2010, p. 1093). The seven year period between *Cybor* and *Phillips* (March 1998 – July 2005) saw the reversal rate grow to 32.1% (Schwartz, 2010, p. 1093). And from *Phillips* through the end of 2008, the reversal rate shrunk to 28.0% (Schwartz, 2010, p. 1093). In sum, the reversal rates were higher after the *Markman* cases than before (Schwartz, 2010, pp. 1094-1095).

Interestingly, from 1991 through 2008, the reversal rate was 28.5% and an additional 6.6% of appeals involved an affirmance of the district court, but still noted error in the claim construction (Schwartz, 2010, p. 1095). This is consistent with prior studies, where the reversal rates from 1996 through 2007 averaged 29.7% (Moore, 2005, p. 239; Schwartz, 2008, pp. 248-249). For 2008, the reversal rate was 37.5% (Schwartz, 2010, p. 1095). Schwartz's (2010) post-*Markman* reversal rates are abnormally high when considering that the average reversal rate of the Federal Circuit, excluding claim construction, is 18% (Sichelman, 2010, pp. 1171-1172).

Despite the results indicating that the claim construction reversal rate rose dramatically after *Markman*, Schwartz (2010) cautions that further empirical analysis is necessary, including regressions for control variables to eliminate possible explanations for the difference (Schwartz, 2010, p. 1098). Schwartz and others also warn of the limitations of this study from selection effects (Schwartz, 2010, p. 1098; Gruner, 2010, pp. 985-988).

The importance of certain selection effects have been debated (Sichelman, 2010, p. 1172; Gruner, 2010, pp. 1007-1052). It has been argued that the high reversal rate for claim construction is not problematic because the selection effects result in inherently uncertain claims being appealed (Gruner, 2010, pp. 1007-1009). This provoked a response that such an explanation does not adequately explain the high reversal rates, because when compared to reversal rates of other complex legal issues outside of the patent context, claim construction still remains the leader (Sichelman, 2010, pp. 1172-1174). And even comparing claim construction to other patent doctrines, the reversal rate far exceeds most other areas (Sichelman, 2010, pp. 1174-1176).

As far as implications of Schwartz's (2010) study to certainty and predictability, it could be that removing claim construction from the province of the jury has made patent law less predictable (Schwartz, 2010, p. 1101). But, as Schwartz (2010) notes, de novo review for claim construction is a confounding factor (Schwartz, 2010, p. 1101). Additional empirical study is necessary to determine the precise effects changes to claim construction have had on predictability (Schwartz, 2010, p. 1107).

One step towards additional empirical research was Ted Sichelman's (2010) analysis of reversal rates from 2000 through 2007 on a variety of patent issues (Sichelman, 2010, pp. 1174-1175). Building on Schwartz (2010), Sichelman's (2010) results show that claim construction has a reversal rate of 33% (Sichelman, 2010, p. 1175). Compared to the reversal rates of other patent issues, claim construction was near the top, only behind novelty and indefiniteness, each with 38% reversal rates (Sichelman, 2010, pp. 1175-1176). When broken down by who prevailed at the district court level, there was no difference in the claim construction reversal rates (Sichelman, 2010, pp. 1177-1178). Gruner asserts that these comparisons are not particularly enlightening because of the selection effects he previously articulated, but

acknowledges that future studies of reversal rates that control for variables such as the stake asymmetry of the parties, the parties' uncertainties as to the quality of their cases, and the ability of one party to better estimate outcomes would be worthwhile endeavors (Gruner, 2010, pp. 1062-1065).

Rather than accepting reversal rates as the correct measure of uncertainty in claim construction, Gruner (2010) argues that settlement rates would be better indicators of the clarity of the claim construction standards (Gruner, 2010, p. 1064). When doing so, the settlement rate for patent cases was 88% in 2008; up from 76% from 1995 through 1999 (Gruner, 2010, p. 1065). Gruner (2010) concludes that these figures illustrate that predictability is high among patent litigants and is growing more certain (Gruner, 2010, pp. 1065-1066). These results are interesting, but not specifically tied to claim construction; further research is necessary to explore this relationship (Gruner, 2010, pp. 1069-1070).

Lefstin (2007) adds a new twist to the empirical study of claim construction by analyzing dissenting opinions at the Federal Circuit from 1998 through mid-2005 (Lefstin, 2007, pp. 1031, 1069). The theory is that the frequency of dissents can be used to measure indeterminacy within the Federal Circuit (Lefstin, 2007, p. 1031). Lefstin (2007) argues that dissent rates are better measures of uncertainty than reversal rates because the observed group is small and relatively fixed as opposed to the more varied population of district court judges (Lefstin, 2007, p. 1032). Additionally, because the two sets of courts do not necessarily review the same set of facts and from the same vantage point, this could skew the results (Lefstin, 2007, p. 1032). And although there are a host of potentially confounding variables, comparing dissents within the same court, but in different fields of law helps provide a benchmark to determine whether the uncertainty is driven by the law itself or characteristics of the court and the judges (Lefstin, 2007, pp. 1032-1034).

The results of this study show that the overall dissent rate from 1998 through 2005 for claim construction was 8.3% (ranging from 1.4% to 19.5%) (Lefstin, 2007, p. 1072). This was nearly identical to the dissent rate for infringement, invalidity, and inequitable conduct (Lefstin, 2007, p. 1072). From this, Lefstin (2007) concludes that "there is no support for the hypothesis that over the entire period of this study, claim construction was any more or less indeterminate than any other issue of patent law" (Lefstin, 2007, p. 1072). However, because of the variation over time, a logistic regression was undertaken and suggests that there was an increasing disparity in claim construction methodology over time, and that from 2002 to 2004 there was likely an increase in legal indeterminacy (Lefstin, 2007, p. 1073). This corresponds, perhaps not coincidentally, to when the Federal Circuit ordered *Phillips* to be heard en banc (Lefstin, 2007, p. 1074).

Lefstin (2007) also compared claim construction dissent rates with dissent rates of contract interpretation in the regional circuits (Lefstin, 2007, p. 1075). It was thought that contract interpretation is analogous to claim construction (Lefstin, 2007, p. 1075). The dissent rates for contract interpretation ranged from 0.00% to 12.03% with an average of 5.74% (excluding the Federal Circuit) (Lefstin, 2007, p. 1077). When compared to the overall dissent rates for each regional circuit, Lefstin (2007) observes that the variation likely has more to do with structural differences between the circuits than variation in the indeterminacy of the cases (Lefstin, 2007, pp. 1080-1081). When comparing claim construction to contract interpretation dissent rates, Lefstin (2007) finds that "over the period from *Cybor* to *Phillips*, the average indeterminacy of patent claim construction was virtually indistinguishable from the indeterminacy associated with contract interpretation at the regional [circuits]" (Lefstin, 2007, p.

1087). When limited to reported cases, claim construction was more indeterminate, but the difference was unremarkable (Lefstin, 2007, p. 1087). In sum, Lefstin's (2007) study supports the view that claim construction did not suffer from uncertainty; at least not any more than other areas within and outside patent law.

Despite the tremendous number of studies empirically analyzing claim construction reversal rates and other objective outcomes, the Supreme Court's recent decision in *Teva Pharmaceuticals USA, Inc. v. Sandoz, Inc.* adds another layer of complexity. In *Teva*, the Court rejected the Federal Circuit's de novo standard of review for claim construction (*Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 835 (2015)). Instead, the Federal Circuit must now review district court claim construction under the clear error standard for subsidiary factfinding, but review the ultimate interpretation de novo (*Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 835, 839 (2015)). What change, if any, *Teva* will have on the Federal Circuit's development of claim construction law and how this affects certainty and predictability is worthy of future study.

Turning now to panel dependence, as Wagner and Petherbridge (2004) illustrate, from April 23, 1996 through November 1, 2002, there was a sharp division at the Federal Circuit between the "procedural" and "holistic" approaches to claim construction and claim construction was thought to be panel dependent (Wagner & Petherbridge, 2004, pp. 1111-1112, 1163). Others have concurred in this conclusion (Sichelman, 2010, pp. 1170, 1189).

Individual judges varied widely in their approaches to claim construction (Wagner & Petherbridge, 2004, p. 1112). Some judges used a "procedural" approach, whereby the judge starts with the ordinary understanding of the claim language and then departs from that meaning only upon significant proof that such a departure is required under the circumstances and according to an established hierarchy of sources (Wagner & Petherbridge, 2004, pp. 1133-1134). Other judges used a "holistic" approach, whereby the judge seeks meaning of the claimed term by looking to the particular circumstances presented rather than following formal steps and an established hierarchy (Wagner & Petherbridge, 2004, p. 1134). The results of their study show that the procedural approach to claim construction was used 63.1% of the time and the holistic approach was used in 36.9% of cases, but the strength of the methods were polarized (Wagner & Petherbridge, 2004, pp. 1148-1149). When observed over time, the move towards the extremes of these approaches increased (Wagner & Petherbridge, 2004, pp. 1149-1151).

When broken down into individual judges on the court, this explains why there was a shift over time to a more procedural approach – two additional procedural judges were added to the court in 2000 - Judges Linn and Dyk (Wagner & Petherbridge, 2004, p. 1153). These same additions may explain why there was a shift in the strength of the methods (Wagner & Petherbridge, 2004, pp. 1153-1155). Further analysis shows that there were factions on the Federal Circuit when it came to claim construction methods (Wagner & Petherbridge, 2004, p. 1159). Judges Dyk, Cleverger, and Linn (the proceduralist) led the shift toward a procedural approach and have varied little from this approach in comparison to the other members of the court (Wagner & Petherbridge, 2004, pp. 1161-1163). Unsurprisingly, the authors found that individual membership and composition of the panel has a statistically significant effect on the claim construction approach used (Wagner & Petherbridge, 2004, pp. 1163-1169).

Despite the argument that panel dependence undermines certainty and predictability, Wagner and Petherbridge (2004) were not necessarily troubled (Wagner & Petherbridge, 2004, p. 1169). They argue that those judges driving panel dependence provide some certainty to the court and that the rest of the judges who are not clearly classified contribute to unpredictability

(Wagner & Petherbridge, 2004, pp. 1169-1170). This may be true at the institutional level, but for individual litigants who do not learn of the makeup of their panel until the day of oral argument, this level of predictability is likely of little value (Wagner & Petherbridge, 2004, p. 1174). This study is now eleven years old and the composition of the court has changed quite dramatically since then. An updated version of this study may be appropriate.

In a more recent study of panel dependence for claim construction, Stiernberg (2013) found that when a Federal Circuit judge has expertise in the technological field concerning the patent in suit, then the judge is more likely to find claim construction errors (Stiernberg, 2013, p. 295). Specifically, the probability of claim construction reversal increased by 53.42% when the judge had a technical background relevant to the patent at issue (Stiernberg, 2013, p. 295). Unfortunately, there was insufficient data to assess whether the Federal Circuit's technical judges are equally likely to reverse district judges that share a technological expertise and whether these Federal Circuit judges are "unduly predisposed to substitute their own claim construction for those of the district courts" (Stiernberg, 2013, p. 296). Further research, although admittedly difficult to conduct, would help bear out whether the composition of the panel has an effect on claim construction (Stiernberg, 2013, p. 296).

Finally, turning to how vague rules or the use of standards affect certainty and predictability, the Federal Circuit has adopted various canons of construction for use in the claim construction process and has done so, at least in part, in a quest for predictability (Sichelman, 2010, p. 1191; Schwartz, 2010, pp. 1079-1080; Petherbridge, 2010, p. 934). The thought is that these canons produce a system of transparent rules, which may increase certainty and predictability. (Sichelman, 2010, pp. 1191-1192; Schwartz, 2010, pp. 1079-1080; Wagner & Petherbridge, 2004, p. 1133; Petherbridge, 2010, p. 934). But because of contradictions and tensions between them, application of these canons may lead to several constructions and judges are then forced to exercise their best judgment in properly construing the claim (Sichelman, 2010, pp. 1191-1192; Schwartz, 2010, pp. 1079-1080; Wagner & Petherbridge, 2004, p. 1133; Petherbridge, 2010, p. 934). As one scholar notes, "commentators, practitioners, trial judges, and even some judges of the Federal Circuit themselves seem united in their view that uncertainty and unpredictability are the order of the day" (Lefstin, 2007, p. 1026).

In the early 2000s, judges on the Federal Circuit split over the proper process for claim construction (Wagner & Petherbridge, 2004, p. 1111; Schwartz, 2010, p. 1080). Some believed that initially resorting to the dictionary was proper, while others felt that the first source for interpretation was intrinsic evidence – the claims, specifications, and prosecution history (Schwartz, 2010, p. 1080; Lefstin, 2007, p. 1074). These approaches are similar to the procedural and holistic approaches described above (Wagner & Petherbridge, 2004, pp. 1133-1136). The disagreement in approaches persisted for several years and became more pronounced over time; then the Federal Circuit issued its en banc opinion in *Phillips v. AWH Corp.* (Schwartz, 2010, p. 1080; Wagner & Petherbridge, 2004, p. 1155). *Phillips* rejected the dictionary-first approach and emphasized that there is no "right" way to analyze claims other than ensuring that particular sources do not contradict the unambiguous meaning of the claim in light of the intrinsic evidence (Schwartz, 2010, p. 1080; Petherbridge, 2010, p. 937; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1324 (Fed. Cir. 2005) (en banc)). But disagreement over how to construe claims remains (Schwartz, 2010, p. 1080; Petherbridge, 2010, p. 938). Indeed, *Phillips* suggests that claim construction is not guided by clear and certain rules, but is determined on a case-by-case basis (Petherbridge, 2010, p. 938). The Federal Circuit's loosely-guided approach in *Phillips* rests on the premise that courts and parties should focus on the understanding of the

PHOSITA (*Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (en banc); Sichelman, 2010, p. 1192). But, as Sichelman (2010) observes, the problem is that the PHOSITA “generally cannot understand a disputed claim term without knowing the applicable law” (Sichelman, 2010, p. 1192). Gruner (2010) takes a different view and concludes that the Federal Circuit’s claim construction standards are succeeding because parties are settling in 88% of filed cases (and numerous disputes that are not ever filed) (Gruner, 2010, pp. 986-988).

Before *Phillips* was decided, commentators noted that it was still an open question as to whether the Federal Circuit was succeeding in bringing certainty and predictability to claim construction, but the results were encouraging that the court was headed in that direction (Wagner & Petherbridge, 2004, p. 1179). Despite additional studies in the decade since *Phillips*, it may still be too early to say for sure whether this goal has been attained. An author who held out hope before *Phillips* was decided has subsequently stated that *Phillips* is derationalizing and that it seems to encourage unpredictability (Petherbridge, 2010, pp. 941-942). As it was a decade ago, the question of the Federal Circuit’s successful contribution of certainty to the claim construction process is still open.

3. Infringement

In addition to validity and claim construction, certainty regarding infringement is probably of the utmost concern to patentees and potential infringers. Henry and Turner’s (2006) study of approximately five thousand patent cases from 1953 through 2002 focused on reversal rates for infringement (Henry & Turner, 2006, pp. 95-99). They found that the Federal Circuit affirmed district court findings that the patent was valid and infringed at a higher rate than during the pre-Federal Circuit era (Henry & Turner, 2006, pp. 100-103). The Federal Circuit’s affirmation rate was .723 for valid and infringed patents, whereas during the pre-Federal Circuit era, the rate was .603 (Henry & Turner, 2006, pp. 102-103). For district court findings of non-infringement, the Federal Circuit’s affirmation rate was .685, which is nearly the same as the pre-Federal Circuit era affirmation rate of .694 (Henry & Turner, 2006, pp. 102-103).

Like with their analysis of invalidity, the authors note that several factors complicate their interpretation of these descriptive statistics and advised using a time-series analysis (Henry & Turner, 2006, p. 103). The results of this analysis show that the Federal Circuit’s affirmation rate of non-infringement findings was similar to that of the regional circuits during the pre-Federal Circuit era (Henry & Turner, 2006, p. 109). For valid and infringed decisions, there was an upward jump in affirmation until the late 1980s, but then the affirmation rate dropped down to the pre-Federal Circuit rates for the rest of the study period (Henry & Turner, 2006, pp. 110-112).

Interestingly, the focus of reversals of valid and infringed findings has shifted (Henry & Turner, 2006, p. 112). During the pre-Federal Circuit era, 71% of reversals of valid and infringed decisions were based on validity and 16% were based on infringement (Henry & Turner, 2006, p. 112).⁵ During the Federal Circuit era, reversals of valid and infringed decisions were based on validity 29% of the time compared to 40% for infringement (Henry & Turner, 2006, p. 112).⁶ Drilling down a bit more, from 1983 through 1992, reversals were 41% and 32% for validity and infringement, respectively (Henry & Turner, 2006, p. 112). From 1992 through 2002, the rates changed to 22% and 44%, respectively (Henry & Turner, 2006, p. 113). Like

⁵ Vacated and remanded decisions make up the remaining cases.

⁶ This also shows that the Federal Circuit vacated or remanded more frequently (Henry & Turner, 2006, p. 112).

with their study of invalidity, Henry and Turner's (2006) study provides interesting general results, but is not specific with respect to the particular infringement issues facing district courts and the Federal Circuit.

Sichelman (2010), in his study of different reversal rates, shows that the doctrine of equivalents and literal direct infringement both had overall reversals rate of 15% (Sichelman, 2010, p. 1175). Contributory infringement had an overall reversal rate of 16% (Sichelman, 2010, p. 1175). To put these rates in perspective, the average reversal rate across all issues during the relevant time was 21% (18% excluding claim construction) (Sichelman, 2010, p. 1175). From this perspective, reversal rates related to infringement were lower than average and perhaps not so uncertain.

But when broken down by whether the patentee or accused infringer prevailed at the district court level, the reversal rates for the doctrine of equivalents were 33% and 12%, respectively (Sichelman, 2010, p. 1177). For literal direct infringement, the reversal rates were 27% and 11%, respectively (Sichelman, 2010, p. 1177). And for contributory infringement, the reversal rates are 0% and 21%, respectively (Sichelman, 2010, p. 1177). Again, to give a point of reference, the average reversal rates across all issues (except claim construction) during the relevant time periods were 20% and 16%, respectively (Sichelman, 2010, p. 1177). From these perspectives, some areas related to infringement are quite certain (contributory infringement) while others are less so (doctrine of equivalents for prevailing patentees).

Petherbridge's (2009) study of the doctrine of equivalents shows different results (Petherbridge, 2009, p. 442). Using moving (lagged) averages, this research shows that from 1992 through 2007, the Federal Circuit's affirmation rate of doctrine of equivalents cases ranged from 20% to 90% (Petherbridge, 2009, p. 442). When breaking down the time periods, the results show an average affirmation rate of 71% from 1992 through 2000, but a drop to 49% from 2001 through 2007 (Petherbridge, 2009, p. 443). These data suggest that the doctrine of equivalents became less certain and predictable for district court judges during this later period (Petherbridge, 2009, pp. 442-444).

Turning now to panel dependence, Petherbridge (2009) also reviews the role of individual judges on the Federal Circuit to determine if judge selection affects the reversal rate (Petherbridge, 2009, pp. 445-446). His study rejects the hypothesis that "[t]here are no differences in the likelihood of [affirmations of the district court's decisions] when different judges hear appeals" with a p-value of .000 (Petherbridge, 2009, p. 446). The odds ratios for the various Federal Circuit judges indicate that several judges impacted the affirmation outcome in a statistically significant way (Petherbridge, 2009, p. 447). For example, Judges Bryson, Rich, Skelton, and Smith had strong positive effects on affirmation, but Judges Linn, Prost, and Schall had strong negative effects (Petherbridge, 2009, p. 447).

Focusing on contemporaneously appointed judges and more active judges, did not change the story much. The hypothesis that "[t]here are no differences in the likelihood of [affirmations of the district court's decisions] when Judges Radar, Lourie, Clevenger, Schall, and Bryson hear appeals" was rejected with a p-value of .008 (Petherbridge, 2009, p. 450). The hypothesis that "[t]here are no differences in the likelihood of [affirmations of the district court's decisions] when Judges Bryson, Clevenger, Gajarsa, Linn, Lourie, Michel, Newman, Radar, Schall, and Dyk author analyses between January 1, 2001 and December 31, 2005" was also rejected with a p-value of .032 (Petherbridge, 2009, p. 450).

Grouping together particular judges as "proceduralists," "swings," and "holistics" showed a statistically significant effect on affirmation outcomes (Petherbridge, 2009, p. 455). In

contrast, grouping together particular judges by the appointing President or whether the judge had a patent background before their appointment to the Federal Circuit had no statistically significant effect on affirmation outcomes (Petherbridge, 2009, p. 455).

These results suggest that reversal rates related to the doctrine of equivalents may very well be panel dependent. Of course, the composition of the court has changed quite dramatically over the last several years, so an updated study would be worthwhile.

Finally, turning to how vague rules or the use of standards affect certainty and predictability, after just over a decade of the Federal Circuit, Judge Michel (1994) described the problem of uncertainty as it pertained to the doctrine of equivalents (Michel, 1994, p. 1236). First, he noted that limitations on the doctrine, such as prosecution history estoppel and the rule against extending protection beyond the prior art, were rarely applied (Michel, 1994, p. 1236). Moreover, the limitation that restricts extension to be within the available range of equivalents that is proportionate to the scope of the claimed invention viewed against the prior art has been useless to judges and the attorneys because of its vagueness (Michel, 1994, pp. 1236-1237). Notwithstanding the Federal Circuit's element-by-element test for equivalence, Judge Michel (1994) opined that with good jury instructions, lay jurors struggled to understand the meaning of the tests and limitations to it (Michel, 1994, p. 1237). And when poor jury instructions were issued, Michel concludes that "the jury's task seems impossible" (Michel, 1994, p. 1237). Even as a judge on the Federal Circuit, Judge Michel admits to occasionally being "baffled by the more basic question under the doctrine of whether an accused device with structurally different components nevertheless works in 'substantially the same way' under [*Graver Tank*]" (Michel, 1994, p. 1237). Continuing on, Judge Michel (1994) notes that the Federal Circuit has said the doctrine of equivalents should not erase a plethora of *meaningful* claim limitations, but at the same time suggests that that all limitations are material and therefore meaningful (Michel, 1994, pp. 1237-1238). As a result, juries and district court judges find infringement analyses difficult and their findings become unpredictable (Michel, 1994, p. 1238).

The results of Lunney's (2004) study support the belief that infringement is uncertain and unpredictable at the Federal Circuit. Instead of emphasizing reversal rates, Lunney focused on success rate variability for infringement (Lunney, 2004, pp. 75-76). This study shows that after creation of the Federal Circuit, patentees were more likely to prevail on appeal on validity grounds, but less likely to succeed when it came to infringement (Lunney, 2004, p. 14). This corresponds to a narrowing of the doctrine of equivalents by the Federal Circuit (Lunney, 2004, pp. 27-28). If this narrowing was supposed to increase certainty and predictability, then the success rate variability at the Federal Circuit should decrease (Lunney, 2004, p. 75). However, the data indicate the opposite – success rate variability increased (Lunney, 2004, p. 76). Prior to creation of the Federal Circuit, the standard deviation for infringement success rates was 3.25 percent (Lunney, 2004, p. 76). When analyzing the period of time after the Federal Circuit began to narrow the doctrine of equivalents, the standard deviation increased to 10.2% (Lunney, 2004, p. 76). From this, Lunney (2004) concludes that the increased success rate variability "suggests that parties are less able to predict appellate litigation outcomes under the Federal Circuit [and that] . . . the Federal Circuit and its doctrinal changes have brought less certainty and predictability to patent enforcement" (Lunney, 2004, p. 76).

In contrast, nearly a decade after Judge Michel's comments, Thomas (2003) argues that the Federal Circuit has shifted toward bright line rules with respect to the doctrine of equivalents (Thomas, 2003, p. 781). In 1996, the court announced the rule that subject matter disclosed, but not claimed was dedicated to the public and could not serve as a basis for infringement under the

doctrine of equivalents (Thomas, 2003, pp. 781-782). But two years later, the court opined that there was no per se rule that subject matter disclosed, but not claimed, is not an equivalent (Thomas, 2003, p. 782). In 2002, the court resolved this conflict by issuing an en banc opinion in *Johnson & Johnson Associates, Inc. v. R.E. Service Co., Inc.*, which adopted the public dedication doctrine, whereby subject matter disclosed, but not claimed, in the patent cannot be reached under the doctrine of equivalents (Thomas, 2003, p. 782). This per se rule is an example of a move from a flexible standard towards a bright line rule (Thomas, 2003, pp. 782-783).

Likewise, with prosecution history estoppel, there was disagreement over the extent to which this rule limited application of the doctrine of equivalents (Thomas, 2003, p. 783). Some courts used a strict bar approach, which precluded any range of equivalents for the amended limitation (Thomas, 2003, p. 784). Other courts adopted a flexible approach, which only limited application of the doctrine of equivalents to situations where the PHOSITA would reasonably believe the patentee surrendered the subject matter (Thomas, 2003, p. 784). The Federal Circuit had favored the flexible approach, but changed course in its en banc opinion in *Festo* and held that the strict bar approach was appropriate (Thomas, 2003, pp. 784-785; Lunney, 2004, p. 35; Petherbridge, 2010, p. 924). To help justify this rule, the court noted that the need for certainty of the patent's scope was being emphasized (Thomas, 2003, p. 785; *Festo Corp. v. Shoketsu Kinzoku Kogyu Kabushiki Co., Ltd*, 234 F.3d 558, 574-575 (Fed. Cir. 2000) (en banc)).

Although the Federal Circuit moved toward a bright-line rule and an effort to enhance certainty, similar to what we saw for validity, the Supreme Court rejected this approach and replaced this rule with a rebuttable presumption of abandonment of the subject matter (Thomas, 2003, pp. 785-786; Lunney, 2004, pp. 35-36; Petherbridge, 2010, pp. 924-925). Despite the move away from the more certain strict bar approach, the Supreme Court's new test was a middle ground between the strict bar approach and the more flexible bar standard, so the blow to certainty was expected to be minor (Thomas, 2003, p. 786; Lunney, 2004, p. 36; Petherbridge, 2010, p. 925).

In sum, the Federal Circuit may have successfully moved toward more certainty and predictability when it came to adopting infringement rules (Thomas, 2003, pp. 781-786), but like with validity, the source of any remaining uncertainty may stem more from the Supreme Court than the Federal Circuit. Assuming these moves toward clear rules provide more certainty and predictability (which is questionable given the empirical studies on reversal rates and panel dependence), the question arises whether such bright line rules are the right tools for the job; that is, has the Federal Circuit sacrificed quality for certainty? We turn to that issue now.

V. Quality

A common critique of the Federal Circuit is that its rules and decisions are of poor, or at least suboptimal, quality (Dreyfuss, 2008, pp. 791, 809; Nard & Duffy, 2007, pp. 1620-1621, 1644, 1645; Dreyfuss, 2010, p. 830). The first lens in which quality is measured through has been whether the court has been too formalistic in its decisionmaking; that is, does the court pay enough attention to policy and technological considerations (Dreyfuss, 2008, pp. 791, 803, 809)? Closely associated with this is the question of what extent being a "specialized" court has had on the quality of the Federal Circuit's rules and opinions. The second lens quality is measured through has been to focus on the Federal Circuit's use of scholarship (legal and otherwise) in its written opinions (Nard, 2002). This criticism of quality and the measures of it have provoked rejoinders, most notably from judges on the Federal Circuit (Plager & Pettigrew, 2007, pp. 1740-1745). The remainder of this section explores these claims, methods, and responses.

A. Formalism

The major criticism of the quality of the Federal Circuit's decisionmaking is that it is too formalistic (Dreyfuss, 2008, p. 791; Rai, 2003, pp. 1103-1104; Lefstin, 2010, p. 846). That is, there is a concern that the court is not engaged in serious thinking, at least with respect to policy, when it adopts and applies the legal rules; instead it produces isolated and sterile opinions that are disconnected from those affected by patent law (Dreyfuss, 2010, p. 833; Nard & Duffy, 2007, pp. 1620-1621). As Dreyfuss (2008) explains, "the Federal Circuit tends to favor a kind of formalism that is more characteristic of legal thinking in the nineteenth century than in the twenty-first" (Dreyfuss, 2008, p. 809). The court "rarely provide[s] insight into the goals the court sees the law as achieving [and] 'policy' discussions take the form of incantations of standard justifications for statutory terms" (Dreyfuss, 2008, p. 809). And as discussed earlier in regards to certainty, there has been a move at the Federal Circuit away from flexible standards towards bright-line rules (Thomas, 2003, pp. 773-774). Although bright-line patent rules may enhance certainty, there is a risk that it distances patent law from innovation policy (Thomas, 2003, p. 774).

Examples of the Federal Circuit's formalist approach abound. In *Phillips v. AWH Corp.*, despite "the torrent of ink that has been spilled on theories of statutory construction and contract interpretation," none of the judges engaged with those policy discussions in their decisions (Dreyfuss, 2010, p. 835). Similarly, Dreyfuss (2004) notes that in *Schering Corp. v. Geneva Pharmaceuticals*, the court cited a tremendous amount of precedent, but never focused on underlying policies (Dreyfuss, 2004, pp. 777-778). Importantly, the two approaches at issue in *Schering* have dramatically different effects on innovation systems – one "preserves incentives to study known inventions and to find valuable features, while [the other] protects first comers, the public, and the temporal limits of patents" (Dreyfuss, 2004, pp. 777-778).

Arti Rai (2003) discusses several examples of the Federal Circuit adopting a formalistic bright-line approach to patent law, where a more flexible, policy-oriented approach may make sense (Rai, 2003, pp. 1103-1110). Rai points to the court's patentable subject matter decisions in *State Street* and *AT&T Corp. v. Excel Communications, Inc.* as examples (Rai, 2003, pp. 1103-1107). She also points to the court's rigid and policy-void opinions in *Xerox* and *Madey v. Duke University* concerning antitrust limitations and experimental use, respectively (Rai, 2003, pp. 1107-1110).

Burk and Lemley (2003) note that the Federal Circuit's actual or functional elimination of policy levers, such as the prohibition against business method patents, the printed matter doctrine, the reverse doctrine of equivalents, and experimental use, were not based on policy changes rendering the rules obsolete, but to a lack of specific authorization in the Patent Act (Burk & Lemley, 2003, pp. 1672-1673). These are additional examples of formalism – strictly sticking to the text of the statute in spite of the need and invitation to use policy to develop patent law and ensure its responsiveness to changed circumstances (Rai, 2003, p. 1040; Burk & Lemley, 2003, pp. 1672-1673).

More recently, Osborn (2012) describes the Federal Circuit's formalism in terms of failing to read precedent in context. For example in *Bilski*, the Federal Circuit relied on the Supreme Court's 1972 decision in *Benson*, when it announced that the machine-or-transformation test was the sole test for patentable subject matter for process claims (Osborn, 2012, p. 429). The cornerstone of the Federal Circuit's explanation of this rule was that *Benson* described the machine-or-transformation test as "the" clue, not "a" clue to patentability (Osborn,

2012, p. 431). And although this is a reasonable interpretation “if the ‘clue’ language appeared in a vacuum, . . . , it did not” (Osborn, 2012, p. 431). In short, the Federal Circuit clung to specific precedential language, but failed to read it in context (or at least give due weight to that context) (Osborn, 2012, pp. 431-432).

Assuming for the moment that the Federal Circuit is too formalistic in its decisionmaking, what could be the cause? Lefstin (2010) argues that the Federal Circuit’s formalism largely stems from its history (Lefstin, 2010, p. 847). In particular, he argues that because the Federal Circuit adopted the CCPA’s body of case law as its own, and because of the CCPA’s particular structure and needs, this has strongly shaped the development of the Federal Circuit’s patent jurisprudence and decisionmaking and yielded a court steeped in formalism (Lefstin, 2010, p. 847).

The PTO, Lefstin (2010) argues, only dealt with patentability (and occasional interferences) and not infringement actions, and therefore had little need to appreciate the consequences of granting patents of broad or narrow scope (Lefstin, 2010, p. 853). The CCPA was limited to reviewing PTO decisions and likewise had no need to consider these consequences or those affecting innovation and competition (Lefstin, 2010, pp. 853-855). The CCPA’s case law reflects this lack of interest in downstream effects from its and the PTO’s decisions (Lefstin, 2010, pp. 853-856). Lefstin (2010) also notes that the CCPA highly emphasized that PTO rejections must have been grounded in a provision of the Patent Act and that the CCPA used strict adherence to the text of the statute to maintain control over PTO practices (Lefstin, 2010, pp. 858-859). CCPA references outside the statute were rare (Lefstin, 2010, p. 858).

By adopting the CCPA’s patent jurisprudence, the Federal Circuit implicitly rejected the patent jurisprudence developed by the regional circuits (Lefstin, 2010, pp. 868-870). And even when the CCPA had not spoken on a particular issue, such as infringement, the Federal Circuit tended to ignore the law developed by the regional circuits (Lefstin, 2010, pp. 870). In fact, the Federal Circuit’s first case, *South Corp. v. United States*, which adopted the CCPA’s case law as precedent, set the tone for the formalism for which the Federal Circuit is now critiqued (Lefstin, 2010, pp. 870-871). In *South Corp.*, Chief Judge Markey, rejecting a suggestion to adopt the laws of other courts, noted that resolving existing conflicts between the circuits would require “a careful, considered, cautious, and contemplative approach” (*South Corp. v. United States*, 690 F.2d 1368, 1371 (Fed. Cir. 1982) (en banc); Lefstin, 2010, pp. 870-871). As described earlier, the Federal Circuit not engaging in a careful, considered, cautions, and contemplative decisionmaking is a similar refrain by legal scholars.

Another source of the Federal Circuit’s formalism has been attributed to it being a specialized court. Although some take issue with the term “specialized court” because the Federal Circuit hears a variety of types of cases (Plager & Pettigrew, 2007, p. 1740), it cannot be disputed that the Federal Circuit has more exposure to patent cases than any other court. As a result, Federal Circuit judges develop some level of expertise in emerging sciences and encounter new problems that arise when patent law is applied to new technology (Dreyfuss, 2010, p. 839; Kesan & Ball, 2011, pp. 401-402, 408). And, as the theory goes, specialization can improve the quality of the adjudication (Dreyfuss, 2004, p. 770; Kesan & Ball, 2011, pp. 401-402, 408).

However, a potential problem with specialization is that channeling a particular type of case to a single court may result in a lack of contact with other legal developments, which may result in tunnel vision and yield stagnated law (Kesan & Ball, 2011, p. 404; Dreyfuss, 2004, p.

778). As Laura Pedraza-Fariña (2015) illustrates using sociological literature, the Federal Circuit engages in typecasting and has an inability to self-coordinate, and that these contribute to what we understand as tunnel vision (Pedraza-Fariña, 2015, pp. 136-137, 140-142). Typecasting happens when an expert community treats a particular problem as similar to other problems already solved within its domain of expertise, and is thus less likely to look for other – potentially better – solutions outside of this area of expertise (Pedraza-Fariña, 2015, pp. 136-137). The inability to self-coordinate arises when a problem requires cooperation and coordination between two or more expert areas and one expert institution places inadequate weight on the competing considerations and interests of the other expert institution (Pedraza-Fariña, 2015, pp. 140-142). Pedraza-Fariña (2015) argues that the Federal Circuit exhibits these qualities and explains that this leads to undesirable consequences in the context of the Federal Circuit (Pedraza-Fariña, 2015, p. 142).

A few suggestions have been made on how to ameliorate the problems associated with specialization. One is to expand the Federal Circuit’s jurisdiction to cover more issues, especially those overlapping with the jurisdiction of the other circuits (Dreyfuss, 2004, p. 786). Others are skeptical that such an approach would have any effect (Pedraza-Fariña, 2015, p. 153). A second is to have judges on the Federal Circuit sit by designation on other courts (Dreyfuss, 2004, p. 796). Doing so would expose Federal Circuit judges to jurisprudential trends across the country and other approaches to decisionmaking (Dreyfuss, 2004, p. 796). The data suggest that in comparison to other circuits, Federal Circuit judges have been infrequent visitors (Dreyfuss, 2004, pp. 794-795).

A third proposal is to have the Federal Circuit use visiting judges more often (Dreyfuss, 2004, p. 796). Like with the second proposal, the interaction with other judges would acquaint the Federal Circuit with different practices (Dreyfuss, 2004, p. 796). The data here also show that the Federal Circuit has been an infrequent host to judges from other courts (Dreyfuss, 2004, pp. 794-795). There are limitations to this third proposal however. Having visiting judges might be disruptive because other judges might not have the expertise to deal with the technical materials frequently involved in patent litigation, and as a result, the case might be viewed as compromised (Dreyfuss, 2004, p. 796). This argument seems to assume though that a lack of exposure to a certain subject matter results in a lower quality opinion. To the extent this is true, having a visiting judge from a district court only makes the problem worse as studies show that visiting district judges are overly deferential to the appellate judges (Dreyfuss, 2004, p. 796).

Alternatively, Laura Pedraza-Fariña (2015) posits a sociological theory for the Federal Circuit’s formalism. This theory describes the Federal Circuit as a “weak expert community” and suggests that it uses formal rules to teach and control subordinate communities such as the PTO and district courts, to legitimize itself before relevant external audiences, and to manage internal dissent (Pedraza-Fariña, 2015, pp. 128-136). Calls for empirical research to test these functions have been made (Pedraza-Fariña, 2015, p. 136). Such studies could include measuring “whether a court is more likely to prefer bright-line rules over flexible, indeterminate tests in periods of high-judge turnover, in periods with great epistemic diversity among judges, or in periods of crises of negative public opinion” (Pedraza-Fariña, 2015, p. 136). Comparisons between patent and non-patent dockets and one or more specialist courts could also prove informative (Pedraza-Fariña, 2015, p. 136).

Regardless of the reason for the Federal Circuit’s formalism, why does it matter? What benefits flow from an anti-formalist approach to decisionmaking or what costs are associated with a formalist jurisprudence? Ideally, enhanced quality would result in opinions where the

court sets out the policies it is trying to achieve, discusses alternative approaches, and explains why the chosen position best achieves the objectives (Dreyfuss, 2008, p. 803). Articulating rules and application in this matter could promote coherence; legal doctrines could fit together in a purposeful way rather than haphazardly (Dreyfuss, 2008, p. 803). From the other perspective, formalism undermines confidence in the court's decisions because it fails to "test[] the accuracy of its positions by trying to explain them" (Dreyfuss, 2008, p. 809). Finally, the Federal Circuit's formalistic approach creates a vacuum in which there is no law, incoherent law, or bad law to apply to changed circumstances (Dreyfuss, 2010, pp. 838-839). Reinterpreting patent law is necessary as the innovation economy has changed dramatically – the explosion of biotechnology and computer science, the development of nanotechnology, the movement to upstream patenting of fundamental advances in new fields, and shifts in the business of patenting (Dreyfuss, 2010, pp. 838-839).

But not everyone is in accord with the view that the Federal Circuit is formalistic or that if it is, that this is problematic. Several Federal Circuit judges have been outspoken about the resistance to using policy in their decisionmaking (Taylor, 2013, p. 641). For example, Judge Newman (1993) has stated, "I caution against . . . policy-driven activism whereby the application of the law will not be known until the Federal Circuit hears the case It is policy choices that lead to departure from precedent, into the judicial activism that weighs against legal stability" (Newman, 1993, p. 688; Taylor, 2013, p. 641). She concludes with "policy choices are not the province of judges" (Newman, 1993, p. 688). Judge Lourie (2006) notes that the court is "not a policy-making legislature" or a "debating society having debates with outside groups on what the law should be" (Lourie, 2006, p. 41; Taylor, 2013, p. 641). Instead, he describes the decisionmaking process as just applying the precedent as best as the judges can to the cases coming before it (Lourie, 2007, p. 22). Judge O'Malley (2012) has also eschewed policy in the court's decisionmaking (O'Malley, 2012, p. 92; Taylor, 2013, p. 644). Judge O'Malley's rationale is that the court needs to determine what the law is and judges consult a crowded field of authority that limits the court's ability to rely upon policy (O'Malley, 2012, pp. 93-94; Taylor, 2013, p. 644).

Judge Plager echoes the same sentiment, but deconstructs the argument a bit more (Plager & Pettigrew, 2007, pp. 1737-1738; Taylor, 2013, p. 642). In examining whether the Federal Circuit's decisions are of sufficient quality, Nard and Duffy (2007) ask whether the decisions "adequately reflect[] current knowledge regarding the beneficial functions of the patent system in generating technological innovation, the potential problems of patent rights in foreclosing legitimate competition, and the need for predictable rules capable of curtailing litigation costs" (Nard & Duffy, 2007, p. 1620). Plager and Pettigrew (2007) challenge the first two of those questions as not necessarily being indicative of high-quality decisionmaking (Plager & Pettigrew, 2007, pp. 1740-1745).

Moreover, Plager and Pettigrew (2007) reject the view that the Federal Circuit should engage in setting patent policy and correcting the perceived errors of Congress and the Supreme Court (Plager & Pettigrew, 2007, p. 1743). They note that the court is merely interpreting a federal statutory scheme and is limited accordingly (Plager & Pettigrew, 2007, p. 1753). As a result, the court cannot engage in common law-esque development of patent law (Plager & Pettigrew, 2007, p. 1753). Although he acknowledges that courts must sometimes exercise judgment in interpreting a statute, Judge Plager rejects the notion that the court should "assess the extent to which the congressional policy is responsive to current problems or to determine

how well-tuned the statute is to subtle changes in people's behavior or market conditions" (Plager & Pettigrew, 2007, pp. 1737-1739).

Although there is some minor variation in the judges' responses to the critique of formalism, a common thread seems to be a fear that the court will be seen as an "activist" court (Osborn, 2012, p. 458; Burk & Lemley, 2003, p. 1638; Rai, 2003, p. 1116). But as some commentators have noted, this should be less of a concern for the Federal Circuit because the Patent Act was designed for judicial discretion to fill the gaps in the statutory scheme (Osborn, 2012, p. 458; Burk & Lemley, 2003, p. 1638; Rai, 2003, p. 1116). The court should not shy away from this duty, but embrace it. (Osborn, 2012, p. 458; Burk & Lemley, 2003, pp. 1638, 1674; Rai, 2003, p. 1116).

Federal Circuit judges responding to arguments that the Federal Circuit produces low-quality opinions may, of course, be biased. Taylor (2013) provides academic support to the judges' responses and argues against the view that the Federal Circuit is overly formalistic. Taylor (2013) asserts that the court does express its policy views when identifying the underlying, basic purpose behind a doctrine and when the court hears a case en banc (Taylor, 2013, p. 638). That being said, Taylor (2013) does not go so far as to argue that the Federal Circuit is a shining example of antiformalism. He recognizes that there are numerous instances where the court's opinions, even in important cases, are devoid of policy discussion when such a discussion might be appropriate (Taylor, 2013, pp. 652-657). Nonetheless, Taylor (2013) supports his argument with examples of cases where the Federal Circuit does address policy in its decisionmaking process, including *Pfaff v. Wells Electronics (on-sale bar), Inc.*, *Integra Lifesciences I Ltd. v. Merck KGaA* (statutory safe harbor), *Board of Trustees of Leland Stanford Junior University v. Roche Molecular Systems, Inc.* (application of Bayh-Dole), and *LG Electronics, Inc. v. Bizcom Electronics, Inc.* (exhaustion doctrine) (Taylor, 2013, pp. 657-658).

Taylor (2013) also recognizes that the use of policy arguments has been used in dissenting opinions from denials of en banc rehearing and in en banc opinions (including concurring and dissenting opinions) (Taylor, 2013, pp. 659-661). A prime example of the Federal Circuit using policy in its decisionmaking is its en banc decision in *Festo* (Taylor, 2013, p. 661). The majority opinion considered the notice function of claims and the need for certainty of patents' scope and how adopting the complete bar to prosecution history estoppel will stimulate innovation and competition (Taylor, 2013, p. 661). Judge Lourie's concurrence and the dissenting opinions in *Festo* also heavily relied upon policy considerations (Taylor, 2013, pp. 661-663). Based on cases like this, Taylor (2013) illustrates that the Federal Circuit does use policy rationales to justify its decisions and that these policy considerations range from basic ones underlying any law to policies generally relevant to patent law to policies specific to particular patent law doctrines (Taylor, 2013, p. 663).

Despite his claims that the Federal Circuit does, in fact, engage in policy analyses, Taylor (2013) emphasizes that in the ongoing dialogue between the Supreme Court and the Federal Circuit, there should be a discussion of the role policy (Taylor, 2013, pp. 675-676). To the extent this discussion over policy continues, Taylor (2013) believes patent law, as a whole, should improve (Taylor, 2013, p. 676). To encourage this, Taylor (2013) suggests (1) identifying doctrines susceptible to policy analysis (i.e. they have not been crowded out by other sources of interpretation), (2) reading statutory provisions with an eye toward their underlying policy or policies, (3) considering all policies, not just the one of most interest to the Federal Circuit – certainty; (4) requesting additional briefing from parties and amici on policy issues in cases heard by panels and the en banc court; and (5) making an effort to familiarize themselves

with secondary materials related to innovation policy, economics of the patent system, and specific patent doctrines (Taylor, 2013, pp. 677-682).

B. Scholarship

The Federal Circuit's use of scholarship has also been a way to evaluate the quality of the court's decisions. In 1994, Judge Michel noted that unlike the Supreme Court, the Federal Circuit seldom cites to scholarship, and speculates that this may have been because the patent literature was not empirical (Michel, 1994, p. 1245). He called upon scholars to produce empirical scholarship and host conferences to share their work so these studies could be cited by the parties and amici and help ensure the court's decisions reflect true relationships rather than assumed ones (Michel, 1994, p. 1255). If there was a lack of empirical patent scholarship, it appears as if that era is long gone (Nard, 2002, pp. 669-671). The existence of this handbook strongly evidences that this is no longer the case! Perhaps we should see an increased reliance on scholarship.

Despite the production of an enormous amount of empirical scholarship about patent law's relationships with firms' innovations and research and development, the role of juries, litigation trends, voting patterns, claim scope, as well as social science research on economics and innovation policy (Nard, 2002, pp. 669-671), scholars argue that this literature has largely been absent from the Federal Circuit's patent opinions (Nard, 2002, pp. 673-674; Dreyfuss, 2004, p. 772). Dreyfuss gives the example of the court's struggles with the doctrine of equivalents (Dreyfuss, 2004, p. 783). As she describes:

“The Federal Circuit launched its attack with the charge that patent attorneys were making ‘the doctrine of equivalents . . . simply the second prong of every infringement charge.’ The suspicion that lawyers were abusing the system led the court to adopt a rather ungenerous view of the doctrine. That interpretation severely limited the breadth of patent claims, and ultimately led to two rounds of remand by the Supreme Court. Had the Federal Circuit considered the accelerating pace of technological innovation - an issue richly studied in the economic literature - then it might have viewed reliance on the doctrine more benignly, as an attempt to deal with the abundance of after-arising technology and the ease with which this technology can now be used to replace elements of the invention as literally claimed in the patent. Moreover, the court failed to draw on empirical evidence demonstrating that thickets of narrow patents raise transaction costs and give rise to other innovation-deadening problems” (Dreyfuss, 2004, p. 783).

To test whether the Federal Circuit is less likely to use scholarship, Nard (2002) reviewed published Federal Circuit opinions from 1983 through 2000 to determine how frequently the court cited scholarship in patent and non-patent cases (Nard, 2002, p. 678). Nard's (2002) results show that the Federal Circuit cites scholarship more frequently in patent cases than non-patent cases and the court has steadily declined its use over the last ten years of the study (Nard, 2002, pp. 678-680).

Nard (2002) then compared the Federal Circuit's citation rates in patent cases with those of the Second and Ninth Circuits in copyright and trademark cases (Nard, 2002, p. 681). This study showed that the Second and Ninth Circuits cited to scholarship considerably more than the

Federal Circuit (Nard, 2002, pp. 681-682). In particular, these two circuits cited scholarship nearly four times more frequently than the Federal Circuit (Nard, 2002, p. 683).

These data, of course, do not explain the cause of this discrepancy. Nard (2002) speculates that it could be that the Federal Circuit is more familiar and comfortable with its subject matter than the Ninth and Second Circuits are with theirs and therefore has less need to consult scholarship (Nard, 2002, p. 683). Alternatively, it could be that the judges on the Second and Ninth Circuits are drawn more from the academy than judges on the Federal Circuit (Nard, 2002, p. 683). Another possibility is that more copyright and trademark scholarship exists, so there is more to draw from (Nard, 2002, p. 683).

Rather than compare the Federal Circuit's use of scholarship in patent cases to the Ninth and Second Circuits' uses in copyright and trademark cases, Schwartz and Petherbridge (2012) compared the citation rates across all circuits (Schwartz & Petherbridge, 2012, p. 1563). In this study, Schwartz and Petherbridge (2012) study citations to legal scholarship by all regional circuits from 1990 through 2008 (Schwartz & Petherbridge, 2012, pp. 1569, 1576-1577). This study concludes that the Federal Circuit's use of legal scholarship is similar to the other regional circuits, thus undercutting the argument that the Federal Circuit's use of scholarship is inadequate *because* it uses it less than the other circuits (Schwartz & Petherbridge, 2012, p. 1569).

In particular, the Federal Circuit used legal scholarship in 5.07% of its reported opinions (Schwartz & Petherbridge, 2012, p. 1578). In comparison, the Federal Circuit cited legal scholarship more frequently than the Eleventh and Eighth Circuits (4.79% and 2.41%, respectively) (Schwartz & Petherbridge, 2012, p. 1578). After eliminating outlier judges, the Federal Circuit fell near the middle of the pack (Schwartz & Petherbridge, 2012, pp. 1579-1581). When limiting the study to the Federal Circuit's patent cases in comparison to the regional circuits' uses in all cases and in all civil cases, the results show the Federal Circuit cited legal scholarship in 6.01% of its patent opinions and that this number is consistent with many of the other circuits (Schwartz & Petherbridge, 2012, pp. 1586-1588). Schwartz and Petherbridge (2012) also confirm Nard's (2002) conclusion that the Federal Circuit uses scholarship in patent cases slightly more than it does in non-patent cases (Schwartz & Petherbridge, 2012, pp. 1570, 1588).

Regardless of the Federal Circuit's comparative citation rates, there are numerous criticisms of these measures and limitations to these studies. One objection is whether engaging with scholarship in opinions is proper. In dismissing the criticism that the Federal Circuit rarely cites legal literature about patent law, Judge Plager (2009) questions whether engaging with and relying on such scholarship is appropriate because it may not be presented by the parties to the litigation and they may not have an opportunity to review and comment upon it (Plager, 2009, p. 1338; Plager & Pettigrew, 2007, pp. 1750-1752). To the extent the parties themselves rely upon this literature, then this may be a more jurisprudentially sound way to encourage the court to engage with the legal scholarship (Plager, 2009, pp. 1338-1339).

A limitation of these studies is that citations might not properly measure the court's engagement with the literature. Just because an opinion does not cite a piece of scholarship, it does not mean the court was unaware of it (Nard, 2002, p. 685; Plager, 2009, p. 1339). It could be that the court was unpersuaded by it or that other forms of analysis were superior or sufficient to arrive at the given outcome (Nard, 2002, p. 685). Nonetheless, Nard argues that judges should "should err on the side of citation or, more dramatically, offer a discussion of the cited

scholarship,” because, citing and discussing scholarship signals to the relevant community that the court is aware of it and that its decisions have consequences (Nard, 2002, p. 685).

Another criticism of the suggestion to rely upon scholarship is that there are substantial costs in doing so. Given the judges’ and clerks’ other obligations, the judges cannot keep up with scholarship (Plager, 2009, p. 1339). Moreover, scouring the literature is resource-intensive and separating the wheat from the chaff is even more so (Nard, 2002, pp. 686-688). Although the court may prefer to use the literature more, it may be impractical for it to do so.

And finally, as noted before, the makeup of the Federal Circuit has changed substantially over the last several years. Schwartz and Petherbridge’s (2012) study only ran through 2008; it may be a worthwhile endeavor to see what changes, if any, have taken place with respect to the Federal Circuit’s use of scholarship over the past few years. Furthermore, as Schwartz and Petherbridge (2012) suggest, scholars might also look to see what influences the Federal Circuit’s decision to use legal scholarship and if these influences differ from those used in the other circuits, whether the Federal Circuit normatively uses legal scholarship enough, and whether legal scholarship is helping with the development of patent law (Schwartz & Petherbridge, 2012, pp. 1570, 1593-1597).

VI. Structure and Staffing

The previous sections of this chapter have reviewed the extent the Federal Circuit has achieved the goals it was established to achieve. This section takes a different approach and investigates the Federal Circuit’s structure, the makeup of the individual judges on the court, and how these affect the court as an institution. This section starts with individual judges and eventually expands to the entire court sitting en banc. In particular, this section will explore how individual judges or types of judges affect the court and its patent jurisprudence. It will then discuss the internal dynamics of the court and how this impacts the decisionmaking process. This section concludes by examining the Federal Circuit when it sits en banc.

A. Individual Judges

There is a common belief among patent practitioners that decisionmaking at the Federal Circuit is highly judge-dependent (Field, 2014, p. 627). And although a distinction is drawn between individual judges who happen to sit on the court and the court as an institution (Duffy, 2004, p. 804), looking at common characteristics among judges and structural issues affecting those judges and the court provides some insight into how the Federal Circuit operates and the influence these characteristics and issues have on the Federal Circuit’s patent jurisprudence.

For example, Paul Gugliuzza (2012) notes that as of 2012, Federal Circuit judges’ experiences heavily skew in favor of patents and international trade, but no one had a background specializing in government contracts, veterans, or personnel law (Gugliuzza, 2012, pp. 1468-1469). This overemphasis on patents and international trade may restrict the court from having a broad perspective to draw from and may contribute to the court’s formalism in its patent jurisprudence (Gugliuzza, 2012, pp. 1468-1469). To the extent there are, in the future, judges with more diverse backgrounds on the court, the effect may be marginal. The traditional backgrounds in patent and international trade may have led to a culture in which judges on the Federal Circuit see themselves as experts in patent law and new judges will be acculturated to the social practices of the Federal Circuit (Pedraza-Fariña, 2015, p. 119). And as discussed in more detail below, others have focused attention on the background of the Federal Circuit judges and

whether these backgrounds influence decisionmaking generally and application of particular doctrines.

Because of studies such as these, it seems appropriate to analyze the individual judges comprising the Federal Circuit given their roles influencing the patent system. The remainder of this subsection will discuss studies measuring outcomes based on the backgrounds and characteristics of the judge, how turnover affects the court, and the role case distribution plays in the structure of the Federal Circuit and its patent jurisprudence.

1. Judicial Backgrounds & Characteristics

Many people have assumed that the Federal Circuit is nothing more than a patent court and that the judges on it are “narrowly specialized technology lawyers who spent all their pre-appointment years practicing only patent law” (Michel, 2010, pp. 1200-1201). This is not, and never has been, the case (Michel, 2010, pp. 1200-1201). Instead, the court hears a variety of different cases and the court is comprised of judges with a variety of backgrounds, some technical and some not (Michel, 2010, pp. 1200-1201). Judge Michel (2010), upon his retirement, believed that having a mix of judges with and without patent backgrounds is its greatest strength and hopes that the court continues to maintain the same proportion of patent versus non-patent judges as it has had over the last thirty years (Michel, 2010, p. 1202).

But what effect have these judges with their different backgrounds had on patent jurisprudence and outcomes? Several empirical studies have undertaken to answer that question. In an early study, Allison and Lemley (2000) analyzed the Federal Circuit’s patent validity decisions from 1989 through 1996 and examined individual judges and groups of judges based on when they were appointed, whether they had patent backgrounds before joining the court, and the party of the appointing President (Allison & Lemley, 2000, pp. 746, 751-752). Of the twenty-two judges in this study, eleven were appointed to the bench before creation of the Federal Circuit and eleven were appointed after its creation (Allison & Lemley, 2000, p. 751). Of the twenty-two judges, six had patent law backgrounds prior to joining the court (Allison & Lemley, 2000, p. 751). Of the twenty-two judges, fourteen were appointed by Republican presidents and eight were appointed by Democratic presidents (Allison & Lemley, 2000, p. 752).

Allison and Lemley’s (2000) results show that judges with patent backgrounds accounted for 38.2% of the participations, but wrote 62.9% of the opinions (Allison & Lemley, 2000, pp. 752-753). These results suggest that judges with patent backgrounds were more likely to be assigned to write the majority opinions (Allison & Lemley, 2000, p. 753). Drilling down, they show that specific judges author a disproportionate number of patent validity opinions (Allison & Lemley, 2000, p. 753). For example, Judge Lourie wrote the opinion in 73.8% of the cases he participated in (Allison & Lemley, 2000, p. 753). Judge Markey wrote the opinion in 52.4%, Judge Newman wrote the opinion in 58.5%, and Judge Rich wrote the opinion in 52.2% (Allison & Lemley, 2000, p. 753). As a result, they conclude that a small number of judges with patent backgrounds have a significant influence on the law concerning patent validity (Allison & Lemley, 2000, p. 753).

But when looking at whether judges with patent backgrounds upheld validity more or less than those without patent backgrounds, the authors found that judges with patent backgrounds upheld the validity of patents 57.9% of the time, while those without patent backgrounds upheld the validity 52.1% of the time (Allison & Lemley, 2000, p. 754). Extending these results to the superpopulation, the authors’ Chi-squared test resulted in a p-value of 0.466, indicating that they

could not reject the null hypothesis and not confidently predict that having a patent law background influenced validity voting (Allison & Lemley, 2000, p. 755).

When looking at whether judges appointed after creation of the Federal Circuit were more “pro-patent” than those appointed beforehand, the authors found that there was no significant difference in the validity outcomes between these two groups (Allison & Lemley, 2000, p. 754). Extending these results to the superpopulation, the authors’ Chi-squared test resulted in a p-value of 0.621, indicating that they could not reject the null hypothesis and not confidently predict that year of appointment influenced validity voting (Allison & Lemley, 2000, p. 754).

Allison and Lemley (2000) also investigated voting patterns of individual judges to measure if they were “pro-patent” or “anti-patent” (Allison & Lemley, 2000, p. 755). Most judges were right around the average, but there were a few outliers (Allison & Lemley, 2000, p. 755). For example, Judges Mayer and Markey were more inclined to hold a patent invalid, while Judges Newman, Plager, and Radar were more likely to uphold the patent’s validity (Allison & Lemley, 2000, p. 755). Nonetheless, the authors note that too much weight should not be placed on these outliers given the small number of cases for each judge (Allison & Lemley, 2000, p. 755). Extending these results to the superpopulation, the authors’ Chi-squared test resulted in a p-value of 0.404, indicating that they could not reject the null hypothesis and not confidently predict that individual judges vote differently in validity cases (Allison & Lemley, 2000, p. 755). However, when looking only at *authored* opinions, the results were different (Allison & Lemley, 2000, pp. 756-757). Applied to the superpopulation, the authors’ Chi-squared test resulted in a p-value of 0.001, indicating that they could reject the null hypothesis and predict with a high degree of confidence that who writes the majority opinion is related to whether the court finds the patent valid (Allison & Lemley, 2000, p. 757).

Looking at affirmation rates and applying it to the superpopulation, the authors’ data show that when the judges were appointed and whether they had patent backgrounds were not statistically significant in predicting affirmation of validity (Allison & Lemley, 2000, pp. 758-759). Allison and Lemley (2000) also investigated voting patterns of individual judges to measure their affirmation rates (Allison & Lemley, 2000, p. 759). Most judges were right around the average, but there were a few outliers (Allison & Lemley, 2000, p. 759). Extending these results to the superpopulation, the authors’ Chi-squared test resulted in a p-value of 0.069, indicating that they could reject the null hypothesis with only 90% confidence (Allison & Lemley, 2000, p. 760). Thus, they could only weakly predict that individual judges vary significantly in the likelihood that they will vote to affirm (Allison & Lemley, 2000, p. 760).

When looking only at *authored* opinions, the results are similar (Allison & Lemley, 2000, pp. 760-761). Applied to the superpopulation, the authors’ Chi-squared test resulted in a p-value of 0.249, indicating that they could not reject the null hypothesis and not confidently predict the court would vote differently in affirming or reversing the district court when different judges wrote the majority opinion (Allison & Lemley, 2000, p. 761).

Finally, Allison and Lemley (2000) analyzed whether Federal Circuit judges were more likely to affirm findings of juries or judges (Allison & Lemley, 2000, p. 762). They found that there was little difference between pre-1982 appointed judges and post-1982 judges (Allison & Lemley, 2000, pp. 762-763). However, judges with patent backgrounds were quite different than those without (Allison & Lemley, 2000, p. 763). Judges with patent backgrounds were less likely to defer to jury findings than their peers without patent backgrounds (Allison & Lemley, 2000, p. 763). However, when it came to affirming district court judges, there was no

appreciable difference between judges with and without patent backgrounds (Allison & Lemley, 2000, pp. 763-764).

In a more recent study, Barnes (2013) examined whether judges with technical expertise analyze section 112's enablement and written description requirements differently than other judges on the Federal Circuit (Barnes, 2013, p. 972). This study uses the Federal Circuit's section 112 cases from 1997 through 2011 (Barnes, 2013, p. 974). Because of the way he conducted his search for these cases, Rule 36 affirmances were not included and some cases may have been omitted (Barnes, 2013, pp. 988-989). He measured technical expertise by noting if the judge had a bachelor's degree in a technical subject or had practical engineering or scientific experience and passed the Fundamentals of Engineering test (Barnes, 2013, p. 981). Seven Federal Circuit judges were classified as having a technical background and twenty-seven were classified as non-technical (Barnes, 2013, p. 983-985). Barnes also included district court judges who sat by designation on the Federal Circuit, but all were non-technical (Barnes, 2013, pp. 985-986). To the extent we are only interested in the technical or nontechnical backgrounds of active and senior Federal Circuit judges, Barnes' inclusion of district judges sitting by designation muddies the waters.

When comparing reversal rates on section 112's disclosure requirements, Barnes (2013) finds that technical judges reverse in 56.8% of the cases, whereas nontechnical judges reverse only 24.6% of the time (Barnes, 2013, pp. 995-996). He breaks the data down further to compare reversal rates when appeals stem from district courts and the BPAI and similar disparities exist (Barnes, 2013, pp. 995-996). Technical judges reverse district courts 60.0% of the time, whereas nontechnical judges only reverse 29.2% of the time (Barnes, 2013, p. 996). For BPAI appeals, technical judges reverse in 42.9% of the cases in comparison to 12.1% for nontechnical judges (Barnes, 2013, p. 996). All of these results were statistically significant at $p < .05$ using Pearson's chi-squared test (Barnes, 2013, p. 996).

Similar analyses were done comparing patent invalidation rates and the results were less stark (Barnes, 2013, p. 996). Overall, technical judges found patents invalid on enablement and written description in 56.7% of the cases, while nontechnical judges did so in 59.8% of the cases (Barnes, 2013, p. 996). The differences between technical and nontechnical judges' invalidation rates from district court and BPAI appeals were also modest (Barnes, 2013, p. 996). None of these results were statistically significant (Barnes, 2013, p. 996).

When limiting the study to whether the authoring judge had a technical background, Barnes (2013) shows that reversal rates were higher when the judge had a technical background (47.1%) than authors without a technical background (23.4%) (Barnes, 2013, p. 1000). Invalidation rates, however, were similar with technical authoring judges invalidating the patent in 55.2% of cases and nontechnical authoring judges invalidating the patent in 58.2% of the cases (Barnes, 2013, p. 1000). These results are similar to those found when looking at entire panels (Barnes, 2013, p. 1000).

Petherbridge's (2009) study of Federal Circuit judges and their views on the doctrine of equivalents is another example of investigating judicial characteristics (Petherbridge, 2009, pp. 444-455). In this study, he rejected the null hypotheses that there are no differences in the likelihood of success on appeal, dispositive success on appeal, and affirmation rates when different judges heard the appeals with p-values of .000, .000, and .001, respectively (Petherbridge, 2009, pp. 445-446). Logistic regression models illustrated similar results and show that the judges had varying levels of influence on the measured outcome variables (Petherbridge, 2009, pp. 446-449).

As described earlier, his study shows that certain judges, such as Bryson, Rich, Skelton, and Smith, had strong positive effects on affirmation of district court decisions concerning the doctrine of equivalents, while Judges Linn, Prost, and Schall had strong negative effects (Petherbridge, 2009, p. 447). Looking at judges appointed contemporaneously and at the most active judges on the court also allowed Petherbridge (2009) to reject the null hypotheses that their involvement did not affect the measured outcomes (Petherbridge, 2009, pp. 450-451). Likewise, grouping judges together as “proceduralists,” “swings,” and “holistics” showed a statistically significant effect on the measured outcomes (Petherbridge, 2009, p. 455). In contrast, grouping together particular judges by the appointing president or whether the judge had a patent background before their appointment to the Federal Circuit had no statistically significant effect on two of the three measured outcomes (Petherbridge, 2009, p. 455). Similarly, when grouping judges by whether they have a patent background before appointment to the court, Petherbridge (2009) failed to reject the null hypotheses that there were no differences in the likelihood of the measured outcomes when these judges heard the appeals (Petherbridge, 2009, pp. 452-454).

Finally, he breaks down the analysis into particular sub-doctrines within the doctrine of equivalents and finds that judges’ methodology, appointing president, and patent background sometimes had statistically significant effects on patentees’ likelihood of success on appeal (Petherbridge, 2009, pp. 462-463). In sum, Petherbridge concludes that doctrine of equivalent outcomes depend on judges and groups of judges (Petherbridge, 2009, p. 465).

As described earlier with respect to certainty, Wagner and Petherbridge’s (2004) study of claim construction decisions from April 23, 1996 through November 1, 2002 shows a division between procedural and holistic judges on the Federal Circuit (Wagner & Petherbridge, 2004, pp. 1111-1112). The addition of two strongly procedural judges in 2000 (Judges Linn and Dyk) caused a shift towards a more procedural approach at the court (Wagner & Petherbridge, 2004, p. 1153). Using binary logistic regression analysis, they found that particular judges participating on the panel has a statistically significant effect on the claim construction approach used (Wagner & Petherbridge, 2004, pp. 1163-1166).

Stiernberg (2013) conducted a study examining whether Federal Circuit judges with technical backgrounds reversed district courts on claim construction more frequently than nontechnical judges (Stiernberg, 2013, pp. 286-288). Importantly, Stiernberg (2013) considers technical expertise by determining whether the judge has scientific or technical expertise relevant to the claim at issue in the case (Stiernberg, 2013, p. 290). In this study, Stiernberg collected all Federal Circuit claim construction cases from April 30, 2007 through April 30, 2012, including Rule 36 affirmances and randomly chose 100 cases for further examination, resulting in 159 claim construction instances (Stiernberg, 2013, pp. 288-289).

The data show that when a Federal Circuit judge has technical expertise related to the patent in suit, the judge is more likely to find error in the district court’s claim construction (Stiernberg, 2013, p. 295). The predicted probability of a Federal Circuit judge reversing on claim construction increases by 53.42% when the Federal Circuit judge has a technical background related to the patent in suit (Stiernberg, 2013, p. 295). The data show that the number of years a Federal Circuit judge has been on the bench has no impact on the probability of reversal of the district court’s claim construction (Stiernberg, 2013, p. 294). Also, differences in political ideology between district judges and Federal Circuit judges were not significant (Stiernberg, 2013, p. 290).

Finally, Field (2014) measures judicial hyperactivity of Federal Circuit judges using reversal rates, activism differentials, and scaled activism scores, which are categorized by the different standards of review (Field, 2014, pp. 628-630). Judicial hyperactivity measures the frequency appellate judges substitute their judgements for those of the district court judge below (Field, 2014, p. 631). Field (2014) used 299 cases from the first half of 2010, including 110 patent cases and 189 non-patent cases; these cases had 828 different issues (Field, 2014, p. 644).

When examining patent cases and using simple reversal rates, Field (2014) shows that there is a wide range of reversal rates among the Federal Circuit judges (Field, 2014, pp. 656-657). Grouping all patent cases together (regardless of their standard of review), Judge Plager was at one extreme with a 66.7% reversal rate, while Judge Mayer had a 20.0% reversal rates (Field, 2014, pp. 656-657). In comparison, when examining simple reversal rates in non-patent cases, Field (2014) shows a wide range, but it is much lower than in the patent case (ranging from 6.1% to 36.8%) (Field, 2014, pp. 660-661).

Using activism differentials and scaled activism scores, developed by Corey Yung, Field (2014) uses de novo review reversal rates as a baseline to better compare judicial activism (Field, 2014, p. 664). Using these methods, Field (2014) shows the level of judicial hyperactivity for each judge for patent cases, with Judge Michel being the least hyperactive and Judge Radar being the most (Field, 2014, pp. 668-669). In non-patent cases, Judge Schall was the least hyperactive, while Judge Plager was the most (Field, 2014, pp. 672-674). This study shows that Federal Circuit judges with patent backgrounds (i.e. regularly practiced patent law or had scientific or technical expertise) are more judicially hyperactive than those without, but only in patent cases; these same judges are not hyperactive in non-patent cases (Field, 2014, pp. 669, 673).

Field (2014) also analyzed the data to determine if the party of the appointing president affected the judges' levels of activism (Field, 2014, pp. 682-685). Similarly to what Petherbridge (2009) demonstrated for the doctrine of equivalents, the party of the appointing president is not statistically significant when it comes to determining judicial hyperactivity (Field, 2014, pp. 682-685).

Given the age of some of these studies and the numerous new appointments to the court over the last few years, follow-up research can be undertaken to see what changes, if any, have taken place to the composition of the judges on the court and whether these changes have had an impact on specific doctrines or methodologies.

2. Turnover

Turnover of judges at the Federal Circuit also has the potential to disrupt patent law development and its application. Judge Michel (2010) recounted that when he joined the court, Chief Judge Markey told him that it usually takes five years for a new judge to hit full stride (Michel, 2010, pp. 1204-1205). In the last two years, there have been four new judges appointed to the court. In the last five years, seven of the twelve active judges on the court have been added. Upon his retirement Judge Michel (2010) noted that the most dramatic development in the court's evolution was that it faced a large, sudden change in membership and that these new members would undoubtedly introduce uncertainty and change in both the balance of the court's members and possibly patent doctrine (Michel, 2010, pp. 1203-1204). Judge Michel's concern, as we saw earlier, has been with certainty and predictability. He warned that sudden changes in precedent will upset expectations of businesses and that this could cause harm to the broader

economy (Michel, 2010, pp. 1204-1205). Whether it be from new jurisprudential views or inexperience, there is some risk of upsetting the status quo (Michel, 2010, pp. 1204-1205).

Bock (2014), however, suggests that turnover at the Federal Circuit could be a positive development (Bock, 2014, pp. 227-236). Although he suggests having a pool of rotating district court judges temporarily serving on the Federal Circuit, some of the same principles would apply to turnover of full-time Federal Circuit judges. Such turnover may help hasten the percolation process and lead to higher-quality doctrinal developments (Bock, 2014, p. 236). Because of the recent spate of appointments, further research on the impact of these new judges and their impact on specific doctrines and methods should be undertaken.

3. Case Distribution

The final area of interest with respect to individual judges is how case distribution affects the development and application of patent law. Federal Circuit Rule 47.2(b) and section 103(b)(3) of the Federal Courts Improvement Act of 1982 aim to provide each Federal Circuit judge with a representative cross-section of the court's jurisdiction (Froats, 2010, pp. 80, 83). In theory, under this random assignment method, Federal Circuit judges would, over time, sit on the same number of panels in the various fields the court has jurisdiction over (Froats, 2010, p. 80). If, however, the system does not result in the judges having a representative cross-section of cases, then some judges could be exercising more influence on some areas (Froats, 2010, p. 80). To implement these rules, a computer in the clerk's office randomly generates three-judge panels (Froats, 2010, pp. 80, 83-84).

Froats' (2010) study examines all patent appeals from the BPAI from 2005 through 2009 to see if the randomization process results in the judges having a representative cross-section of the BPAI appeals (Froats, 2010, pp. 81, 84-85, 88). The author notes that one limitation of this study is that it fails to account for recusals and instances where judges are unavailable because of illness, emergency, or designation to another court (Froats, 2010, p. 90). Furthermore, the author contends that patent prosecution is a distinct field from patent litigation and should be examined separately (Froats, 2010, p. 99). It is not clear whether the clerk's office shares this view.

Froats' (2010) data show that the current system results in great disparities in the number of appeals from the BPAI heard by each judge (Froats, 2010, pp. 93-94). For example, Judge Prost heard 29.1% of the BPAI appeals (32 panels), whereas Judges Schall and Dyk only participated in 17.3% of these appeals (19 panels each) (Froats, 2010, p. 93). The author suggests that this disparity calls into question the success of the randomization process (Froats, 2010, p. 94).

In measuring the effects of an uneven case distribution, Froats (2010) also studied the subset of precedential opinions issued by the Federal Circuit during the relevant time period (Froats, 2010, p. 105). If there is an uneven distribution of precedential cases, then this could be problematic because certain judges would have a larger role in shaping patent jurisprudence as it relates to prosecution (Froats, 2010, p. 105). The data show that Judge Moore (controlling for the fact that she was appointed during the relevant time period) participated in 31.0% of the appeals, Judge Newman participated in 30.8%, and Judges Michel, Gajarsa, and Prost participated in 28.2% (Froats, 2010, p. 106). On the other end of the spectrum (not counting senior judges), Judges Lourie and Schall participated on 12.8% and 15.4% of the cases, respectively (Froats, 2010, p. 106). The author notes that although it is possible for certain judges to have more influence on patent law jurisprudence because of their participation on these panels, he does not go so far to say that a particular judge has more influence than another based

on these results or that the random assignment system leads to this (Froats, 2010, p. 107). Finally, the author notes that it is likely impossible to know in advance which cases will result in precedential opinions, so designing an assignment system to achieve these results is unlikely (Froats, 2010, p. 107).

B. Internal Dynamics

The internal dynamics of the Federal Circuit may also affect the development of patent law and whether the Federal Circuit achieves the goals it was established to create. Chief Judge Markey (1992) noted that part of the Federal Circuit's success in bringing uniformity to patent law was that the judges unanimously agreed to subject their precedential opinions to review by their colleagues and the Senior Technical Advisor (Markey, 1992, p. 578). This review was limited to language that appeared to create a conflict with Federal Circuit precedent; it did not involve a review of the decision itself (Markey, 1992, p. 578). Although this process added to each judge's workload, Markey (1992) noted that it was an example of the court's dedication to its mission and resulted in its success (Markey, 1992, p. 578). The effectiveness of peer and STA review depends on the willingness of the non-panel judges to review and comment on draft opinions and the receptivity of the judges on the panel (Bock, 2014, p. 207). The STA's conflict check process has been scaled back in recent years to only review opinions upon request (Bock, 2014, p. 207). The effects of scaled back STA review is an opportunity for further research as is studies of how well the peer review system works.

A concern has been raised that the Federal Circuit suffers from the "curse of expertise," which yields a resistance to correct misguided precedent (Bock, 2014, p. 216). In short, because of their expertise in patent law, judges on the Federal Circuit approach their work with overconfidence, which renders them unreceptive to reconsider their prior analyses (Bock, 2014, p. 216). The rollback of the STA's conflict check and limited attention to scholarship may evidence this (Bock, 2014, p. 216), although Schwartz and Petherbridge (2012) cast doubt on the latter issue.

Bock (2014) also points to the "knowing-doing gap" as a potential source for the Federal Circuit's misguided precedent (Bock, 2014, p. 219). In other words, the Federal Circuit judges may well be aware that their precedent is suboptimal, but they have difficulty garnering support to break free from the precedent-setting institutional inertia (Bock, 2014, pp. 219-220). The potential causes of the knowing-doing gap include judges wanting to act consistently with their prior decisions, maintaining a collegial working environment, and avoiding the costs of correction when there is no perceived urgency (Bock, 2014, pp. 220-227). If these behaviors exist, then the effect is an ossification of precedent (sometimes suboptimal).

To overcome the curse of expertise and the knowing-doing gap, Bock (2014) suggests changing the internal dynamics of the Federal Circuit by using a group of rotating district judges to serve on the court for staggered terms of limited duration (Bock, 2014, pp. 227-229). Adding non-expert district judges adds new voices and could help the court focus on suboptimal precedent and understand the difficulties this precedent presents (Bock, 2014, p. 229). In addition, temporarily adding district judges could help overcome the knowing-doing gap because there would be fewer prior opinions by these judges and hence fewer opportunities to act inconsistently (Bock, 2014, pp. 232-233). Also, because of the frequent turnover of these district judges, they may feel more free to "rock the boat" to reevaluate prior precedent (Bock, 2014, pp. 233-234). Finally, these district court judges may be feel the urgency in correcting suboptimal

precedent in circumstances where they will be forced to grapple with the precedent upon their return to the district court (Bock, 2014, p. 235).

To be sure, the internal dynamics discussed here are preliminary observations and theoretical arguments that may affect the development and application of patent law. Empirical research to justify or reject these theories would be welcome additions to the literature.

C. En Banc Review

The final aspect of how the Federal Circuit's structure and staffing affects its role as an institution and the goals it was established to achieve is when the court hears and decides cases en banc. Cotropia (2010) examined the Federal Circuit's en banc rate in an effort to determine if the court was "willing to innovate new legal rules, percolate these concepts, and then eventually adopt them in future decisions" (Cotropia, 2010, p. 822). In his study, Cotropia (2010) measures the proportion of en banc reviews to written decisions (Cotropia, 2010, p. 813). His dataset consisted of data from the AO reports from 1998 through 2009 as well as a Westlaw search for the same period (Cotropia, 2010, p. 814). His results show that the Federal Circuit decided cases en banc 0.18% of the time (Cotropia, 2010, p. 817). He then compared this rate with those of the Third, Fifth, Ninth, Tenth, and DC Circuits, all of which had higher en banc rates (0.21%, 0.21%, 0.38%, 0.32%, and 0.24%, respectively) (Cotropia, 2010, p. 817). Cotropia (2010) notes that although the Federal Circuit's en banc rate was the lowest of the selected circuits, the differences between it and the next three lowest circuits were not statistically significant (Cotropia, 2010, p. 817). The differences between the Federal Circuit and the Ninth and Tenth Circuits were statistically significant (Cotropia, 2010, p. 817). Based on these results, Cotropia (2010) suggests that the Federal Circuit does not exhibit much willingness to change the law through en banc review, but that it is not alone (Cotropia, 2010, p. 822).

In explaining how these results explain or impact percolation and entrenchment, Cotropia (2010) offers a few explanations. One is simply that although there is not uniformity within the court, the law remains entrenched (Cotropia, 2010, p. 822). Another explanation could be that the disputes provoking dissenting opinions are minor and not sufficiently important for en banc review (Cotropia, 2010, pp. 822-823). The final explanation is that the Federal Circuit could be harmonizing the law without using the transparent en banc procedure, but instead uses the comment period on precedential opinions to resolve potential conflicts (Cotropia, 2010, p. 823). As a result, the law does not become entrenched; instead it evolves, but does so in a less transparent way than en banc review provides (Cotropia, 2010, p. 823). Importantly, Cotropia's (2010) study was not limited to patent decisions; it included all areas under the Federal Circuit's jurisdiction.

In contrast, Vacca (2011) examined all of the Federal Circuit's en banc patent cases decided from 1982 through 2010 (forty cases total) and calculated the en banc rate as a proportion of the court's total patent cases (Vacca, 2011, pp. 736-738). Vacca's results show the Federal Circuit hears 0.29% of its patent cases en banc (Vacca, 2011, p. 736-738). This measure of the en banc rate is higher than Cotropia's (2010) finding of en banc cases generally (0.18%). When looking only at the en banc cases decided from 2001 through 2009, the Federal Circuit's en banc rate is 0.30% or 0.23% depending on whether or not one includes cases ordered to be heard en banc, but not yet decided (Vacca, 2011, p. 738). In comparison with all of the other circuits' en banc rates for all cases, the Federal Circuit had the highest rate (Vacca, 2011, p. 738). Menell and Vacca (2015) have updated Vacca's earlier study to expand it through 2014. Their

results show that during this time, the Federal Circuit decided 0.28% of its patent cases en banc (Menell & Vacca, 2015).

Vacca (2011) also explores the process in which the Federal Circuit hears patent cases en banc (Vacca, 2011, p. 739). First, he notes that the Federal Circuit has ordered cases to be heard en banc sua sponte in at least 48% of the cases (Vacca, 2011, p. 739). Second, he describes how the Federal Circuit freely permits amici curiae to file briefs in its en banc cases without leave of the court or seeking consent from the parties (Vacca, 2011, p. 743). In some cases, the court specifically calls for the United States or PTO to file an amicus brief (Vacca, 2011, p. 743). A survey of en banc orders from other circuits did not reveal such a practice (Vacca, 2011, p. 744). The Federal Circuit's rationale for soliciting the views of stakeholders is so it can make informed decisions on how to shape and interpret patent law, taking multiple viewpoints and interests into consideration (Vacca, 2011, p. 744).

Given these practices, and the broad scope of the questions the Federal Circuit seeks to answer when it sits en banc, Vacca (2011) argues that the Federal Circuit's en banc process is similar to an administrative agency engaging in substantive rulemaking (Vacca, 2011, p. 744). Just like an administrative agency issues a notice of proposed rulemaking, the Federal Circuit issues an order for rehearing en banc, setting forth when it will hear the case and what issues it will examine (Vacca, 2011, pp. 747-748). And similar to an agency giving interested parties an opportunity to participate in the rulemaking process by submitting their views or arguments, the Federal Circuit's practice of freely permitting amici to file briefs mimics this commenting process (Vacca, 2011, p. 749). Finally, an administrative agency must publicize the final rule and explain its basis and purpose (Vacca, 2011, p. 749). The Federal Circuit engages in similar conduct when it issues its en banc opinion announcing its rule (Vacca, 2011, p. 749). Vacca (2011) concludes that although other institutions can and should play a role in shaping patent policy, the Federal Circuit seems willing to do so and does so in an open and inclusive manner (Vacca, 2011, pp. 757-758).

Finally, Taylor (2013) also briefly examines the Federal Circuit's en banc decisions as they relate to formalism. Taylor (2013) suggests that when the court decides cases en banc, it oftentimes does so in a way that analyzes the basic underlying purpose of the rule, but also considers innovation policy (Taylor, 2013, pp. 638, 659-664). But like with most general statements, there are exceptions and the Federal Circuit's use of policy in en banc decisions is no different (Taylor, 2013, pp. 653-654, 656-657). Despite the general practice of using policy in en banc decisions, Taylor suggests the Federal Circuit could do a better job incorporating policy into its decisions (Taylor, 2013, p. 681). One suggestion is encouraging amici to file briefs relating to policy concerns in en banc cases (Taylor, 2013, p. 681). Vacca's (2011) review of en banc orders indicates that the court is doing exactly this (Vacca, 2011, p. 743).

As noted earlier, to complement the Federal Circuit's current en banc practices, Laura Pedraza-Fariña (2015) suggests that the court make use of advisory panels on issues of patent law and policy (Pedraza-Fariña, 2015, pp. 154-159). These advisory panels, with a mixture of technological, economic, and sociological expertise, could advise the Federal Circuit on areas of the law in need of clarification and provide input on how a decision may impact innovation in particular fields (Pedraza-Fariña, 2015, pp. 154-155).

VII. Relationships with Other Institutions⁷

As John Duffy (2004) has pointed out, when studying the success or failure of the Federal Circuit as an institution, we cannot look at the Federal Circuit in isolation (Duffy, 2004, p. 806). Instead, “a complete analysis of any institution encompasses that institution’s relation to other relevant actors” (Duffy, 2004, p. 806). Therefore, to fully understand the Federal Circuit, we must consider the other institutions that play a role in the patent system (Duffy, 2004, p. 806).

This section examines the Federal Circuit’s interactions with other institutions and, in appropriate situations, examines which institutions are and should be performing what role in the development of patent law. In particular, this section will look at the historical disinterest and recent hyper-interest by the Supreme Court, its treatment of Federal Circuit opinions, and the Federal Circuit’s response. This section will explore the role of the PTO and its relationship with the Federal Circuit. Next, this section will look at the role district courts can and should play in the framework of patent law. The next subsection briefly discusses the role of the Solicitor General and how this office has affected the Federal Circuit’s development of patent law. Finally, this section concludes with an examination of the role Congress has and should play in the development of patent policy and how the Federal Circuit has fit in to this relationship.

As will be evident, unlike the rest of this chapter, the sections below do not focus on prior empirical studies. Instead, the scholarship on the interaction of these institutions with the Federal Circuit are largely theoretical and descriptive accounts. There is a dearth of sophisticated empirical literature supporting or rejecting these theories.

A. Supreme Court

The Supreme Court has, over the last ten to fifteen years had an increased interest in patent law (Dreyfuss, 2010, pp. 829-830). Duffy (2010) illustrates that prior to the mid-twentieth century the Supreme Court had a relatively large number of patent cases on its docket in any given year (Duffy, 2010, p. 520). But starting around 1950, the Supreme Court’s interest in patent cases dropped dramatically (Duffy, 2010, p. 520). From 1950 through 1982, the Supreme Court heard, on average, just over one patent case per term (Duffy, 2010, p. 522). Immediately after the Federal Circuit’s creation, the Supreme Court showed even less interest in patent law – hearing only five cases in the first twelve years (Duffy, 2010, p. 522; Lee, 2010, p. 42). Moreover, four of the five cases did not involve substantive patent rules, but were procedural or jurisdictional issues (Duffy, 2010, p. 522). This lack of Supreme Court intervention in patent cases arguably showed deference to the Federal Circuit’s expertise in the field (Lee, 2010, p. 42).

But starting in 1994, the Supreme Court began to show more interest in patent law (Duffy, 2010, p. 523; Lee, 2010, p. 43). From 1995 through 1998, the Court decided five cases and all but one involved important patent policy matters (Duffy, 2010, pp. 523-524). And over the next ten terms (1999-2008), the Court heard eleven more patent cases (Duffy, 2010, p. 524). At this point, the Court had returned to its pre-Federal Circuit rate of hearing patent cases (Duffy, 2010, p. 524). Recently, the Supreme Court has been highly interested in patent cases. From the 2009 term through the 2014 term, the Supreme Court decided twenty patent cases (Written Description, Supreme Court Patent Cases - <http://writtendescription.blogspot.com/p/patents-scotus.html>).

⁷ For additional materials on the theory of patent institutions, see Volume I, chapter E.1.

And because of this increased interest in patent cases, a struggle over which institution - the Supreme Court or Federal Circuit - is best suited to manage patent jurisprudence has arisen. Over the last ten to fifteen years, the Supreme Court has indicated that it is concerned with the Federal Circuit's performance (Dreyfuss, 2008, p. 791). During this time, the Supreme Court has reversed or vacated the Federal Circuit's decision in virtually all of the cases (Dreyfuss, 2008, p. 791; Dreyfuss, 2010, pp. 829-830). What appears to be occurring is that the Federal Circuit has posited itself as an expert institution in patent law and has become disobedient in following Supreme Court precedent (Pedraza-Fariña, 2015, p. 124). As Laura Pedraza-Fariña (2015) notes, "[t]here have been no quantitative empirical studies comparing Federal Circuit disobedience of Supreme Court decisions to disobedience by other circuits, or assessing whether the Federal Circuit is more likely to defy the Supreme Court in its attributed area of expertise (patent law) than in any of the other cases that make up its docket . . . [but] qualitative evidence suggests that this is the case" (Pedraza-Fariña, 2015, p. 124).

Moreover, as mentioned earlier, Federal Circuit is perceived as being too formalistic and this may be another source of contention between the two courts (Lee, 2010, p. 46). Regardless of the cause of this tension, as Peter Lee concludes, "[t]he Supreme Court's deference to Federal Circuit jurisprudence, as well as its general indifference to patent matters, appears to have ended" (Lee, 2010, p. 43).

Of course, by institutional design, the Supreme Court has the final say on patent issues. But there are several limitations to the Supreme Court serving as the steward of patent law. First, the Court cannot intervene too frequently because of the limited number of cases it hears each term (Dreyfuss, 2010, pp. 839). In essence, hearing a small handful of cases would not allow the Court to effectively be the steward of patent law. Second, and related to the first, is that the Court does not hear enough patent cases to develop an expertise in the subject matter (Dreyfuss, 2008, p. 806; Dreyfuss, 2010, pp. 839). Although the Supreme Court has shown a heightened interest in patent cases over the last several years, hearing three to six patent cases per year seems incomparable to the hundreds of patent cases the Federal Circuit hears each year. Moreover, because the Federal Circuit hears all patent appeals, the Supreme Court cannot rely on the experience of different circuit courts to guide its rulemaking and policy-setting (Dreyfuss, 2008, p. 808).

Notwithstanding these limitations, it is not clear that the Supreme Court is as antiformalistic as the Federal Circuit is formalistic. As described earlier, Taylor (2013) defends the Federal Court against charges that it suffers from an excessive level of formalism and illustrates several examples where the court engages in policy analysis, especially in en banc and dissenting opinions (Taylor, 2013, pp. 638, 657-663).

Taylor also evaluates the Supreme Court's perceived antiformalism in patent cases. His analysis reveals that the Supreme Court has a checkered history of policy analysis in patent cases (Taylor, 2013, p. 638). He lists a host of patent cases over the last decade or more where the Supreme Court's analyses did not rest on policy considerations, including *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc.* (relying on precedent and other governing statutes); *eBay, Inc. v. MercExchange, LLC* (relying on "well-established principles of equity"); *Quanta Computer, Inc. v. LG Electronics, Inc.* (relying on precedent); *Kappos v. Kyatt* (relying on precedent); *Microsoft Corp. v. i4i Ltd* (relying on precedent); *Board of Trustees of Leland Stanford Junior University v. Roche Molecular Systems, Inc.* (relying on statutory and case law); and *Global-Tech Appliances, Inc. v. SEB S.A.* (relying "the long history of willful blindness and its wide acceptance in the Federal Judiciary").

Nonetheless, Taylor does acknowledge that the Supreme Court frequently uses policy in its analyses of patent cases (Taylor, 2013, p. 666). For example, the Court in *Merck KGaA v. Integra Lifesciences I, Ltd.* interpreted the statutory text in light of the purposes of the statute and regulations and the realistic effect of the narrow interpretation of the rule by the Federal Circuit (Taylor, 2013, pp. 666-667). Likewise, in *Pfaff v. Wells Electronics, Inc.*, the Court interpreted the on-sale bar rule in the context of the “basic policies underlying the statutory scheme” (Taylor, 2013, p. 667). The Supreme Court’s use of policy considerations is even more prevalent in areas where the statutory language is more open-ended (e.g. non-obviousness and patentable subject matter) or non-existent (doctrine of equivalents) (Taylor, 2013, pp. 638, 667-673).

Because patent law, as currently structured, involves a balancing of rules, standards, incentives, and exemptions, policy is necessarily implicated. And, as Taylor posits, regardless of whether the Federal Circuit wants to engage in the balancing act or not, the balancing act is ongoing (Taylor, 2013, p. 674). As such, he encourages the Federal Circuit and the Supreme Court to engage in more policy discussion and create an ongoing dialogue between the courts (Taylor, 2013, pp. 675-682). Doing so may also help solve the problem that patent law is not percolating at an optimal rate because the Federal Circuit does not “compete” with any other circuits (Nard & Duffy, 2007, pp. 1620-1621, 1644, 1645).

One way of fostering this dialogue and having the Supreme Court play a significant role in the percolation process is for the Supreme Court to view itself not as the “final law sayers,” but as the “prime percolator” (Golden, 2009, p. 662). Because the Federal Circuit has a wealth of experience with patent law, its contributions to the development of patent doctrine and administration are invaluable (Golden, 2009, p. 660). If the Supreme Court decided cases in this “prime percolator” role, it would only provide partial direction in its opinions and let the lower courts and PTO to flesh out the details and allow for continued growth (Golden, 2009, p. 663). In particular, Golden suggests that the Supreme Court consider three traits that indicate if a case is good for review on the merits:

- (1) the substantive question involved is not currently subject to meaningful debate in the courts below;
- (2) there is good reason to suspect that the Federal Circuit's settled approach to that question is substantially inferior to a legally permissible alternative; and
- (3) the case at hand is a good vehicle for addressing the substantive question as part of determining the outcome of a dispute between the specific parties involved (Golden, 2009, pp. 709-710).

And although the Supreme Court could undertake this approach on its own, Golden urges the Federal Circuit to work with the Supreme Court to help percolate patent law by not writing or reading opinions broadly and hearing more cases en banc (Golden, 2009, p. 717). As noted above, the Supreme Court has become more active in patent cases over the last decade or so and the Federal Circuit has been active in hearing cases en banc (Menell & Vacca, 2015). Additional study of whether these developments mimic Golden’s suggestions and whether it has impacted percolation and entrenchment should be undertaken.

B. PTO

Some have argued that a major problem with patent law is that the Federal Circuit is not in the best position to develop the law, and that instead, the PTO and its staff of patent specialists

would be better (Dreyfuss, 2004, pp. 791-792; Rai, 2003, p. 1065). But there have been a couple major limitations on the PTO serving in this role. First, the PTO may not do a better job than the Federal Circuit because of a lack of resources and the lack of a long-standing culture managing the law (Dreyfuss, 2004, pp. 792-793). Second, unlike many administrative agencies, the PTO has no substantive rulemaking authority (Dreyfuss, 2004, p. 793; Dreyfuss, 2010, p. 838; Gugliuzza, 2013, p. 1820).

Even so, the PTO's role in granting patents and adjudicating challenges to patentability give it some potential power. However, the Federal Circuit has given minimal deference to the PTO's fact-finding, which weakens the PTO's influence (Gugliuzza, 2013, pp. 1820-1822; Rai, 2003, p. 1065). Moreover, the Federal Circuit enhances its power by minimizing the PTO's role and autonomy by deciding questions on appeal that were not addressed by the PTO and then remanding the case for further consideration (Gugliuzza, 2013, p. 1822). As Pedraza-Fariña (2015) explains, these are examples of an expert institution seeking to maintain control over a body of knowledge (Pedraza-Fariña, 2015, pp. 109, 131). But this is not always the case. There are instances where the Federal Circuit has given weight to the PTO's longstanding internal practices that do not have the force of law (Gugliuzza, 2013, p. 1824).

But the AIA's adoption of more meaningful ways to administratively challenge issued patents, such as post-grant review, inter partes review, and covered business methods review, may give the PTO additional power to interpret and shape patent law and policy (Gugliuzza, 2013, pp. 1825-1827; Dreyfuss, 2015, pp. 1-5). Because these new procedures at the PTAB are cheaper and quicker, they seem to be attractive options for patent stakeholders (Dreyfuss, 2015, p. 4). And because of the timing, the PTAB is likely to be the first institution to implement Supreme Court law and consider substantive changes under the AIA (Dreyfuss, 2015, pp. 4-5).

And because PTAB judges have significant expertise in patent law and there is an effort to have at least one judge with expertise in the field of invention on each panel, the PTAB has the potential to contribute to the development of patent law policy (Dreyfuss, 2015, pp. 4-5, 20). For example, Rochelle Dreyfuss (2015) has taken a look at initial PTAB cases and argues that the PTAB's efforts have been successful at laying out a framework for analyzing issues related to definiteness and patentable subject matter in light of the Supreme Court's pronouncements in *Nautilus* and *Alice* (Dreyfuss, 2015, pp. 20-21). In contrast, the Federal Circuit has struggled with interpreting these cases (Dreyfuss, 2015, pp. 20-21).

Dreyfuss (2015) also points out that the PTAB decisions could go a long way in changing the nature of the Federal Circuit's jurisprudence (Dreyfuss, 2015, pp. 24-25). For example, one explanation for the Federal Circuit's rigid and formal analyses is that the court is trying to enhance predictability and uniformity (Dreyfuss, 2015, pp. 24-25). However, the Supreme Court has routinely rejected these rigid rules (Dreyfuss, 2015, pp. 24-25). Dreyfuss (2015) argues that because the PTAB is providing detailed and technology-specific analyses, bright line rules and less deference may be less necessary (Dreyfuss, 2015, pp. 24-25).

Despite its potential, Dreyfuss (2015) recognizes some limitations. One such limitation is that the PTAB, like the Federal Circuit, does not frequently refer to underlying policy in deciding cases (Dreyfuss, 2015, p. 28). Engaging with underlying policies could facilitate the dialogue with the Federal Circuit and eventually the Supreme Court (Dreyfuss, 2015, p. 28). Of course, given the hierarchical structure of these institutions, the ability of the PTAB to play an important role in shaping patent law and policy depends on the Federal Circuit's willingness to engage in a meaningful dialogue with the PTAB (Dreyfuss, 2015, pp. 31-32). Because the PTAB and its

new processes are still in their early formative years, this is an area ripe for further theoretical and empirical study.

C. District Courts

Facts, as in in most areas of the law, play a critical role in patent law (Rai, 2002, p. 881). In patent law, facts affect assessments of infringement, validity, and patent scope (Rai, 2002, p. 881). And the Federal Circuit's purported expertise involves, to a large extent, comprehending complex technologies covered in patents, the prior art, and the allegedly infringing protects or processes, and being able to assess the relationship between them (Dreyfuss, 2008, p. 802). Much of this turns on factual determinations (Rai, 2002, p. 881).

But because it is an appellate court, the Federal Circuit is, in theory, required to give deference to district courts on factual matters (Dreyfuss, 2008, pp. 802-803; Gugliuzza, 2013, p. 1831). But similar to what was shown with respect to the PTO, the Federal Circuit's review of district court decisions contravenes the traditional analysis (Rai, 2003, p. 1065). To overcome what the Federal Circuit sees as a deferential hurdle, it has recast some issues into questions of law (Dreyfuss, 2008, pp. 802-803); Rai, 2002, pp. 885-886; Gugliuzza, 2013, pp. 1831-1832; Pedraza-Fariña, 2015, pp. 98-102, 122-123). And when the Supreme Court has occasionally stepped in to stop this practice, the Federal Circuit has responded by requiring that district courts engage in a particular analytical approach (Dreyfuss, 2008, pp. 802-803). These practices fall in line with Pedraza-Fariña's (2015) theory that the Federal Circuit behaves like a weak expert institution – maintaining control over a body of knowledge by, *inter alia*, rejecting what others do and how they do it (Pedraza-Fariña, 2015, p. 109).

One concern with the Federal Circuit wrestling fact-finding control away from the district courts is that the Federal Circuit may not be any better at this because the Federal Circuit's expertise is in patent law, not the factual complexities of a particular technology (Rai, 2002, pp. 888; Rai, 2003, pp. 1088-1089). Another concern is that even if the Federal Circuit is a superior fact-finder, having it perform this function is inefficient (Rai, 2003, pp. 1089-1090). As Rai (2003) explains, both trial court and Federal Circuit resources are “expended on questions that will typically matter in only a single case” and certainty about the patent rights is delayed (Rai, 2003, p. 1089-1090).

Despite these concerns, it is questionable whether district judges do a better job (Rai, 2002, p. 889). To address this problem, Rai (2002, 2003) suggests specialized patent trial courts (Rai, 2002, p. 894; Rai, 2003, pp. 1065-1066, 1099-1101). To a certain extent, some district courts have become de facto specialized courts by hearing a disproportionate amount of patent cases (Kesan & Ball, 2011; Gugliuzza, 2013, p. 1839).

Kesan and Ball (2011) undertook a study to test whether increasing patent specialization resulted in “better” adjudication – that is, more accurate and efficient patent litigation (Kesan & Ball, 2011, p. 396). In their study, Kesan and Ball (2011) first looked to see how patent litigation is concentrated (Kesan & Ball, 2011, p. 420). They find that patent litigation is highly concentrated, but “most patent cases are still presided over by judges with little or no patent experience” (Kesan & Ball, 2011, p. 420).

Next, they examine how judicial experience (patent and otherwise) relates to the efficiency of handling patent cases (Kesan & Ball, 2011, p. 420). They find that judicial experience “seem[s] to reduce case duration, thereby increasing the efficiency with which patent cases are adjudicated” (Kesan & Ball, 2011, p. 420). In particular, they find that recent patent

experience (three years or less before the case is filed) has a bigger impact than total patent experience, but the impact is only moderate (Kesan & Ball, 2011, p. 443).

Finally, Kesan and Ball (2011) ask how experience (patent and otherwise) relates to accuracy in patent cases (as measured by the probability of being overturned on appeal) (Kesan & Ball, 2011, p. 420). They find that more experience with patent cases does increase the accuracy of patent rulings (Kesan & Ball, 2011, p. 420). In particular, they “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” and that “general judicial experience has no impact on the reversal rate” (Kesan & Ball, 2011, pp. 443-444). Drilling down a bit more into specific patent issues, Kesan and Ball (2011) show that recent and cumulative patent experience reduces the probability of reversal on grounds other than claim construction, and that *recent* patent experience reduces the probability of reversal on claim construction (Kesan & Ball, 2011, pp. 443-444). However, their results also show that *cumulative* patent experience has no impact on the probability of reversal on claim construction (Kesan & Ball, 2011, pp. 443-444).

Congress’s creation in the AIA of a pilot specialized trial judge program may complement the de facto specialization taking place at the trial court level (Kesan & Ball, 2011, p. 396) and could help alleviate some of the institutional deficiencies identified by scholars. And although benefits may flow from specialized trial courts or judges, the Federal Circuit’s recent willingness to transfer cases from specialized districts, such as the Eastern District of Texas, could be seen as an effort to “retain its status as the only expert patent court” (Gugliuzza, 2013, p. 1839) and potentially undermines the patent system of these benefits. Further research into these practices and the power struggle between the Federal Circuit and the district courts is warranted.

D. Solicitor General

As described earlier in this section, the Supreme Court began its renewed interest in patent cases in 1994. And although the merits of the Court’s 1994 case were not of much importance, Duffy (2010) argues that this case was important because it marks the first time the Court had issued an invitation for the Solicitor General to file an amicus brief on whether the Court should grant certiorari (also known as CVSG orders) (Duffy, 2010, p. 525).

Duffy’s data shows that the Supreme Court had used CVSG orders fairly regularly since the 1960s and hit its peak in the 1980s (Duffy, 2010, pp. 525-526). And starting in 1999, the Court began to use them in patent cases more regularly (Duffy, 2010, p. 526). However during the interim five year period, the Solicitor General argued as an amicus or a party in four of the five cases (Duffy, 2010, p. 528). In these cases, the Solicitor General fared well with the Court adopting its position or arguments in most of the cases (Duffy, 2010, p. 528).

But from 2000 through 2009, the Solicitor General’s role in patent cases grew stronger (Duffy, 2010, p. 529). During this period, the Court issued nineteen CVSG orders in patent or patent-antitrust cases (Duffy, 2010, p. 530). These CVSG orders comprised 10% of the Court’s total CVSG orders during this time period (Duffy, 2010, p. 530).

The importance of the Solicitor General’s role in patent cases stems from the fact that the Supreme Court traditionally has relied on circuit splits to decide whether to grant certiorari (Duffy, 2010, p. 530). Given the Federal Circuit’s exclusive jurisdiction over patent cases, this was not a likely indicator of the importance of the issue (Duffy, 2010, p. 530). And although the Court has used split decisions when the Federal Circuit decides cases en banc, the other proxy it uses to decide whether a case warrants review is to rely on CVSG orders (Duffy, 2010, p. 536).

In short, the Supreme Court has come to rely on the Solicitor General to advise it on the worthiness of patent cases (Duffy, 2010, pp. 536-537).

From 2000 until 2009, the Solicitor General fared well in having its position adopted by the Supreme Court in patent cases (Duffy, 2010, p. 538). In only one case, *eBay, Inc. v. MercExchange, L.L.C.*, did the party supported by the Solicitor General lose the case (Duffy, 2010, p. 538). And even in *eBay*, the Court adopted the Solicitor General's analysis (Duffy, 2010, p. 538). Comparing the success rate of the Solicitor General to the Federal Circuit's is also telling (Duffy, 2010, p. 540). Duffy shows that since 1996, the Solicitor General participated in thirteen patent cases and supported a different result than the Federal Circuit in nine of those (Duffy, 2010, p. 540). In all nine of those cases, the Supreme Court agreed with the Solicitor General position over the Federal Circuit's (Duffy, 2010, p. 540). And in two of the cases where the Solicitor General agreed with the Federal Circuit's end result, but disagreed with the reasoning, the Supreme Court adopted a rule closer to the Solicitor General's position than the Federal Circuit's (Duffy, 2010, p. 540).

The Supreme Court's increased reliance on the Solicitor General has given it increased power to help formulate patent law (Duffy, 2010, p. 543). The importance of this development has been that the creation of the Federal Circuit may have inadvertently shifted the power to shape patent law and policy away from the judiciary and towards the executive branch (Duffy, 2010, p. 543).

Duffy's study of the role of the Solicitor General in shaping patent law and policy is now several years old and the Supreme Court has continued its increased interest in patent law during this time. Not only could a researcher conduct a follow-up study to determine if the Solicitor General's role has remained prominent and success rate has remained high, but further analysis could be undertaken to see how these rates compare with other fields of law.

E. Congress

Although Congress has largely delegated patent policymaking to the courts (Rai, 2003, pp. 1040-1041) and the Federal Circuit has staked out a claim as the expert institution (Pedraza-Fariña, 2015), Congress clearly has the power to change patent law and policy. If Congress does not like what the Federal Circuit is doing, it can change the law (Dreyfuss, 2010, p. 840; Gugliuzza, 2013, p. 1827).

But there are concerns that Congress is an ineffective institution when it comes to patent policy. First, there is a concern that Congress has not been interested enough in patent policy (Dreyfuss, 2010, p. 840, Anderson, 2014, p. 965). From 1952 until 2011, there were more than fifty years of disinterest, followed by several years of failed attempts at reform (Dreyfuss, 2010, p. 840, Anderson, 2014, p. 965). It was not until 2011, upon passage of the American Invents Act, that Congress mustered sufficient political will to enact real change.

Second, scholars argue, even if political will exists, intervention by Congress is undesirable (Rai, 2003, pp. 1127-1129). As Arti Rai points out, innovation is unpredictable, so detailed statutes enacted by Congress will often be wrong (Rai, 2003, p. 1127). And once codified, these laws become intractable and only perpetuate the problems (Rai, 2003, p. 1127). In addition, policymaking by Congress is subject to opportunistic behavior (Rai, 2003, p. 1130; Anderson, 2014, p. 966).

Notwithstanding these concerns, scholars have recently begun to illustrate the interesting relationship between Congress and the Federal Circuit (Anderson, 2014; Gugliuzza, 2013, pp. 1827-1828). Rather than writing detailed statutes to effectuate change, Congressional hearings

on patent law have acted as catalysts to spur the Federal Circuit into action to revisit certain aspects of its patent jurisprudence (Anderson, 2014, pp. 966-967; Gugliuzza, 2013, pp. 1827-1828). Jonas Anderson (2014) and Paul Gugliuzza (2013) describe how Congress began seriously examining patent reform in 2005 and that as a result of the legislative proposals, the Federal Circuit responded to several of these proposals by publicly commenting on them, exercising its infrequently used discretionary powers, urging the bar to appeal these issues to the Federal Circuit, and ultimately altering its precedent to moot parts of the legislation (Anderson, 2014, pp. 967-968; Gugliuzza, 2013, pp. 1827-1828). Anderson (2014) argues that Congress playing a catalytic role, which drives the Federal Circuit into action, permits Congress to focus its reform efforts on areas where the Federal Circuit has little or no control, such as administrative reform (Anderson, 2014, p. 1006).

Despite the claim that this relationship between Congress and the Federal Circuit has the potential to strike an appropriate balance between competing policy consideration, this potential rests on the assumption that Congress will continue overseeing patent policymaking (Anderson, 2014, p. 1018). There has been a decade of such oversight, but future scholarship may want to continue monitoring this trend and the Federal Circuit's responses to see if it persists and to determine if patent policy is optimized by this relationship.

VIII. Conclusion

In a sense, the Federal Circuit has been an experiment in institutional design (Duffy, 2004, p. 803). Thus, it is fitting that this court has been the subject of an extraordinary amount of empirical study to determine if the experiment has been a success or failure. As this chapter has illustrated, we still do not have a clear answer to that broad question. Given that the goals of the Federal Circuit sometimes work at cross purposes and that there are a multitude of variables affecting the development of patent law and the underlying policies, it is doubtful that this question can ever be answered with finality.

Nonetheless, the empirical studies of the Federal Circuit serve an important purpose. We may never be able to design a perfectly functioning system to administer patent law. In fact, we may not even be able to design a perfectly functioning court to resolve patent appeals. However, continued research into the effectiveness of particular areas and how those areas interact with others and the underlying policies can help those charged with designing and implementing the system to do so with a grounded understanding of what the strengths, weaknesses, and challenges are.

The tremendous amount and sophistication of the empirical scholarship on the Federal Circuit is a great start. But there is much more work to be done. The addition of several new judges at the Federal Circuit, several years of a Supreme Court with an active interest in patent law, Congressional action to reform patent law, and changes in procedures and policies at the PTO will drive the need to reevaluate previous studies, undertake completely new analyses, and determine what changes, if any, are necessary.

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