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Decisionmaking in Patent Cases at the Federal Circuit

Jason Reinecke

Marquette University Law School, jason.reinecke@marquette.edu

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Decisionmaking in Patent Cases at the Federal Circuit

Jason Reinecke*

Abstract

This Article provides the results of an empirical study assessing the impact of panel composition in patent cases at the Federal Circuit. The dataset includes 2675 three-judge panel-level final written decisions and Rule 36 summary affirmances issued by the Federal Circuit between January 1, 2014 and May 31, 2021. The study informs the longstanding debate concerning whether the Federal Circuit is succeeding as a court with nationwide jurisdiction in patent cases and provides insight into judicial decisionmaking more broadly. And several results show that many of the worst fears that commentators have about the Federal Circuit appear overstated or untrue.

For example, the results show that, in the aggregate, patent-related ideology plays a role in voting and decisionmaking at the Federal Circuit—that is, some judges are

* Assistant Professor of Law, Marquette University Law School. Stanford Law School, J.D. 2018; University of Wisconsin-Madison, B.S. Mechanical Engineering 2015. For helpful comments, I would like to thank Nate Atkinson, Bruce Boyden, Emily Cauble, Anuj Desai, Laura Dolbow, Paul Gugliuzza, Mark Lemley, Jonathan Masur, Kali Murray, Yaron Nili, Chad Oldfather, Lisa Larrimore Ouellette, Lee Petherbridge, Jason Rantanen, Dave Reinecke, Kim Reinecke, Dave Schwartz, Nina Varsava, Melissa Wasserman, Rob Yablon, participants at PatCon 2023, workshop participants at Wisconsin Law School, and student participants at my 2023 Marquette University IP Speaker Series presentation in 2023. For helpful discussions regarding statistical methods, I would like to thank Matthew Bondy, Thomas Lumley, Azeem Zaman, and Samantha Zyontz. All views expressed are my own. The dataset, computer code, and regression results can be found on Harvard Dataverse. See Jason Reinecke, *Decisionmaking in Patent Cases at the Federal Circuit*, HARV. DATAVERSE (Feb. 14, 2024), <https://perma.cc/EQU4-YPJM>.

more likely to vote in a pro-patentee direction than others. This patent ideology is not explained by political affiliation, nor is it significantly explained by the judges' prior patent-related experience. The former observation undercuts the assumption made by scholars that if political affiliation does not predict voting in an area of law, then that area of law must either be clear and binding, or there must be a near-consensus about the appropriate principles.

The results also indicate that decisionmaking at the Federal Circuit is influenced by panel effects, which refer to changes in judges' voting patterns based on the preferences of the other judges on the panel. The study exemplifies how prevalent panel effects can be in an area of law, considering they persist in patent cases at the Federal Circuit despite several reasons to believe panel effects may not exist.

This study also compares decisionmaking in precedential, nonprecedential, and summarily affirmed cases and finds that voting and decisionmaking is most influenced by patent ideology in precedential cases. Prior studies of judicial decisionmaking in other circuits typically focus exclusively on precedential cases, and thus must be interpreted in view of that limitation.

Furthermore, according to the results, judges do not appear to use summary affirmances as a tool to systematically bury cases opposing their patent ideology. To the contrary, decisionmaking in summarily affirmed cases is largely, if not entirely, independent of patent ideology. And judges are not more likely to summarily affirm cases coming out against their patent ideology, when considered as a fraction of the total number of opportunities to issue a summary affirmance.

The results also show that judges tend to write a disproportionate share of opinions favoring their patent ideology. As a result, there is greater risk than previously recognized that the law will develop to reflect the idiosyncratic preferences of a few judges and that opinions will be written ideologically.

Table of Contents

INTRODUCTION	171
I. STUDY DESIGN AND METHODOLOGY	179

A.	<i>Dataset</i>	179
B.	<i>Panel Assignment at the Federal Circuit</i>	182
II.	RESULTS.....	187
A.	<i>Ideological Decisionmaking</i>	187
1.	Political Ideology	187
a.	<i>Prior Literature</i>	188
b.	<i>Results</i>	192
2.	Ideology Based on Prior Patent-Related Experience	197
a.	<i>Prior Literature</i>	197
b.	<i>Results</i>	199
3.	Observed Patent Ideology	207
a.	<i>Prior Literature</i>	209
b.	<i>Estimating Patent Ideology Based on Revealed Relative Patent-Related Ideological Preferences</i>	213
c.	<i>Modeling Judges Individually</i>	221
d.	<i>Comparative Importance of the Law</i> ...	222
B.	<i>Panel Effects</i>	224
C.	<i>Patent Ideology and Publication</i>	227
1.	Voting Patterns Within Each Designation	229
2.	Use of Rule 36 Summary Affirmances	239
D.	<i>Authorship</i>	242
III.	IMPLICATIONS	247
	CONCLUSION.....	253

INTRODUCTION

As the individuals vested with the power to resolve legal disputes, judges play a critical role in the legal system.¹ Indeed, to understand how judges decide cases is to understand the

1. See LEE EPSTEIN ET AL., *THE BEHAVIOR OF FEDERAL JUDGES: A THEORETICAL AND EMPIRICAL STUDY OF RATIONAL CHOICE* 1 (2013) (“Judges indeed play a central role in the American legal system—more so than in most others.”); JOHN P. DAWSON, *THE ORACLES OF THE LAW* xi (1968) (“In the continuing drama of American law the judge still holds the center of the stage, down in front of the footlights . . . Much of our finest intelligence is engaged in studying what judges do and say and in guessing at their inmost sensations.”).

law—as Oliver Wendell Holmes, Jr. famously put it, “The prophecies of what the courts will do in fact, and nothing more pretentious, are what I mean by the law.”²

Although there is a growing empirical literature surrounding decisionmaking by the United States Courts of Appeals,³ this scholarship frequently omits the Federal Circuit from the analysis.⁴ Decisionmaking at the Federal Circuit warrants greater attention. For instance, due to its nationwide jurisdiction over numerous subject areas, including patent law, the Federal Circuit wields considerable control over many areas of law.⁵ Although the Supreme Court occasionally decides a patent appeal, the Federal Circuit provides the final word in nearly all such appeals—the Federal Circuit issues hundreds of patent decisions each year, whereas the Supreme Court decides a few patent cases, at most.⁶ Nor does Congress exert significant influence over patent law.⁷ The relevant statutes outlining the most important patent law doctrines provide little helpful detail.⁸ As a result, the Federal Circuit has, in many respects,

2. Oliver Wendell Holmes, Jr., *The Path of the Law*, 10 HARV. L. REV. 457, 460–61 (1897).

3. See generally EPSTEIN ET AL., *supra* note 1; FRANK B. CROSS, *DECISION MAKING IN THE U.S. COURT OF APPEALS* (2007).

4. See *infra* Part II; see also, e.g., Jason Rantanen, *Missing Decisions and the United States Court of Appeals for the Federal Circuit*, 170 U. PA. L. REV. ONLINE 73, 75, 77 (2022) (explaining that a prior study of United States circuit courts did not include the Federal Circuit, and the Federal Circuit’s termination data is difficult to compare directly with the other circuits).

5. See David O. Taylor, *Formalism and Antiformalism in Patent Law Adjudication: Rules and Standards*, 46 CONN. L. REV. 415, 418 (2013) (characterizing the Federal Circuit as a “semi-specialized court with nationwide jurisdiction over appeals in patent cases” created to “strengthen the U.S. patent system, foster technological growth and industrial innovation, eliminate forum shopping among the regional courts of appeal, and increase uniformity and reduce uncertainty in substantive patent law”).

6. See Paul R. Gugliuzza & Mark A. Lemley, *Myths and Reality of Patent Law at the Supreme Court* 9–27 (Stan. L. Sch., Working Paper No. 585, 2023) [hereinafter Gugliuzza & Lemley, *Myths and Reality of Patent Law*].

7. See Arti K. Rai, *Engaging Facts and Policy: A Multi-Institutional Approach to Patent System Reform*, 103 COLUM. L. REV. 1035, 1041 (2023) (“Congress has delegated policymaking responsibility in patent law to the judiciary.”).

8. See Rochelle Cooper Dreyfuss, *In Search of Institutional Identity: The Federal Circuit Comes of Age*, 23 BERKELEY TECH. L.J. 787, 801 (2008) (explaining that the Patent Act “always depended on common law elaboration” and “was drafted with policy levers that could facilitate flexible and responsive

been left to its own devices to set the law of the land on patents. Due to its heavy influence over patent law, the Federal Circuit has been nicknamed the “Supreme Court of Patents.”⁹

With great power comes great risk. For example, there is risk that the Federal Circuit will be captured by interest groups;¹⁰ produce law that is too stale and uniform or,

application”); Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1638 (2003) (explaining that the Patent Act “sets the basic parameters for patentability and infringement” but “does not specify in detail how those basic principles are to be applied”); Rochelle Cooper Dreyfuss, *What the Federal Circuit Can Learn from the Supreme Court-and Vice Versa*, 59 AM. U. L. REV. 787, 794 (2010) (“Although patent law is nominally statutory, it leaves wide gaps for judge-made law.”); Rai, *supra* note 7, at 1117 (positing that “[t]he sparseness [sic] of the statutory language suggests the need for further judicial elaboration”); Giles S. Rich, *The Vague Concept of ‘Invention’ as Replaced by Section 103 of the 1952 Patent Act*, 14 FED. CIR. B.J. 147, 149 (2004) (“The closest approach to a restatement was the Patent Act of 1952, but as a statute it does not, of course, carry its own explanation.”); *see also* David O. Taylor, *Formalism and Antiformalism in Patent Law Adjudication: Precedent and Policy*, 66 SMU L. REV. 633, 677–78 (2013) (providing “the following non-exhaustive list of patent law doctrines not closely circumscribed by statute: eligible subject matter; utility; non-obviousness; claim construction; experimental use; infringement under the doctrine of equivalents; prosecution history estoppel; laches; equitable estoppel; inequitable conduct; patent misuse; exhaustion; injunctive relief; damages; and enhanced damages”).

9. *See, e.g.*, David R. Pekarek-Krohn & Emerson H. Tiller, *Federal Circuit Patent Precedent: An Empirical Study of Institutional Authority and Intellectual Property Ideology*, 2012 WIS. L. REV. 1177, 1184 (2012) (explaining that the Federal Circuit “has been called by some the ‘Supreme Court of Patents’” and concluding that, as compared to the Supreme Court, district courts treat the Federal Circuit as more authoritative on patent law than the regional circuits on copyright); Mark D. Janis, *Patent Law in the Supreme Court*, 2001 U. ILL. L. REV. 387, 387 (2001) (“The Court of Appeals for the Federal Circuit . . . has become the de facto supreme court of patents.”); *see also, e.g.*, Paul R. Gugliuzza, *How Much Has the Supreme Court Changed Patent Law?*, 16 CHI. KENT J. INTELL. PROP. 330, 331 (2017) (arguing that the Supreme Court’s influence on patent law is limited due to the fact that the Court rarely delves into the fundamental patent law doctrines); Gugliuzza & Lemley, *Myths and Reality of Patent Law* *supra* note 6 (providing an extensive review of the evidence showing the limits of the Supreme Court’s influence on patent law); Jonathan S. Masur, *Regulating Patents*, 2010 SUP. CT. REV. 275, 277 (2010) (“[T]he Federal Circuit has assumed near-total authority over patent policy and doctrine, which is a position held by no other appellate court over any area of law.”).

10. *See* Stuart Minor Benjamin & Arti K. Rai, *Fixing Innovation Policy: A Structural Perspective*, 77 GEO. WASH. L. REV. 1, 17 (2008) (“The behavior of the Federal Circuit was arguably consistent with standard accounts of capture

conversely, too divergent;¹¹ and create law that reflects the idiosyncratic preferences of just a few judges.¹² These potential risks could come at great cost. For instance, patent law is a key tool used to incentivize innovation,¹³ and innovation is a key driver of economic growth, and increased living standards and well-being.¹⁴ As the court with so much control over patent law, decisionmaking at the Federal Circuit has considerable influence over patent law's ability to achieve its goals.¹⁵ These issues, and others relating to the soundness of vesting one court

of regulatory processes by well-represented interest groups.”); John R. Thomas, *Formalism at the Federal Circuit*, 52 AM. U. L. REV. 771, 794 (2003) (suggesting that the Federal Circuit's jurisprudence is influenced by the preferences of the patent bar); Rochelle Cooper Dreyfuss, *Specialized Adjudication*, 1990 BYU L. REV. 377, 379 (1990) (“[C]oncentration of cases . . . makes the tribunal more vulnerable to politicization than courts of general jurisdiction.”); Melissa F. Wasserman & Jonathan D. Slack, *Can There Be Too Much Specialization? Specialization in Specialized Courts*, 115 NW. L. REV. 1405, 1419 (2021) (“Concentrating judicial power in a small subset of judges enables interest groups to consolidate and focus their energy and resources towards appointments of that court. Moreover, the repetitive nature of the workload may make specialized judges vulnerable to interest groups that routinely argue before them.”).

11. See *infra* note 133 and accompanying text.

12. See Wasserman & Slack, *supra* note 10, at 1418–19.

13. See Burk & Lemley, *supra* note 8, at 1576.

14. See JAMES BROUGHEL & ADAM THIERER, TECHNOLOGICAL INNOVATION AND ECONOMIC GROWTH: A BRIEF REPORT ON THE EVIDENCE 3 (2019). See generally JOSEPH A. SCHUMPETER, CAPITALISM, SOCIALISM, AND DEMOCRACY (1942); Paul M. Romer, *Increasing Returns and Long-Run Growth*, 94 J. POL. ECON. 1002 (1986); Robert E. Lucas, Jr., *On the Mechanics of Economic Development*, 22 J. MONETARY ECON. 3 (1988); Paul M. Romer, *Endogenous Technological Change*, 98 J. POL. ECON. S71 (1990); Gene M. Grossman & Elhanan Helpman, *Endogenous Innovation in the Theory of Growth*, 8 J. ECON. PERSPS. 23 (1994); Iftekhar Hasan & Christopher L. Tucci, *The Innovation-Economic Growth Nexus: Global Evidence*, 39 RSCH. POL'Y 1264 (2010).

15. There is a large body of literature concerning the costs that can arise when patent law is not properly tailored. See, e.g., Stephen Yelderman, *The Value of Accuracy in the Patent System*, 84 U. CHI. L. REV. 1217, 1219–20 (2017); Jeremy W. Bock, *Does the Presumption of Validity Matter? An Experimental Assessment*, 49 U. RICH. L. REV. 417, 449 (2015); T. Randolph Beard et al., *Quantifying the Cost of Substandard Patents: Some Preliminary Evidence*, 12 YALE J.L. & TECH. 240, 243–45 (2010); R. Polk Wagner, *Understanding Patent-Quality Mechanisms*, 157 U. PA. L. REV. 2135, 2137–45 (2009). See generally Andres Sawicki, *Better Mistakes in Patent Law*, 39 FLA. ST. U. L. REV. 735 (2012).

with nationwide jurisdiction over patent law, are ultimately empirical questions.¹⁶

This Article informs these questions, and provides significant insights into decisionmaking more generally, by providing the results of a large empirical study assessing the impact of panel composition in patent disputes at the Federal Circuit.¹⁷ The dataset includes all 2675 three-judge panel-level final written decisions and Federal Circuit Rule 36¹⁸ summary affirmances issued by the Federal Circuit between January 1, 2014 and May 31, 2021 that resulted in the disposition of at least one patent-related issue (except for issues solely relating to inventorship or patent ownership because they are not readily categorized into pro-patentee or pro-challenger rulings).¹⁹ Notably, unlike most studies concerning the impact of the identities of the judges on voting and decisionmaking, which typically examine only precedential cases,²⁰ this study also includes all nonprecedential and summarily affirmed cases in the time period of study. Provided below is a brief summary of the results and implications.

Voting and Decisionmaking: The results show that “patent ideology” plays a role in voting and decisionmaking in patent cases at the Federal Circuit, in the sense that some judges are more likely to vote in favor of the patent owner (a “pro-patentee” vote) and others in favor of the patent challenger/accused infringer (a “pro-challenger” vote).²¹ The magnitude of the differences is discussed in detail in Part II.A below, but to provide a brief overview: the percentage of pro-patentee votes cast by the twelve judges who were active for the majority of the time period of study (hereinafter the “active judges”) ranges between 16.4% and 31.1%, which means that the most pro-patentee active judge was nearly twice as likely to vote in favor of the patent owner than the most pro-challenger active

16. See Lee Petherbridge, *Patent Law Uniformity?*, 22 HARV. J.L. & TECH. 421, 424 (2009) (“[T]he claim of a lack of jurisprudential diversity is substantially an empirical one—a claim that there is a lack of noticeable heterogeneity in the course of the court’s decision-making.”).

17. See *infra* Part II.

18. FED. CIR. R. 36(a) (judgment of affirmance without opinion).

19. See *infra* Part II.A.

20. See *infra* Part II.A.

21. See *infra* notes 135–145 and accompanying text.

judge. The five most pro-patentee judges have between 1.45 and four times the odds of casting a pro-patentee vote than the three most pro-challenger judges. The differences are generally larger when only validity cases are assessed. Although the magnitude of this effect is quite significant, it should not be overstated: the strength of a party's case plays a larger role than patent ideology.

This patent-related ideology is not explained by politics. This observation challenges the conclusion in the prior literature that if political affiliation does not explain voting in an area of law, then the law in that area must be clear and binding, or there must be a near-consensus as to the appropriate principles.

Nor is this patent ideology significantly explained by whether the judge has a technical background or had prior patent law experience prior to joining the bench. But there is evidence that judges with such experience tend to be more pro-patentee, on average. Because the Federal Circuit always comprises many judges who have prior patent experience, this fact could be one reason the Federal Circuit is pro-patentee on balance.²²

The results cast doubt on the conclusion that the Federal Circuit has produced jurisprudence that is overly isolated or uniform. To the contrary, many judges appear to have very different views about how patent cases ought to be resolved. At the same time, the strength of a party's case has the most impact. Furthermore, the fact that many judges have such different views supports the fact that the Federal Circuit has not been captured by any particular interest group.

Importantly, the results show that some judges *vote* more pro-patentee than others, which is important because those votes shape patent law.²³ But the results do not explain *why* some judges vote more pro-patentee than others. It could be that some judges have a more favorable view of patents and what they offer to society. Alternatively, because recent Supreme Court precedent has tended to favor patent challengers, it could be that some Federal Circuit judges believe that Supreme Court

22. See Jonathan Masur, *Patent Inflation*, 121 YALE L.J. 470, 473, 520 (2011) (explaining that many commentators have argued that the Federal Circuit has driven patent law in a pro-patentee direction).

23. See *infra* Table 7.

precedent should be read more broadly than others. Or it could be a mix of the two, either alone or in combination with other factors. For the rest of the Article, when I refer to a judge's pro-patentee or pro-challenger leanings or ideology, I refer only to that judge's voting behavior and remain agnostic as to *why* that judge votes comparatively more pro-patentee or pro-challenger.

Panel Effects: The results, discussed below in Part II.B, show that decisionmaking at the Federal Circuit is also influenced by panel effects, which refer to changes in judges' voting patterns based on the preferences of the other judges on the panel. The study exemplifies how prevalent panel effects can be, considering they persist at the Federal Circuit despite numerous reasons to believe that such effects may not exist in this context, including that all judges on the court either have or develop expertise in patent law while on the bench, and that the judges undoubtedly believe that patent law is very important.

Publication: The results, discussed in Part II.C, indicate that voting and decisionmaking is most influenced by patent ideology in precedential cases. For example, the percentage of pro-patentee votes cast by the active judges in precedential cases ranges between 19.9% and 55.2% (as opposed to 16.4% and 31.1% in cases generally). Prior studies of judicial decisionmaking in other circuits typically focus exclusively on precedential cases, and thus must be interpreted in view of this limitation.

The impact of patent ideology in voting in precedential patent cases at the Federal Circuit is greater than the politics-related ideological divides found in prior studies for many areas of law, including Title VII,²⁴ capital punishment, abortion, and piercing the corporate veil. The absolute differences are similar to the divides in Americans with Disabilities Act ("ADA")²⁵ and Contract Clause cases, and the proportional differences are similar to sex discrimination cases. The differences are less stark than for Environmental Protection Agency ("EPA"), affirmative action, and campaign finance cases.

24. 42 U.S.C. § 2000e-5.

25. 42 U.S.C. § 12188(a)(1).

The results also support that judges are not systematically using summary affirmances to bury cases that might otherwise create published precedent that the judges would not like. Judges do not appear to have strong pro-patentee or pro-challenger preferences in cases that are summarily affirmed. And judges are not more likely to summarily affirm cases coming out against their patent ideology, when considered as a fraction of the total number of opportunities to issue a summary affirmance.

All judges' proportion of pro-patentee precedential votes exceeded their proportions of pro-patentee nonprecedential and summarily affirmed votes. The reason behind this observation is unclear. It could be that, in view of significant pro-challenger precedent issued by the Supreme Court in recent years, all judges see the need to explain the circumstances under which the patent owner has the better case. Another reason might be that because, as many scholars have suggested, the Federal Circuit is pro-patentee on balance, it may be more difficult for pro-challenger panels to issue pro-challenger precedential opinions without a threat of being reversed en banc.

Relatedly, patentees win more frequently (and patent challengers less frequently) in precedential and nonprecedential decisions than in summarily affirmed decisions.²⁶ Paul Gugliuzza and Mark Lemley made a similar finding in the specific context of patentable subject matter decisions, and they argued that such asymmetry could, over time, skew substantive law in a pro-patentee direction and, at a minimum, provides an inaccurate picture of how the Federal Circuit decides cases.²⁷ Based on the results here, the same could be true for patent cases more generally.

Authorship: It was previously discovered that some judges at the Federal Circuit write a disproportionate number of patent opinions.²⁸ The results in this study, discussed below in Part II.D, further show that authorship of pro-patentee and pro-challenger opinions are even more lopsided, with pro-patentee judges more likely to author pro-patentee opinions and vice versa. In view of this finding, because authoring judges

26. See *infra* Part III.

27. See *infra* note 209 and accompanying text.

28. See *infra* note 192 and accompanying text.

have greater ability to shape an opinion, there is even greater risk than previously recognized that the case law will develop to reflect the idiosyncratic preferences of a few judges, and that opinions will be written more broadly and more starkly in favor of the authoring judge's patent ideology.

This Article proceeds as follows: Part I describes the design of the study and the methodology. Part II provides the results of the study. Although the primary purpose of this Article is to discuss and analyze the data, Part III discusses some of the implications of the results.

I. STUDY DESIGN AND METHODOLOGY

In this Part, I discuss the dataset, including how the dataset was created and coded, and then I assess whether there are any difficulties in view of case assignment at the Federal Circuit that must be taken into account.

A. Dataset

The dataset includes all 2,708 panel-level²⁹ final written decisions and Rule 36 summary affirmances issued by the Federal Circuit between January 1, 2014 and May 31, 2021—a period of nearly seven and a half years—that resulted in a disposition of at least one issue that could be classified as a pro-patentee ruling (e.g., the ruling came out in favor of the patentee, patent applicant, or prospective patentee or patent applicant),³⁰ a pro-challenger ruling (i.e., the ruling came out against the patentee and in favor of the patent challenger/patent application challenger/accused infringer), or a

29. En banc decisions were excluded because “[e]n banc decisionmaking entails a set of strategic considerations independent of those that apply in the panel setting.” Daniel J. Hemel & Kyle Rozema, *Decisionmaking on Multimember Courts: The Assignment Power in the Circuits* 14 (Nw. L. Econ. Rsch., Working Paper No. 17-05, 2017), <https://perma.cc/DY72-LHTK> (PDF). See generally Micheal W. Giles et al., *Setting a Judicial Agenda: The Decision to Grant En Banc Review in the U.S. Courts of Appeals*, 68 J. POL. 852 (2006).

30. An example of a prospective patentee or patent applicant would be a party challenging proposed rulemaking by the United States Patent and Trademark Office for, e.g., impermissibly burdening patentees and patent applicants. There were very few such cases—nearly every coded case more traditionally pitted a patent owner against some sort of patent challenger (e.g., alleged infringer or inter partes review petitioner).

mixed ruling.³¹ The dataset includes rulings in favor of the patent owner or patent challenger even if the relevant issues did not relate directly to the specific issues of patent validity or infringement (e.g., attorney fees in a patent infringement case)—pro-patentee and pro-challenger biases may manifest in patent cases even outside of the issues specific to patent law, because a patent owner (or patent challenger) still stands to gain or lose depending on the outcome.³²

As discussed in more detail below, the cases were separately coded for various issues of patent validity (as well as for patent validity generally) because voting divides may be more likely to manifest in such cases.³³

Because such cases may not be representative of most, I oftentimes exclude the rare cases decided by two judges and those decided by two judges plus a visiting judge. With such cases excluded, the total number of cases is 2,675.

I identified the cases using the Compendium of Federal Circuit Decisions created by a team at the University of Iowa led by Jason Rantanen.³⁴ The Compendium included the coding for numerous fields of interest, including the precedential status of the opinion, the composition of the panel, the authoring judge,

31. The dataset thus includes the dispositions for all patent-related cases, except cases with issues relating solely to inventorship and patent ownership were excluded because those issues are not readily parsed into pro-patentee and pro-challenger rulings. For these types of issues, the court ultimately picks one rightsholder or group of rightsholders over another, as opposed to picking a side between a rightsholder and a rights challenger. In the rare case that a panel decision was replaced by a subsequent opinion by the same panel, I excluded the original opinion from the analysis. In rare cases, the court will side with the losing party on some issues in dicta, or the court will agree with some arguments taken by the losing party. To keep coding as objective as possible, and because the ultimate resolution seems to be the best guide as to which party the court agreed with on the most pressing issues and arguments, I utilized the court's ruling to guide coding.

32. See *infra* Table 1.

33. See *infra* notes 65, 74, 89, 174 and accompanying texts.

34. See *The Compendium of Federal Circuit Decisions*, FED. CIR. DECISIONS DATABASE, <https://perma.cc/D4LN-T3LA> (last visited Sept. 13, 2022) [hereinafter *Compendium*]. For a discussion of the methodology and contents of the *Compendium*, see generally *The Compendium of Federal Circuit Decisions*, U. IOWA, <https://perma.cc/GC8W-JXTT> (last visited Sept. 13, 2022); Jason Rantanen, *The Landscape of Modern Patent Appeals*, 67 AM. U. L. REV. 985 (2018).

and the identities of any dissenting judges.³⁵ I hand coded numerous additional datapoints of interest, including the overall disposition of the appeal;³⁶ whether the ruling was pro-patentee, pro-challenger, or mixed;³⁷ the favorability of the appealed ruling from the perspective of patent owner; whether any obviousness, patentable subject matter, or other validity ruling(s) were mixed or favored the patent owner or patent challenger/accused infringer;³⁸ and the same fields for any dissents.

Mixed rulings (e.g., an affirm-in-part and vacate-in-part on an appeal brought by the patent owner) were coded as providing a mixed result even if one side or the other appeared to have won the lion's share of the issues. That way, coding remained objective. It is often very difficult, if not impossible, to accurately tell from an opinion which issues were most important to the parties and driving the appeal.

When analyzing cases that were summarily affirmed, I identified the winning party (or parties, if the case presented a cross appeal) by analyzing the briefing. I assumed that the Federal Circuit affirmed on all grounds presented except for alternative bases for affirmance.³⁹

I also did not code issues when the parties did not contest the ultimate resolution of the issue⁴⁰ because dispositions on

35. See *Compendium*, *supra* note 34.

36. The dispositions included affirm, reverse, vacate, dismiss, or a mix of more than one of those dispositions.

37. This field was coded for the case as a whole, which means for some cases, the panel rendered a mixed ruling (i.e., at least one issue was resolved in favor of each party). Although securing a vacate-and-remand is not as favorable as an outright reversal, both rulings were coded as a win for the appellant. Oftentimes, appellants only seek vacatur, and regardless such relief is generally a win for the party that obtained that relief.

38. I considered a case to concern one of these issues so long as the ruling pertained to the substantive analysis of the issue (e.g., vacating a United States Patent Trial and Appeal Board ("PTAB") judgment of obviousness on the basis that the PTAB failed to adequately explain its reasoning was coded as a validity issue).

39. It seems that a court would be likely to write an opinion if the court had to reach an alternative ground to affirm an appeal. Regardless, this issue arose very rarely and impacts only the coding relating to whether a party won on an issue of validity.

40. Such issues included, for example, any instances in which the parties agreed on a remand for the issue, as well as decisions simply stating that the appeal was moot or otherwise disposed of based on the outcome of a related

uncontested issues do not provide information about the judges' decisionmaking—the judges were not the ones who decided how to dispose of the issue.

Of the 2,708 decisions in the dataset, 29.8% (806) were precedential decisions, 30.1% were nonprecedential decisions (814), and the remaining 40.2% (1,088) were summary affirmances. The patent owner won before the district court in 19.5% (529) of the cases, and the patent challenger won in 71.8% (1,945) of the cases. There were 1,361 appeals from district courts and 1,301 appeals from the United States Patent Trial and Appeal Board (“PTAB”). The remainder were appeals from either the United States International Trade Commission or the United States Court of Federal Claims.

B. *Panel Assignment at the Federal Circuit*

In this subpart, I assess whether the assignment of cases that result in a decision at the Federal Circuit appears to present any non-randomness that must be accounted for when analyzing the results.

A randomized experiment is the gold standard for establishing causal conclusions—i.e., for establishing that the treatment causes the outcome.⁴¹ Randomization ensures that the group receiving the treatment and the group that does not receive the treatment will differ, on average, only as to whether they received the treatment.⁴² Any differences in outcomes between both groups can therefore be attributable to the

appeal, assuming there was no discussion of any disagreement between the parties as to the appropriateness of such a disposition (e.g., dismissing an appeal of a district court's denial of fees because, in a related appeal, the Federal Circuit concluded that the relevant patent was invalid).

41. See CHESTER ISMAY ET AL., INTRODUCTION TO STATISTICS AND DATA SCIENCE ch.7 (manuscript), <https://perma.cc/ZN5G-A3BV> (last updated Feb. 14, 2020); Nancy Cartwright, *What Are Randomized Controlled Trials Good For?*, 147 PHIL. STUD. 59, 59 (2010); Adam S. Chilton & Marin K. Levy, *Challenging the Randomness of Panel Assignment in the Federal Courts of Appeals*, 101 CORNELL L. REV. 1, 14 (2015).

42. See Chilton & Levy, *supra* note 41, at 14.

treatment.⁴³ Without randomization, it can be possible that the outcome is correlated with whether the treatment was applied.⁴⁴

Here, because the relevant questions generally revolve around whether some judges are more likely to rule in favor of (or against) the patentee than others, the operative question is whether some judges hear a disproportionate number of cases in which a patent owner brings a strong or weak appeal. In such a scenario, it could be unclear to what extent a judge's propensity to vote in favor of (or against) the patentee is due to the judge's preferences or instead due to the judge's unrepresentative caseload.

The relevant literature on judicial decisionmaking has oftentimes taken for granted that panel assignments are random.⁴⁵ But Adam Chilton and Marin K. Levy showed that at

43. *See id.*

44. *See id.* (demonstrating that without randomization in experimental design, there is a risk of correlation between the treatment and the outcome, which can lead to biased or unreliable results).

45. *See, e.g., id.*, at 2 (“A fundamental academic assumption about the federal courts of appeals is that the three-judge panels that decide cases have been randomly configured.”); CASS R. SUNSTEIN ET AL., ARE JUDGES POLITICAL? AN EMPIRICAL ANALYSIS OF THE FEDERAL JUDICIARY 4 (2006); CROSS, *supra* note 3, at 108; William M. Landes & Richard A. Posner, *Rational Judicial Behavior: A Statistical Study*, 1 J. LEGAL ANALYSIS 775, 818 (2009); Petherbridge, *supra* note 16, at 444; Cass R. Sunstein et al., *Ideological Voting on Federal Courts of Appeals: A Preliminary Investigation*, 90 VA. L. REV. 301, 303 (2004); John R. Allison & Mark A. Lemley, *How Federal Circuit Judges Vote in Patent Cases*, 27 FLA. ST. U. L. REV. 745, 752 (2000). *See generally* Alberto Galasso & Mark Schankerman, *Patent Rights, Innovation, and Firm Exit*, 49 RAND J. ECON. 64 (2018); Alberto Galasso & Mark Schankerman, *Patents and Cumulative Innovation: Causal Evidence from the Courts*, 130 Q.J. ECON. 317 (2014).

least some aspects of panel assignment may not be random for all circuits.⁴⁶ They did not, however, test the Federal Circuit.⁴⁷

To test whether the Federal Circuit panels that result in an opinion are consistent with random assignment, I checked the randomness of assignment based on whether the case resulted in a decision relating to obviousness, patentable subject matter, or another validity issue; whether the case is an appeal from the PTAB; and whether the district court ruling as to the appealed portion(s) of the case favored the patent challenger/alleged infringer, patent owner, or was mixed. These are the observable characteristics that seem most relevant to the relative strength of the patent owner's case.

For each test, first I calculated for each judge the number of relevant cases that they heard (i.e., that resulted in a ruling on a particular issue, PTAB appeals, or cases in which the district court decision favored the patent challenger/accused infringer). Next I subtracted that value from the number of such cases that would be expected,⁴⁸ and then for each I calculated a value representing the collective average deviation from the mean for the judges.⁴⁹ Then, I ran a large number of simulations (in my case, 1,000 because that is a common convention in the legal and political science literature)⁵⁰ to randomly reassign panels to the cases,⁵¹ and for each simulation, I calculated the

46. See Chilton & Levy, *supra* note 41, at 4–7. See generally Marin K. Levy, *Panel Assignment in the Federal Courts of Appeals*, 103 CORNELL L. REV. 65 (2017). Specifically, Chilton and Levy tested whether panel assignments in various federal courts of appeals (not including the Federal Circuit) appear consistent with random assignment. See generally Chilton & Levy, *supra* note 41. They found evidence that “several of the circuit courts [though not all] have panels that are nonrandom in ways that impact the ideological balance of panels.” *Id.* at 5. They clarified that they did not mean to suggest any improper motive by anyone preparing court schedules, as many legitimate reasons will cause deviations from strict randomness, including spacing judicial assignments, accommodating vacation schedules, and honoring recusals. *Id.* at 5–6.

47. See Chilton & Levy, *supra* note 41, at 4–7.

48. The expected number of cases is the global probability of such a case times the number of total sittings for the judge.

49. I did this by taking the square root of the sum of the squares of these values, a common statistical technique to combine such values.

50. See, e.g., THOMAS M. CARSEY & JEFFREY J. HARDEN, MONTE CARLO SIMULATION AND RESAMPLING METHODS FOR SOCIAL SCIENCE 72 (2014).

51. For all simulations, I calculated a statistic that included information for the senior judges and a statistic that considered only the twelve judges who

measure just discussed. After running the simulations, I checked to see whether the value for the actual data fell within the outer 5% of the values calculated for the simulation.

For the simulations concerning the case types (obviousness, patentable subject matter, and other validity issues) and whether the district court decision favored the patent challenger, the actual results did not fall within the outer 5% of the simulation values in either direction—the only values that even reached the outer fifth of the simulation values were the ones for the favorability of the district court decision.⁵² The actual values for PTAB appeals, however, did fall within the upper 5% of simulated values.

Looking more closely at the data, every active judge's proportion of PTAB cases fell within 5% of the mean for the judges, except for Judge Stoll, whose value was 6.7% from the mean. The primary reason for Judge Stoll's large deviation appears to be because she joined the court in July 2015 (around 1.5 years after January 1, 2014 when case collection began), and the Federal Circuit began hearing more PTAB appeals around that time. To demonstrate that this reason accounted for the deviation, I re-ran the simulations for only cases decided July 2015 or later (i.e., after Judge Stoll joined the bench). For such data, the actual values for PTAB appeals did not fall within the outer 5% of the mean (the values barely fell outside the outer 25% of the mean).⁵³ The primary reason for the improvement appears to be that, once adjusted, Judge Stoll is no longer a significant source of deviation.

In view of these findings, where appropriate, I include whether the appeal is from the PTAB and/or the year the case was decided as an input into the statistical test, I analyze PTAB cases separately, and/or I separately analyze the cases decided on or after July 2015.

were in active status for most or all of the relevant time period. The results for both approaches were materially indistinguishable.

52. The actual value fell above 911/1,000 simulations with senior judges excluded and 914/1,000 simulations with senior judges included. Because these values are somewhat close to falling within the outer 5% of the values, for all relevant regressions, I include the party that won before the district court as an input into the statistical test to control for its impact on decisionmaking.

53. The actual PTO values fell above 769/1,000 simulations (senior judges included) and 765/1,000 simulations (senior judges excluded).

Although the paneling could be non-random in respects that were not tested, importantly, paneling does not have to be perfectly random to establish causality. While random assignment is the gold standard, non-randomness is not problematic unless that non-randomness causes the treatment (whether a judge sat on a panel) to be related to the outcome (whether the case was resolved in favor of the patent owner or patent challenger).⁵⁴

In my view, nothing about the Federal Circuit's case assignment procedure would appear to cause some judges to systematically hear cases more strongly favoring either the patentee or patent challenger/accused infringer. The Federal Circuit's Internal Operating Procedure 3, paragraph 1 states that "[t]he clerk's office runs a computer program that randomly generates three-judge panels for each month, subject to the judges' availability."⁵⁵ In addition, "[t]he clerk's office screens cases to determine if they are calendar-ready."⁵⁶ Then the "computer program merges the list of calendar-ready cases in order of filing with panels of judges determined randomly."⁵⁷ This is done, however, subject to some caveats, including that a panel cannot include more than one senior judge, the "[a]ssignment of cases to panels will be made so as to provide each judge with a representative cross-section of the fields of law within the jurisdiction of the court,"⁵⁸ a case that is remanded by the Supreme Court is referred to the panel that previously decided the matter, and "[w]hen an appeal is docketed in a case that was previously remanded by [the court], or when an appeal concerning attorney fees is docketed after any appeal on the underlying merits is decided, the clerk's office attempts to assign the appeal to the previous panel, to a panel including at least two members of the previous panel (if one of those members was the authoring judge), or to a panel that contains the authoring judge, if such a panel is otherwise constituted and available on a subsequent argument calendar."⁵⁹

54. See Chilton & Levy, *supra* note 41, at 14.

55. Fed. Cir. Internal Operating P. 3, ¶ 1.

56. *Id.* ¶ 2.

57. *Id.*

58. FED. CIR. R. 47.2.

59. Fed. Cir. Internal Operating P. 3, ¶ 2.

Although these aspects of paneling may constitute sources of non-randomness, they do not appear to be sources that would also cause some judges to have a disproportionate share of cases in which patent owners have, on average, stronger or weaker litigating positions. Thus, any untested non-randomness in panel assignment would not appear to present a problem for this empirical test.

II. RESULTS

In this Part, I provide the results. I first assess whether some judges are more pro-patentee than others. Then I evaluate the interaction between judges' patent preferences and authorship. Next, I turn to the interaction between patent preference and publication. And last, I turn to authorship.

The dataset and all regression⁶⁰ results are available online.⁶¹

A. *Ideological Decisionmaking*

In this subpart, I assess whether some judges are more pro-patentee than others. I also determine whether such differences are explainable by political ideology or the judges' patent-related backgrounds.

1. Political Ideology

The first question I assess is whether decisionmaking and voting at the Federal Circuit appears driven by political ideology. I begin with a survey of the prior literature relating to this question and then discuss the results.

60. A regression examines the relation between an outcome variable and potential explanatory variables. Where, like here, the outcome variable is binary (whether or not the patent owner won the appeal), a logistic regression model is commonly used. See, e.g., DAVID W. HOSMER, JR. ET AL., APPLIED LOGISTIC REGRESSION ch. 1 (3d ed. 2013); SCOTT MENARD, LOGISTIC REGRESSION: FROM INTRODUCTORY TO ADVANCED CONCEPTS AND APPLICATIONS ch. 1 (2010).

61. See Jason Reinecke, *Decisionmaking in Patent Cases at the Federal Circuit*, HARV. DATAVERSE (Feb. 14, 2024), <https://perma.cc/EQU4-YPJM>.

a. Prior Literature

The impact of political ideology on judicial decisionmaking has been tested mostly in federal appellate courts other than the Federal Circuit. These studies have generally focused on only precedential decisions and have shown that political ideology influences decisionmaking, both in the aggregate⁶² and in most, though not all, specifically studied areas of law.⁶³

Although studying published decisions is valuable in its own right, it has limitations. To truly know the degree to which political ideology plays a role in judicial decisionmaking, all votes must be accounted for—not just the votes in precedential cases.⁶⁴ Without empirical testing, it is unclear whether voting

62. See, e.g., Landes & Posner, *supra* note 45, at 802–21; Frank B. Cross, *Decisionmaking in the U.S. Circuit Courts of Appeals*, 91 CAL. L. REV. 1457, 1504–09 (2003); see also Daniel R. Pinello, *Linking Party to Judicial Ideology in American Courts: A Meta-Analysis*, 20 JUST. SYS. J. 219, 236 (1999) (providing a meta-analysis).

63. See SUNSTEIN ET AL., *supra* note 45, at 8–54 (studying numerous areas of law that the authors thought would lead to politically ideological voting, and finding that such voting was prevalent for numerous areas of law but not for criminal appeals or cases involving federalism, the Commerce Clause, the Takings Clause, punitive damages, and standing); Sunstein et al., *supra* note 45, at 311–31 (similar); see also Adam B. Cox & Thomas J. Miles, *Judging the Voting Rights Act*, 108 COLUM. L. REV. 1, 3 (2008) (voting rights); Thomas J. Miles & Cass R. Sunstein, *Do Judges Make Regulatory Policy? An Empirical Investigation of Chevron*, 73 U. CHI. L. REV. 823, 826–27 (2006) (*Chevron* doctrine); Frank B. Cross & Emerson H. Tiller, *Judicial Partisanship and Obedience to Legal Doctrine: Whistleblowing on the Federal Courts of Appeals*, 107 YALE L.J. 2155, 2155–76 (1998) (same); Richard L. Revesz, *Environmental Regulation, Ideology, and the D.C. Circuit*, 83 VA. L. REV. 1717, 1756–64 (1997) (environmental regulation in the D.C. Circuit); Sheldon Goldman, *Voting Behavior on the United States Courts of Appeals Revisited*, 69 AM. POL. SCI. REV. 491, 496–98 (1975) (studying numerous areas).

64. See Keith Carlson et al., *The Problem of Data Bias in the Pool of Published U.S. Appellate Court Opinions*, 17 J. EMPIRICAL L. STUD. 224, 234 (2020); see also Paul R. Gugliuzza & Mark A. Lemley, *Can a Court Change the Law by Saying Nothing*, 71 VAND. L. REV. 765, 808 (2018) [hereinafter Gugliuzza & Lemley, *Can a Court Change the Law*] (explaining that what matters is how the court decides cases generally, not just how the court decides cases in precedential opinions); Jason Rantanen, *Empirical Analyses of Judicial Opinions: Methodology, Metrics and the Federal Circuit*, 49 CONN. L. REV. 227, 266–69 (2016) (explaining the importance of including summary affirmances in analysis); Harry T. Edwards & Michael A. Livermore, *Pitfalls of Empirical Studies that Attempt to Understand the Factors Affecting Appellate Decisionmaking*, 58 DUKE L.J. 1895, 1922–23 (2009) (criticizing studies of judicial decisionmaking for failing to account for nonprecedential

in nonprecedential and summarily affirmed cases would be more ideological (e.g., because judges know that such decisions rarely attract criticism or en banc review) or less (e.g., because judges only dispose of easy cases in this manner, or because judges are less concerned about the outcomes of cases that do not create precedent).⁶⁵

There also exists literature relating to political ideology and intellectual property, but this literature also does not provide a consistent answer. John Allison and Mark Lemley empirically studied 143 written, final patent validity decisions by the Federal Circuit reported in the *United States Patents Quarterly* (which does not include every written opinion or any summary affirmances)⁶⁶ between early 1989 and 1996.⁶⁷ Allison and Lemley found “little evidence of ideological divisions affecting the final outcome of cases.”⁶⁸ But it is unclear whether their

decisions, on the basis that both types of decisions reflect important decision data); Denise M. Keele et al., *An Analysis of Ideological Effects in Published Versus Unpublished Judicial Opinions*, 6 J. EMPIRICAL L. STUD. 213, 229–32 (2009) (finding that judges’ decisions in U.S. Forest Services cases followed their ideological preference in published opinions, but not in unpublished opinions); David S. Law, *Strategic Judicial Lawmaking: Ideology, Publication, and Asylum Law in the Ninth Circuit*, 73 U. CIN. L. REV. 817, 853 (2005) (finding that some judges on the Ninth Circuit are more likely to vote ideologically in published cases than in unpublished cases in the context of asylum); Donald R. Songer et al., *Nonpublication in the Eleventh Circuit: An Empirical Analysis*, 16 FLA. ST. U. L. REV. 963, 983 (1989) (finding, based on a review of decisions before the Eleventh Circuit, that panels with a Republican majority were more likely to publish their liberal decisions than panels with a liberal majority).

65. The limited available evidence relating to decisionmaking in published versus unpublished decisions does not highlight a general trend. See Keele et al., *supra* note 64, at 229–32 (finding that judges did not follow their ideological preferences in either published or unpublished opinions); see also Gugliuzza & Lemley, *Can a Court Change the Law*, *supra* note 64, at 797–801 (asserting that understanding court decisions requires examining more than just precedential opinions, as nonprecedential decisions also significantly influence legal interpretations and practices); Law, *supra* note 64, at 853 (suggesting that judges may be more likely to express ideological views in published cases than in unpublished cases, particularly in the context of asylum law); Songer et al., *supra* note 64, at 983 (indicating that certain types of cases, such as labor and antitrust, are more frequently published than others, like criminal or prisoner petition cases, which might affect the perceived ideological leaning of judicial decisions).

66. See Rantanen, *supra* note 64, at 247 n.89.

67. See Allison & Lemley, *supra* note 45, at 746.

68. See *id.* at 752–65.

findings are due to the absence of such an association, the limited sample, or the fact that the sample was dominated by Republican-appointed judges.

Around the same time, then-Professor Kimberly Moore (who is now a Federal Circuit judge) studied all 323 claim construction cases appealed to the Federal Circuit between April 23, 1996 and December 31, 2000 and found that “there is no significant difference in how judges appointed by Republicans and judges appointed by Democrats construe claims.”⁶⁹ Again, it is unclear whether this finding could be due to an insufficiently large sample of cases, or whether this finding is unique to the issue of claim construction.

Lee Petherbridge studied all Federal Circuit decisions other than summary affirmances concerning the doctrine of equivalents between January 1992 and May 2007 and received mixed results concerning the impact of political ideology on decisionmaking in such cases.⁷⁰ Specifically, Petherbridge found that only authorship by judges appointed by one of the two Republican appointing presidents predicted patent owner success for one sub-issue, and only authorship by judges appointed by the only Democratic appointing president predicted patent owner success for a different sub-issue.⁷¹ The reasons for these mixed results is unclear, and it is also unclear whether the results would hold if summary affirmances and additional issues of patent law were included.

In a pair of articles, Banks Miller and Brett Curry studied the impact of political ideology on the decisions of the Federal Circuit judges in the sixty-seven obviousness cases appealed from the Board of Patent Appeals and Interferences (the predecessor to the PTAB) between 1997 and 2007⁷² and separately in 108 cases in appeals from district courts during the same time period.⁷³ In both studies, they found that political

69. See Kimberly Moore, *Are District Court Judges Equipped to Resolve Patent Cases*, 15 HARV. J.L. & TECH. 1, 8, 9, 27 (2001).

70. See Petherbridge, *supra* note 16, at 435 n.76, 452–54, 463 (2009).

71. See *id.* at 452–54, 463.

72. See Banks Miller & Brett Curry, *Experts Judging Experts: The Role of Expertise in Reviewing Agency Decision Making*, 38 LAW & SOC. INQUIRY 55, 62 (2013) [hereinafter Miller & Curry, *Experts Judging Experts*].

73. See Banks Miller & Brett Curry, *Expertise, Experience, and Ideology on Specialized Courts: The Case of the Court of Appeals for the Federal Circuit*,

ideology, standing alone, was not a significant contributor to decisionmaking (although, as discussed below, the variable was significant when coupled with their expertise variable).⁷⁴ The sample sizes in both studies were small, however.

Turning to studies pertaining to courts other than the Federal Circuit and/or to intellectual property more broadly, in a very early study in 1974, Lawrence Baum reviewed patent decisions by the U.S. Court of Appeals for the D.C. Circuit from 1942 to 1972 (prior to the creation of the Federal Circuit in 1982, the other courts of appeals heard certain patent appeals) and found that all liberal dissents opposed patent applicants and all conservative dissents favored applicants.⁷⁵ This study is very dated, however, and is limited to assessing dissenting behavior.

Matthew Sag, Tonja Jacobi, and Maxim Sytch studied intellectual property case outcomes before the Supreme Court between 1954 and 2006 and found that more conservative justices were modestly more likely to vote in favor of the intellectual property rightsholder, but the size of the effect was significantly lower than in cases involving prominent social issues.⁷⁶ Barton Beebe separately tested whether political ideology impacted judicial decisionmaking in 452 judicial votes in fair use cases across all federal courts and reached a null result, though again the size of the dataset was small.⁷⁷

Moving outside the context of the courts, James E. Daily compared the donations to Republican candidates and causes between the economics and legal scholars who signed an open letter to Congress arguing that patent law raised the costs of innovation and inhibited technological progress against the economics and legal scholars who signed an open letter to

38 LAW & SOC. INQUIRY 839, 851 (2009) [hereinafter Miller & Curry, *Expertise, Experience, and Ideology on Specialized Courts*].

74. See Miller & Curry, *Experts Judging Experts*, *supra* note 72, at 62–65; see also Miller & Curry, *Expertise, Experience, and Ideology on Specialized Courts*, *supra* note 73, at 856–57.

75. See Lawrence Baum, *The Federal Courts and Patent Validity: An Analysis of the Record*, 56 J. PAT. OFF. SOC'Y 758, 771 n.38 (1974).

76. Matthew Sag et al., *Ideology and Exceptionalism in Intellectual Property: An Empirical Study*, 97 CORNELL L. REV. 801, 803 (2009).

77. See Barton Beebe, *Does Judicial Ideology Affect Copyright Fair Use Outcomes?: Evidence from the Fair Use Case Law*, 31 COLUM. J.L. & ARTS 517, 520–21 (2008).

express their opposing views.⁷⁸ Daily found that such donations were statistically significantly correlated with signing the second letter, but that it was a weak effect, and he further noted that “[p]erhaps the most interesting conclusion that can be drawn is that there are *not* very many significant differences in the signatories’ backgrounds.”⁷⁹

Joseph Raffiee and Florenta Teodoridis found some evidence that liberal-leaning patent examiners at the United States Patent and Trademark Office were less likely to grant software patent applications than conservative-leaning examiners.⁸⁰

Maggie Wittlin, Lisa Larrimore Ouellette, and Gregory N. Mandel surveyed 129 intellectual property attorneys (mostly patent practitioners) and found that practitioners with hierarchical values and greater individualism (both associated with conservatism) tended to hold more pro-patentee views.⁸¹ It has also been shown in a study assessing the patent views of the general public that conservatives are more likely to believe it is important to comply with intellectual property law and to favor stronger patent rights.⁸²

As a whole, the available literature provides a mixed review as to the association between political and patent ideology, but there is some evidence that, on average, conservatives may tend to be more pro-patentee than liberals.

b. Results

I analyzed the role of political ideology on decisionmaking and judicial voting at the Federal Circuit during the studied

78. See James E. Daily, *An Empirical Analysis of Some Proponents and Opponents of Patent Reform*, PATENTLY-O PAT. L.J., Mar. 8, 2016, at 1, 1.

79. *Id.* at 9.

80. See generally Joseph Raffiee et al., *Partisan Patent Examiners? Exploring the Link Between the Political Ideology of Patent Examiners and Patent Office Outcomes* (Feb. 28, 2023) (manuscript), <https://perma.cc/6SCR-EN3D> (PDF).

81. See Maggie Wittlin et al., *What Causes Polarization on IP Policy?*, 52 U.C. DAVIS L. REV. 1193, 1223–26 (2018); see also Lisa Larrimore Ouellette, *Cultural Cognition of Patents*, 4 IP THEORY 28, 29 (2014).

82. See Gregory N. Mandel et al., *Intellectual Property Law’s Plagiarism Fallacy*, 2015 B.Y.U. L. REV. 915, 959 (2015); Gregory N. Mandel, *The Public Perception of Intellectual Property*, 66 FLA. L. REV. 261, 291 (2014).

time period. Consistent with the lion's share of the empirical studies in the literature, I use the judicial ideology of the judge's appointing president as an indicator of the judge's own political ideology.⁸³ In short, judicial decisionmaking and voting at the Federal Circuit during this time period do not appear to be significantly explained by the political ideology of the judges.

Table 1 presents the judges' voting patterns for all cases in which they sat.⁸⁴ Table 1 accounts for dissenting votes. The judges are listed in order of increasing probability of voting in favor of the patentee. A "(D)" after a judge's last name signifies that the judge was appointed by a Democratic president, and a "(R)" after the judge's name signifies that the judge was appointed by a Republican president. The first three columns respectively provide the total number of pro-patentee, pro-challenger, and mixed votes for each judge, and the last two columns respectively signify the percentage of each judge's votes that were pro-patentee and pro-challenger. The bottom row provides the total pro-patentee, pro-challenger, and mixed case outcomes (not total votes).

Before diving further into the details, I note that, although all judges voted in favor of the patent owner less than half the time and nearly every judge voted in favor of the patent challenger more than half the time, this fact should not be taken as an indication that the Federal Circuit is decidedly pro-challenger. As an initial matter, there is no reason to think that the percentages should be approximately equal for an ideologically neutral court. And, notably, across all appealed

83. See EPSTEIN ET AL., *supra* note 1, at 74 ("The most common ex ante measure of judicial ideology (the most common measure of judicial ideology, period) is the party of the appointing President."); Cross, *supra* note 62, at 1479 ("Most empirical studies of ideology in decisionmaking use the political party of the judge's appointing president as a proxy for the judge's own political ideology."); Miles & Sunstein, *supra* note 63, at 848 ("To test for the effect of politics, we classified those judges according to the party of the president who nominated them to the circuit court."); Moore, *supra* note 69, at 9 n.39 (noting that the author tracked whether the Federal Circuit judges in her study were appointed by Democratic or Republican presidents); David Zaring, *Reasonable Agencies*, 96 VA. L. REV. 135, 179 (2010) ("I focused on the party of the appointing president as a measure of ideology . . .").

84. For ease of reviewing the tables, visiting judges (who account for nineteen votes in total) are not listed in the table (their votes, however, are listed in any totals that are provided).

cases, the patent owner won only 19.5% of the time,⁸⁵ and the patent challenger won 71.9% of the time. It is well known that appellants generally have weaker cases than appellees.⁸⁶ Thus, on average, patent owners have the weaker case before the Federal Circuit.

85. The success rate is 21.9% in appeals from district courts. Interestingly, this value is smaller than previously reported measures of patent owner success before district courts. For example, one prior study found that patentees won 26% of definitive merits rulings. See John R. Allison et al., *Understanding the Realities of Modern Patent Litigation*, 92 TEX. L. REV. 1769, 1777 (2014). Another found that patentees won 32.5% of cases that went to judgment. See Mark A. Lemley, *Where to File your Patent Case*, AIPLA Q.J., Fall 2010, at 1, 5–6. The disparity could be because the district court studies appear to have assessed only merits-related rulings, where this study assessed all appealed issues, and some of the mixed case results reported here would have been considered merits wins for the patentee. The disparity could also be at least in part because patentees are more likely to appeal their losses.

86. See *infra* note 156 and accompanying text.

Table 1: Judges' Voting Patterns (All Cases)

	Pro-patentee	Pro-challenger	Mixed	% Pro-patentee	% Pro-challenger
Dyk (D)	101	426	89	16.4	69.2
Prost (R)	126	492	95	17.7	69.0
Bryson (D)	42	149	36	18.5	65.6
Lourie (R)	117	420	81	18.9	68.0
Plager (R)	22	75	16	19.5	66.4
Mayer (R)	33	112	18	20.2	68.7
Schall (R)	33	100	22	21.3	64.5
Wallach (D)	131	404	78	21.4	65.9
Reyna (D)	137	421	69	21.9	67.1
Hughes (D)	134	397	80	21.9	65.0
Chen (D)	129	366	87	22.2	62.9
Linn (D)	33	84	21	23.9	60.9
Taranto (D)	156	388	92	24.5	61.0
Stoll (D)	115	290	63	24.6	62.0
Clevenger (R)	47	122	19	25.0	64.9
O'Malley (D)	143	319	76	26.6	59.3
Moore (R)	162	328	74	28.7	58.2
Newman (R)	152	298	39	31.1	60.9
Rader (R)	14	13	5	43.8	40.6
Total	600	1752	356	22.2	64.7

Turning now to a visual inspection of whether political ideology appears to explain decisionmaking, no clear pattern emerges from an inspection of the table. Indeed, Democratic-appointed and Republican-appointed judges fall on both sides of the data.

Table 2 presents the case result as a function of the panel composition. “R” and “D” again signify Republican-appointed and Democratic-appointed, respectively (e.g., “RDD” means that one Republican-appointed judge and two Democratic-appointed judges sat on the panel). Panels with a majority of Republican-appointed judges (i.e., two or three Republican-appointed judges sat on the panel) ruled in favor of the patentee and patent challenger at nearly the exact same rate as panels with a majority of Democratic-appointed judges.

Specifically, the differences were just 1.7% and 4.2%, respectively. Although panels consisting of all Republican appointees voted slightly more pro-patentee than other panels, the total number of such cases is relatively small, and as just indicated, panels with at least two Republican appointees were not pro-patentee (they actually ruled in favor of the patentee slightly less frequently than majority-Democratic panels).

The only observation that stands out is that an increase from one to two Republicans on the panel yields an increase in the chances of the patent challenger winning by 5%. But the changes from zero to one and two to three all yield a *decrease* in the chances of the patent challenger winning, so, again, there is little evidence that political ideology explains decisionmaking.

Table 2: Case Result by Panel Composition

Panel Composition	Pro-patentee	Pro-challenger	Mixed	% Pro-patentee	% Pro-challenger
RRR	26	65	9	26	65
RRD	146	492	84	20.2	68.1
RDD	294	808	179	23.0	63.1
DDD	130	382	79	22.0	64.6

The judges' voting patterns were also assessed for votes relating to validity (1724 cases), the specific validity issue of obviousness (1069 cases), PTAB cases (1301 cases), and cases decided July 2015 or later (2238 cases). And once again, there is no discernible trend between political ideology and propensity to rule in a pro-patentee or pro-challenger manner. Nor does an analysis of the case result by panel composition or the total votes by party show any meaningful differences or trends for any of these subcategories of cases. In sum, political ideology does not appear to greatly explain decisionmaking.

To more formally assess the significance of the differences, I ran a number of logistic regressions, each using the entire dataset and only cases decided on or after July 2015 as observations.⁸⁷ These regressions are discussed in more detail later in connection with assessing prior patent-related experience.⁸⁸ With respect to political ideology, the regression

87. See *infra* notes 105–110.

88. See *infra* notes 105–110.

results support that political affiliation does not explain judicial decisionmaking or voting.⁸⁹ Of course, this does not necessarily mean that there is no connection between the two in any context. Indeed, prior studies outside the context of the Federal Circuit have suggested that conservatives (both with and without backgrounds in intellectual property) tend to be at least somewhat more pro-patentee than liberals. But the results here support that decisionmaking in patent cases is not overly political, and there will not always be politically charged divides at the Federal Circuit.

2. Ideology Based on Prior Patent-Related Experience

Next, I assess whether judges with experience in patent law prior to joining the Federal Circuit, or judges with a technical background, appear to vote differently from judges who join the court without such experience. Once again, I start with a survey of the prior literature, and then I turn to this study.

a. Prior Literature

In short, the empirical literature to date presents a mixed view of the role of patent-related expertise prior to joining the bench on judicial decisionmaking, though on balance it appears that judges with prior patent-related experience may tend to be a bit more pro-patentee.

Many studies show no such trend. For instance, as explained previously, Lemley and Allison found little evidence

89. The only exceptions are that many (though not all) of the regressions showed a statistically significant relationship between the probability of the patent challenger winning and an increase from one to two Republican-appointed judges hearing the appeal, and some of the relevant regressions showed a small but significant relationship between the variable representing the number of Republican-appointed judges hearing the appeal and the patent challenger's probability of success. Indeed, as explained previously and as can be seen in Table 2, there does appear to be an increase in the patent challenger's probability of success as the number of Republican-appointed judges increases from one to two. And when only validity cases are assessed, the jump from one to two Republican-appointed judges is associated with a decrease in the patent owner's probability of success and an increase in the patent challenger's probability of success. But because these are the only statistically significant findings, too much should not be made of them. Regardless, the impact of the number of Republican appointees hearing an appeal is undoubtedly small.

that judges varied in their votes in patent validity cases.⁹⁰ Likewise, in her study of claim construction cases, then-Professor Kimberly Moore found no statistically significant difference in how judges with a technical background or with prior patent-related experience decided claim construction cases.⁹¹ In a later claim construction study, then-Professor Moore found that judges with technical backgrounds are more likely to dissent in claim construction cases, but they were not more likely to author the opinion when the construction is being reversed, and they were not more likely to reverse than nontechnically trained judges.⁹² In his study on doctrine of equivalents cases, Petherbridge likewise failed to reject the hypotheses that there were no differences in the likelihood of affirmance or patent owner success when judges with and without patent backgrounds heard the appeals.⁹³

Other studies have noted at least a possible trend between prior patent experience and propensity to rule in favor of the patentee. Martin S. Masar III studied all 176 opinions (126 were majority opinions) issued by the Federal Circuit involving a pharmaceutical abbreviated new drug application reported from the enactment of the Hatch-Waxman Act⁹⁴ in 1984 through March 26, 2009.⁹⁵ Masar III noted that judges with prior patent experience voted in favor of brand companies over generics more frequently than other judges, but Masar III did not appear to assess whether the result was statistically significant, and the sample size of the study was very small.⁹⁶

In their study of certain obviousness cases, Miller and Curry concluded that significant contributors to decisionmaking included whether the judge had expertise in patent law prior to joining the court and the combination of that fact with political ideology (although prior patent experience was most important),

90. See *supra* notes 67–68 and accompanying text.

91. See Moore, *supra* note 69, at 26.

92. See Kimberly A. Moore, Markman *Eight Years Later: Is Claim Construction More Predictable?*, 9 LEWIS & CLARK L. REV. 231, 245 (2005).

93. See Petherbridge, *supra* note 16, at 454.

94. 21 U.S.C. §§ 301, 355(j), 360cc.

95. Martin S. Masar III, *Effects of the Federal Circuit Judges on Hatch-Waxman Litigation*, 19 DEPAUL J. ART, TECH. & INTELL. PROP. L. 315, 342–43 (2009).

96. *Id.* at 342.

with judges appointed by a Republican president who had prior expertise in patent law more likely to uphold a patent.⁹⁷ But their study was very small. Interestingly, they did not find a similar effect for judges who gained patent-related experience while on the bench.⁹⁸ It is unclear whether their results would hold outside of obviousness, which the authors specifically chose to study because they believed it was particularly likely to be decided disparately.⁹⁹

b. Results

Turning now to this study,¹⁰⁰ Tables 3 and 4 show the case result by panel composition based on the number of judges on the panel with a technical background (Table 3) or with patent experience (Table 4) prior to becoming a judge, respectively.¹⁰¹ A “Y” denotes a judge with prior patent experience or a technical background (i.e., “YYY” means the panel consisted of three

97. See Miller & Curry, *Experts Judging Experts*, *supra* note 72, at 62; Miller & Curry, *Expertise, Experience, and Ideology on Specialized Courts*, *supra* note 73, at 855–56.

98. See Miller & Curry, *Experts Judging Experts*, *supra* note 72, at 62–65; Miller & Curry, *Expertise, Experience, and Ideology on Specialized Courts*, *supra* note 73, at 841.

99. Miller & Curry, *Expertise, Experience, and Ideology on Specialized Courts*, *supra* note 73, at 840.

100. For this analysis, the votes of the visiting judges were not considered.

101. It has been previously concluded that, for active judges appointed as of 2001, only Judges Lourie, Newman, Linn, Rader, and Dyk had prior patent experience. See Moore, *supra* note 69, at 26. In addition, Judge Taranto argued numerous patent appeals. Dennis Crouch, *Richard Taranto: Next Federal Circuit Judge*, PATENTLYO (Mar. 1, 2012), <https://perma.cc/LVA2-P9GS>. Judge Moore clerked on the Federal Circuit, practiced patent law, and was a law professor focusing on patent law. See *Judge Biographies*, U.S. CT. APPEALS FOR FED. CIR., <https://perma.cc/E6JG-X9YC> (last visited Feb. 29, 2024). Judge Stoll clerked on the Federal Circuit and practiced patent law at a law firm for many years. See *id.* Judge Chen served as a technical assistant to the Federal Circuit and served as both assistant solicitor and solicitor of the United States Patent and Trademark Office. See *id.* All previously identified judges had a technical background except for Rader, Taranto, and Dyk. The remaining judges (Prost, O’Malley, Wallach, Reyna, Hughes) do not appear to have patent-related experience prior to joining the bench. Because Judge O’Malley was a district court judge in a court of general jurisdiction prior to joining the Federal Circuit, out of abundance of caution, some regressions discussed below were also run with her categorized as having prior patent experience. See *infra* note 108.

judges with prior patent experience/a technical background, and “YNN” means the panel consisted of one judge with such experience and two judges without).

Starting with Table 3, the results suggest that panels with at least one judge with a technical background vote more pro-patentee, though it is not clear that further increasing the number of such judges on the panel impacts decisionmaking. Specifically, the change from one to two such judges results in a very small increase in *both* the probability of the patent owner *and* patent challenger winning (meaning that there are fewer mixed decisions). And panels with three judges with a technical background vote more pro-challenger than panels with one or two such judges, though there are not very many observations of panels with three such judges.

Turning to Table 4, although panels vote increasingly pro-patentee, and generally vote decreasingly pro-challenger, as the number of judges with a patent background increases, the differences are small.

**Table 3: Case Result by Panel Composition
(Technical Background)¹⁰²**

Panel Composition	Pro-patentee	Pro-challenger	Mixed	% Pro-patentee	% Pro-challenger
YYY	19	69	14	18.6	67.6
YYN	153	408	72	24.2	64.5
YNN	298	800	177	23.4	62.7
NNN	124	455	86	18.6	68.4

**Table 4: Case Result by Panel Composition
(Prior Patent Experience)**

Panel Composition	Pro-patentee	Pro-challenger	Mixed	% Pro-patentee	% Pro-challenger
YYY	74	207	40	23.1	64.5
YYN	247	668	147	23.3	62.9
YNN	222	679	131	21.5	65.8
NNN	51	178	31	19.6	68.5

102. The total number of majority Y and majority N panels is greater than the total number of three-judge panel compositions because a few cases were decided by only two judges.

The results are quite similar when only cases decided on or after July 2015 are assessed. When only validity cases are assessed, the results are similar, but the effect of the jump is slightly larger.

In short, a visual inspection of the evidence suggests that the judges with a patent-related background might be somewhat more pro-patentee, but any effects seem small.

The results are far more uniform than found in the context of politically ideological voting and decisionmaking in many other studied areas of law. In their study of decisionmaking in areas of law expected to be driven by political ideology, Sunstein, Schkade, and Ellman found that, as panels shifted from three to zero Democratic appointees, panels issued liberal rulings 61%, 50%, 39%, and 34% of the time.¹⁰³ Even in Cross's study, which was not limited to areas of law expected to be politically charged, panels of three Democrat appointees were 12.8% more likely to affirm a liberal ruling, and 6.6% less likely to affirm a conservative ruling, than panels of three Republican appointees.¹⁰⁴

To more formally assess the significance of the differences, I ran several regressions, some using a case-level approach and others using a vote-level approach.

Case-level regressions: The first set of logistic regressions utilize a case-level approach—i.e., they focus on case outcomes by treating each case as an observation. To account for correlations between observations, I cluster cases decided by the same three judges.¹⁰⁵

103. Sunstein et al., *supra* note 45, at 306.

104. Cross, *supra* note 62, at 1505–06.

105. Traditional logistic regression analysis assumes that each observation (in this scenario, each case observation) is independent of the others. *See, e.g.,* HOSMER ET AL., *supra* note 60, at ch. 9. Here, that assumption may not hold. To be sure, each observation should provide largely independent information because each relates to a unique case. But the observations may be correlated at least to some extent because many cases are decided by the same judges. *See id.* at ch. 9.1. The result is that traditional logistic regression analysis may not produce the correct standard errors (the measure of statistical accuracy of an estimate) and p values. To obtain standard errors and p values that account for this correlation, in addition to traditional logistic regression analysis, I utilize a common approach referred to as generalized estimating equations (“GEEs”), which involves clustering the correlated observations. *See id.*; *see also* Diana L. Miglioretti & Patrick J. Heagerty, *Marginal Modeling of Nonnested Multilevel Data Using Standard Software*,

Table 5 provides the results for a representative regression. For this regression, all cases decided by three non-visiting judges were considered. The results are similar when only cases decided July 2015 and later are considered. When only validity rulings are considered, the results are similar, but the effects are generally a bit larger and the p values a bit smaller.

The outcome variable for the Table 5 regression was whether the outcome favored the patentee. Regressions were also run with the outcome variable set as whether the outcome favored the patent challenger (note that these variables are not complete opposites because some cases yield a mixed result), and the results are similar.

I included the following basic case-related explanatory variables: whether the appeal was from the PTAB (PTAB Appeal), whether the patent owner or patent challenger won

165 AM. J. EPIDEMIOLOGY 454, 455, 462–63 (2006) [hereinafter Miglioretti & Heagerty, *Nonnested Multilevel Data*]; Diana L. Miglioretti & Patrick J. Heagerty, *Marginal Modeling of Multilevel Binary Data with Time-Varying Covariates*, 5 BIOSTATS. 381, 382 (2004) [hereinafter Miglioretti & Heagerty, *Multilevel Binary Data*]; Clay Ford, *Getting Started with Generalized Estimating Equations*, U. VA. LIBR., <https://perma.cc/5LN9-BDUZ> (last visited Nov. 29, 2022). For this analysis, I utilize R’s “gee” package. See, e.g., *Package ‘gee’*, COMPREHENSIVE R ARCHIVE NETWORK (Oct. 17, 2022), <https://perma.cc/A4RY-BTR2>. I used an exchangeable correlation structure because it seemed plausible that the correlation between pairs of responses within each cluster is approximately constant, considering each cluster represents the cases decided by the same panel of judges. See HOSMER ET AL., *supra* note 60, at ch. 9.3; see also, e.g., Miglioretti & Heagerty, *Nonnested Multilevel Data*, *supra*, at 454. Moreover, the exchangeable correlation structure is the default for many packages and is a reasonable and parsimonious choice when data does not have a clear choice of structure. See HOSMER ET AL., *supra* note 60, at ch. 9.3; Miglioretti & Heagerty, *Nonnested Multilevel Data*, *supra*, at 454. Furthermore, the estimates provided by a GEE approach are robust to the choice of correlation structure—i.e., even if the chosen correlation structure is not the true structure, the parameter estimates from GEE are still valid where the robust estimates provided by GEE are used (as opposed to the naive estimates GEE provides). Throughout this Article, I always report the robust estimates.

For these regressions, I cluster all cases decided by the same three judges. Although all cases decided by even one common judge would likely be correlated to an extent, the chosen approach clusters the most highly correlated observations, and calculating standard errors via clustering at the level of each individual judge would be extremely computationally difficult as it would require fitting more than 500,000 different models and adding and subtracting variance values from each model. See, e.g., Miglioretti & Heagerty, *Nonnested Multilevel Data*, *supra* note 105, at 455, 462–63.

before the district court (*P/C* won before district court), and the year the case was decided (2015–2021).¹⁰⁶ For the Table 5 regression, the remaining explanatory variables relate to the impact of changing the number of a certain type of judge on the panel. For instance, “Zero-to-one TB” represents the change in the odds of the patent owner winning the appeal resulting from the addition of another judge with a technical background.¹⁰⁷ The coefficient for that variable (provided in the Coefficient Estimate (p value) column) is 1.68, which means that panels with one judge with a technical background have 1.68 times the odds of voting for the patent owner than panels with zero such judges. The p value is 0.001, which indicates that the result is statistically significant. The regressions were run both with and without the political-related variables, and the results relating to the technical and patent background variables are similar regardless.

106. The year 2014 is not included because, when there are n different classes, only $n-1$ variables are needed because $n-1$ variables already provide all relevant information: when variables 2015–2021 are not set, the year is 2014.

107. The actual variable in the regression was set whenever at least one judge on the appeal had the relevant characteristic. When coded in this manner, the estimate for the regression coefficient for the variable provides the value described above.

Table 5:
**Regression Results Relating to the Impact of Technical
 Background on the Patent Owner's Success Rate**

Variable	Coefficient Estimate (p value)
Intercept	0.078 (< 0.00001)
PTAB Appeal	0.880 (0.242)
P won before district court	18.4 (< 0.00001)
C won before district court	1.20 (0.458)
Zero-to-one R	0.922 (0.596)
One-to-two R	0.810 (0.171)
Two-to-three R	1.38 (0.341)
Zero-to-one TB	1.68 (0.001)
One-to-two TB	1.09 (0.592)
Two-to-three TB	0.799 (0.537)
2015	0.916 (0.733)
2016	1.30 (0.284)
2017	1.11 (0.680)
2018	1.13 (0.621)
2019	1.38 (0.210)
2020	0.932 (0.783)
2021	0.883 (0.671)

Looking at the regression, and as explained previously, the variables relating to the number of Republican-appointed judges on the panel are not statistically significant predictors of patent owner success. The only statistically significant explanatory variable relating to technical background is Zero-to-one TB. This finding is consistent with the visual inspection of the data—the largest change in the patent owner's chances of success occurred between appeals with zero and one judge(s) with a technical background. The impact of adding a second judge or a third judge with a technical background is not significant. For the analogous regression concerning validity, again, only Zero-to-one TB is significant, but the coefficient is larger (2.16) and the p value smaller (0.0002).

Turning now to the regressions relating to prior patent background, when assessing all cases, I found a nearly statistically significant change in patent challenger success for the increase from one to two such judges. But the same jump did not result in a statistically significant change in the patent

owner's chances of success, nor were any other variables significant.¹⁰⁸

Vote-level regressions: The second set of logistic regressions takes a vote-level approach—i.e., each vote by each judge is treated as an observation. To account for potential correlations in observations, I cluster on two levels: by the judge who voted and by the case that was decided.¹⁰⁹

Although these results are likely to be very similar to the results above, they are likely not identical because judges can dissent, which causes a judge's vote to be different than the case outcome. Although most judges on the Federal Circuit dissent quite infrequently (nearly every judge dissented in fewer than 2.5% of cases in which the judge sat), Judge Newman dissented in 11% of cases, and even low levels of dissent could impact the results.

Table 6 provides the results for a representative regression. For this regression, all votes by non-visiting judges in three-judge panels were considered. Regressions were also run using such votes only from cases decided on or after July 2015 and only on validity votes, and the results are similar regardless.

For the Table 6 regression, the outcome variable was whether the vote favored the patentee. Regressions were also run with the outcome variable set as whether the vote favored the patent challenger, and the results were similar.

108. Judge O'Malley was identified as not having prior patent experience because her only prior patent-related experience appears to be as a district court judge sitting on a court of general jurisdiction. That does not seem to qualify as prior patent experience in the same way as experience as an attorney. In any event, I reran several of the regressions discussed in this subsection categorizing Judge O'Malley as having prior patent experience, and while the impact of moving from one to two judges with prior patent experience was magnified (and significant for both patent owner and patent challenger success), there was still no significant impact from moving from zero to one or from two to three such judges.

109. Votes by the same judge are likely correlated to at least some extent, as are votes by different judges relating to the same case. To obtain standard error estimates and p values for data with two levels of clustering of this variety, I utilize the approach described by Diana L. Miglioretti and Patrick J. Heagerty. See generally Miglioretti & Heagerty, *Nonnested Multilevel Data*, *supra* note 105; Miglioretti & Heagerty, *Multilevel Binary Data*, *supra* note 105.

The same basic, case-related explanatory variables were utilized. Additional explanatory variables included: Judge TB and Judge R, which respectively refer to whether the voting judge has a technical background or was appointed by a Republican president. The remaining variables relate to the impact of changing the other judges hearing the appeal with the voting judge. For example, Zero-to-one other TB refers to the impact on a judge's voting when the number of other judges on the panel with a technical background increases from zero to one. These and related variables are discussed in more detail later.

Table 6: Regression Results Relating to the Impact of Technical Background on Judicial Voting

Variable	Coefficient Estimate (p value)
Intercept	0.095 (< 0.00001)
PTAB Appeal	0.874 (0.29)
P won before district court	15.9 (< 0.00001)
C won before district court	1.09 (0.70)
Judge TB	1.40 (0.031)
Judge R	0.983 (0.92)
Zero-to-one other TB	1.30 (0.025)
One-to-two other TB	1.03 (0.83)
Zero-to-one other R	0.935 (0.55)
One-to-two other R	0.930 (0.67)
2015	0.967 (0.90)
2016	1.32 (0.29)
2017	1.09 (0.74)
2018	1.15 (0.59)
2019	1.37 (0.22)
2020	0.969(0.91)
2021	0.884 (0.67)

The results again indicate that the political affiliation of a judge's appointing president does not predict voting. The results also indicate that judges with a technical background tend to

vote a bit more pro-patentee than judges without a technical background—specifically, they are 1.4 times as likely to vote in that manner, all else equal ($p = 0.031$). When only validity cases are assessed, the coefficient is slightly larger (1.5, $p = 0.048$). The reason that this approach captured a statistically significant effect whereas the former approach mostly did not is likely because this approach is more sensitive to dissents. Judge Newman (who has a technical background) issued numerous dissents, and most favored the patent owner. Unlike these regressions relating to technical background, the results of the regressions relating to whether the voting judge had prior patent experience indicate that prior patent experience is not a significant indicator of voting.¹¹⁰

In sum, there is some evidence that judges with a technical background, and possibly judges with prior patent experience, vote a bit more pro-patentee. But the effect on decisionmaking was not present for all changes in panel composition. It could be that a more nuanced dissection of prior experience would be most illuminating. For example, perhaps those with prior experience focused on procuring and/or enforcing patent rights tend to hold pro-patentee views, whereas those with experience focusing on defending against claims of patent infringement tend to hold more pro-challenger views. A larger dataset that has information for more judges across a longer period of time would be best suited to test these questions, though even that approach would not always properly categorize the judges (e.g., Judge Lourie cast a comparatively smaller fraction of pro-patentee votes, yet his prior patent experience focused on procuring patents and working for a brand pharmaceutical company).

3. Observed Patent Ideology

Although decisionmaking at the Federal Circuit does not appear to be greatly explained by political ideology or prior

110. The regressions assessing all the data were run again with Judge O'Malley cast as having prior patent experience. See *supra* note 108 for a discussion of Judge O'Malley's classification. With that change, whether a judge had prior patent experience was almost significantly correlated with whether the patent owner won the appeal and was significantly correlated with whether the patent challenger won the appeal.

technical and/or patent-related experience, are some judges nevertheless more pro-patentee than others?

It might be tempting to conclude from the previously discussed results that the judges must not materially differ in how they decide cases. For example, in their study on political ideology, Sunstein, Schkade, Ellman, and Sawicki found, despite having expectations to the contrary, that political affiliation does not predict voting in criminal appeals, takings claims, punitive damages challenges, standing, and Commerce Clause challenges to congressional enactments.¹¹¹ They concluded that, for these areas of law, the law must either be clear and binding, or there must be a near-consensus about the appropriate principles.¹¹²

But it seems plausible that areas of law can be divided in ways that are not readily explained by political affiliation. In the patent context, there could be a pro-patentee versus pro-challenger divide at the Federal Circuit that is not completely explained by political beliefs. In their survey, for example, Wittlin, Ouellette, and Mandel found that the interaction of their variables for hierarchy and individualism (both associated with conservatism) with the subjects' belief that intellectual property rights are private property rights (as opposed to government interventions in the markets for inventions and creations) more strongly predicted the subjects' views on patents.¹¹³

Starting with a visual inspection of the data, and turning back to Table 1 above to assess voting trends as to all cases, there does appear to be a pro-patentee versus pro-challenger divide. Various active judges appear more likely to rule in favor of the patentee than others. For instance, the three active judges who cast the most pro-patentee votes respectively voted in favor of the patentee 31.1%, 28.7%, and 26.6% of the time.¹¹⁴ Conversely, the three active judges who cast the fewest pro-patentee votes respectively voted in favor of the patentee

111. See SUNSTEIN ET AL., *supra* note 45, at 11; Sunstein et al., *supra* note 45, at 306.

112. See SUNSTEIN ET AL., *supra* note 45, at 60–62; Sunstein et al., *supra* note 45, at 334–35.

113. Wittlin et al., *supra* note 81, at 1233.

114. See *supra* Table 1.

16.4%, 17.7%, and 18.9% of the time.¹¹⁵ For reference, overall, panels ruled in favor of the patentee 22.2% of the time.¹¹⁶ The active judge who cast the greatest percentage of pro-patentee votes was 91% more likely to cast a pro-patentee vote than the active judge who cast the greatest percentage of pro-challenger votes. Even comparing the active judges who cast the second most and second fewest pro-patentee votes, the difference is still 63% (and is 77% for validity cases).

What is just as striking, however, is just how consistently many judges voted. Specifically, eleven of the nineteen judges (and six of the twelve active judges) voted within $\pm 2.6\%$ of the mean.

For the rest of this subpart, I assess ideological decisionmaking more formally. I begin with a survey of the prior literature relating to this question, and then I discuss the results.

a. Prior Literature

The prior empirical literature once again does not provide significant insight into whether, and if so to what degree, decisionmaking at the Federal Circuit depends on the judges hearing the appeal. As explained previously, the Allison and Lemley study found no support for the proposition that judges decide cases materially differently, but it is unclear whether this finding was due to the limited sample.¹¹⁷ Petherbridge looked at a few judges in his sample and concluded that, at least in the context of the doctrine of equivalents cases that were not affirmed under Rule 36, not all of the judges appeared to decide cases the same way.¹¹⁸

R. Polk Wagner and Petherbridge showed that the Federal Circuit judges at the time utilized varying methodological approaches in claim construction cases between 1996 and

115. See *supra* Table 1.

116. See *supra* Table 1.

117. See *supra* notes 67–68 and accompanying text.

118. See Petherbridge, *supra* note 16, at 450–51.

2002.¹¹⁹ Their study was limited to claim construction.¹²⁰ It is also unclear whether these panel dependencies still exist as of 2006 when the Federal Circuit issued a landmark decision in *Phillips v. AWH Corp.*¹²¹ that clarified the appropriate methodological approach for such analysis.¹²² Indeed, there is evidence that the Federal Circuit started addressing claim construction appeals much differently after that case.¹²³ Furthermore, others who have studied claim construction outcomes (as opposed to methodology) concluded that such outcomes do not appear particularly panel dependent.¹²⁴

Petherbridge, Rantanen, and Ali Mojibi studied 338 inequitable conduct decisions (other than summary affirmances) issued by the Federal Circuit through mid-2010, and, although they did not formally test panel dependency, they noted that the chances of patent owner success appeared to vary by judge.¹²⁵ It is unclear, however, whether such panel dependency was significant, whether such dependency would extend to other issues in patent law, or whether such dependencies still exist after the Federal Circuit's en banc

119. R. Polk Wagner & Lee Petherbridge, *Is the Federal Circuit Succeeding? An Empirical Assessment of Judicial Performance*, 152 U. PA. L. REV. 1105, 1125–26, 1129–36, 1171–72 (2004).

120. *See id.*

121. 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

122. *See generally id.*

123. *See, e.g.*, J. Jonas Anderson & Peter S. Menell, *Informal Deference: A Historical, Empirical, and Normative Analysis of Patent Claim Construction*, 108 NW. U. L. REV. 1, 6 (2013) (finding that the claim construction reversal rate dropped significantly after *Phillips*). *But see* R. Polk Wagner & Lee Petherbridge, *Did Phillips Change Anything? Empirical Analysis of the Federal Circuit's Claim Construction Jurisprudence*, in *INTELLECTUAL PROPERTY AND THE COMMON LAW* (S. Balganesch ed., Cambridge Univ. Press 2012).

124. *See, e.g.*, Christian A. Chu, *Empirical Analysis of the Federal Circuit's Claim Construction Trends*, 16 BERKELEY TECH. L.J. 1075, 1119 (2001) (“Although some Federal Circuit judges authored more patent opinions than their colleagues, the court appears remarkably unified in its rulings and its rate of reversal.”); Moore, *supra* note 69, at 26 (finding a “high degree of conformance among voting patterns of the Federal Circuit judges” in claim construction appeals).

125. Lee Petherbridge et al., *The Federal Circuit and Inequitable Conduct: An Empirical Assessment*, 84 S. CAL. L. REV. 1293, 1304–06, 1305 n.40, 1306 n.41, 1336 (2011).

decision in *Therasense v. Becton, Dickinson & Co.*,¹²⁶ which significantly increased the difficulty to prove inequitable conduct.¹²⁷

Looking at reversal rates at the Federal Circuit, Ted Sichelman has argued that Federal Circuit decisions do not appear to be very panel-dependent outside of claim construction.¹²⁸ Reversal rates are, however, at best a rough measure of panel dependency.

In his study of Hatch-Waxman cases, Masar III concluded that “it was difficult to categorize judges as either ‘pro-generic’ or ‘pro-brand,’” and, although Masar III categorized a few judges as outliers, he found that “the majority [of judges who participated in more than ten studied decisions] came quite close to the average pro-brand voting rate.”¹²⁹ It is unclear, however, whether these findings are due to the small sample size.

Paul M. Janicke and LiLan Ren studied 262 cases decided at the Federal Circuit between 2002 and 2004 that resulted in a final, dispositive ruling.¹³⁰ They did not reject the null hypothesis that the identity of a voting judge makes no difference to the case outcome,¹³¹ though it is unclear whether their lack of finding was due to the small sample size of their study.¹³²

126. 649 F.3d 1276 (Fed. Cir. 2011).

127. See generally *id.* See also Robert D. Swanson, Comment, *The Exergen and Therasense Effects*, 66 STAN. L. REV. 695, 695 (2014).

128. See Ted Sichelman, *Myths of (Un)Certainty at the Federal Circuit*, 33 LOY. L.A. L. REV. 1161, 1170, 1184–93 (2010).

129. Masar, *supra* note 95, at 342.

130. Paul M. Janicke & LiLan Ren, *Who Wins Patent Infringement Cases?*, AIPLA Q.J., Winter 2006, at 1, 4.

131. *Id.* at 30.

132. They did reject the null hypothesis after banding the judges into groups based on the results from their study and comparing those groups, *id.*, though they do not explain the degree to which there are differences, and such categorization leads to concerns about endogeneity, which refers to situations in which an explanatory variable (e.g., which band a judge belongs to) is correlated with an error term. See Michael R. Roberts & Toni M. Whited, *Endogeneity in Empirical Corporate Finance*, in 2 HANDBOOK OF THE ECONOMICS OF FINANCE 493, 494 (2013) (defining endogeneity). Specifically, the problem is that the observations were used to determine which band to place the judges (which already assumes that the observed differences were meaningful), and then the bands were used to see whether they explain the

Stepping outside the empirical literature, there is no consensus among spectators as to whether decisionmaking at the Federal Circuit is panel dependent. As Christopher Cotropia has explained, commentators have critiqued the Federal Circuit for creating law that is too uniform and single-minded, while others critique the court for being too disjointed.¹³³ Panel dependency is, however, a common critique of the court. Former Federal Circuit Judge Paul Michel, for example, described panel dependency as the “most frequently mentioned [problem with the Federal Circuit cited] by practitioners.”¹³⁴

In short, the available literature does not provide a concrete answer as to whether, and if so to what extent, decisionmaking in patent cases at the Federal Circuit is panel dependent.

very observations on which they are based. *See* Janicke & Ren, *supra* note 130, at 30. The result is that it is unclear whether it is the differences between the bands of judges that are causing the differences in outcomes or whether the relation is due to random differences in voting that were subsequently characterized as meaningful.

133. *See* Christopher A. Cotropia, *Determining Uniformity Within the Federal Circuit by Measuring Dissent and En Banc Review*, 43 LOY. L.A. L. REV. 801, 806–07, 806 n.28 (2010); *see also* Craig Allen Nard & John F. Duffy, *Rethinking Patent Law’s Uniformity Principle*, 101 NW. U. L. REV. 1619, 1627 (2007) (“[O]ne of the prominent criticisms of the Federal Circuit is that the court exhibits ‘panel dependency.’”); Nard & Duffy, *supra*, at 1620–21 (“The Federal Circuit has been accused of producing an isolated and sterile jurisprudence that is increasingly disconnected from the technological communities affected by patent law.”); Nard & Duffy, *supra*, at 1627 n.38 (“The charge of panel dependency remains a controversial one.”); S. Jay Plager & Lynne E. Pettigrew, *Rethinking Patent Law’s Uniformity Principle: A Response to Nard and Duffy*, 101 NW. U. L. REV. 1735, 1756 (2007) (arguing that patent jurisprudence is any less diverse due to the Federal Circuit’s jurisprudence); Kali N. Murray, *The Cooperation of Many Minds: Domestic Patent Reform in a Heterogeneous Regime*, 48 IDEA: THE INTELL. PROP. L. REV. 289, 318–21 (2008); Paul R. Michel, *The Court of Appeals for the Federal Circuit Must Evolve to Meet the Challenges Ahead*, 48 AM. U. L. REV. 1177, 1191 (1999) (“The problem most frequently mentioned by practitioners is known as ‘panel-dependency.’ . . . I believe that these complaints are exaggerated. . . . I believe that the complaint regarding panel-dependency may be symptomatic of broader ills, such as, ‘indeterminacy’ or ‘unpredictability.’”).

134. Michel, *supra* note 133, at 1191.

b. *Estimating Patent Ideology Based on Revealed Relative Patent-Related Ideological Preferences*

To observe the judges' relative patent ideologies, I utilize voting behavior in en banc cases (which are not part of the dataset, which comprises panel-level appeals) and voting behavior in panel-level cases with dissents, again from outside the studied time period, because such cases reveal relative patent-related ideological preferences between the judges.¹³⁵ I use cases from outside the studied time period to eliminate concerns surrounding endogeneity.¹³⁶

I coded all twenty-five en banc cases decided by the Federal Circuit that provided information concerning the relative patent ideologies of at least two judges in the dataset.¹³⁷ I also coded all dissents that provided such information that issued between June 1, 2021 (the day after the last day in the dataset) and November 13, 2022, as well as between October 2, 2004 (the earliest date of an appeal with a dissent in the Compendium) and December 31, 2013 (the day before the first day in the dataset), for a total of 255 cases.¹³⁸

Based on the judges' differences in voting behavior in overlapping cases, I organized the judges in terms of their relative patent ideologies.¹³⁹ Once the judges were organized, I

135. This technique is similar in principle, though simpler, to techniques that have been employed to assess political ideology at the Supreme Court and other courts of appeals. *See, e.g.,* Corey Rayburn Yung, *Judged by the Company You Keep: An Empirical Study of the Ideologies of Judges on the United States Courts of Appeals*, 51 B.C. L. REV. 1133, 1144–55 (2010); Andrew D. Martin & Kevin M. Quinn, *Dynamic Ideal Point Estimation via Markov Chain Monte Carlo for the U.S. Supreme Court, 1953–1999*, 10 POL. ANALYSIS 134, 136–45 (2002).

136. *See supra* note 132 for a discussion of endogeneity.

137. *See Compendium, supra* note 34.

138. These cases are available on the Harvard Dataverse. *See* Reinecke, *supra* note 61.

139. Where a judge voted more pro-patentee than another judge in some cases and more pro-challenger in others, the judge who voted more pro-patentee more frequently was deemed more pro-patentee than the other. For instance, in cases heard by both Judges Chen and Dyk, Judge Dyk voted more pro-patentee once and more pro-challenger four times, so Judge Dyk was classified as more pro-challenger than Judge Chen. Because not all judges hear every case, it is possible for inconsistencies in the data (i.e., Judge A is deemed more pro-patentee than B and more pro-challenger than C, but Judge C voted more pro-challenger than Judge A in overlapping cases). In such

divided them into a pro-patentee group and a pro-challenger group. Table 7 below provides the classifications. For ease of interpretation, Table 7 lists the judges in order of increasing likelihood of voting in favor of the patentee in the dataset. “P” refers to a pro-patentee classification and “C” refers to a pro-challenger classification.

I chose the division line based on the location that seemed to provide a stark contrast in voting in the en banc and panel-level dissenting cases. This contrast fell between Judge Lourie (the fifth-most pro-challenger of the twelve active judges) and Judge Stoll (the sixth or seventh most pro-challenger active judge).

In overlapping cases, Judge Lourie was observed as voting more pro-challenger than twelve of the other eighteen judges and more pro-patentee than only six judges. In panel cases, Judge Lourie issued only two dissents favoring the patentee, whereas he issued nine dissents favoring the patent-challenger. Judge Lourie also cast approximately the same number of pro-patentee and pro-challenger votes in en banc cases (ten versus eleven, along with four middle-ground votes).¹⁴⁰

Although there are fewer observed votes for Judge Stoll, notably, her only panel-level dissent favored the patentee, and her four en banc votes likewise favored the patentee. An analysis of her voting in overlapping cases placed her as more pro-patentee than six judges (Dyk, Hughes, Lourie, Newman, Prost, and Reyna)¹⁴¹ and more pro-challenger than only one judge (Judge Taranto, though the two voted differently only once in overlapping cases). For these reasons, Judge Stoll was classified as pro-patentee.

Due to relatively limited data, Judge Clevenger was difficult to classify. What is clear from the data is that Judge Clevenger falls somewhere in the middle of the pack, but

instances, judges were organized based on whichever classification had more support. Notably, and possibly a testament to the robustness of this classification method, there were only minor inconsistencies that did not produce meaningful classification difficulties.

140. A middle-ground vote refers to a vote where some judges voted more pro-patentee and others voted more pro-challenger.

141. It is unlikely that Judge Stoll is more pro-patentee than Judge Newman—who was clearly identified as pro-patentee based on the observed voting. The observation is more likely because the total number of observations is small, and their patent ideologies may not be all that different.

nothing stood out as placing him in either camp. The regressions were thus run with Judge Clevenger classified both as pro-patentee and as pro-challenger. The results reported in this Article are, for Judge Clevenger, classified as pro-challenger because such results generally result in larger p values and thus represent the more conservative results. Any differences do not meaningfully impact the key results. The results of the regressions with Judge Clevenger classified as pro-patentee are available on Harvard Dataverse.¹⁴²

A visual inspection of Table 7 indicates that this classification strategy far better captures a degree of patent-related ideological decisionmaking than previous strategies. Notably, under the classification system, the seven judges who voted most pro-challenger were identified as such and eight of the nine judges who voted most pro-patentee were identified as such (the other was Judge Clevenger, who was not classified).

142. Although the data supported classifying Judge Chen as pro-patentee, because the available data is somewhat limited, the regressions were also run with Judge Chen classified as pro-challenger. The results of these regressions are also provided. *See* Reinecke, *supra* note 61. Once again, the key results are not meaningfully impacted, though in some instances some p values become larger. *See id.*

**Table 7:
Judge Classification Based on Revealed Preferences
Through En Banc Voting and Cases with Dissents**

	% Pro-patentee	Classification
Dyk	16.4	C
Prost	17.7	C
Bryson	18.5	C
Lourie	18.9	C
Plager	19.5	C
Mayer	20.2	C
Schall	21.3	C
Wallach	21.4	P
Reyna	21.9	C
Hughes	21.9	C
Chen	22.2	P
Linn	23.9	P
Taranto	24.5	P
Stoll	24.6	P
Clevenger	25.0	
O'Malley	26.6	P
Moore	28.7	P
Newman	31.1	P
Rader	43.8	P

Table 8 below provides the case result by panel composition. In the first column of the table, a “P” refers to a pro-patentee judge and “C” refers to a pro-challenger judge (e.g., “PPC” means two pro-patentee judges and one pro-challenger judge heard the appeal).

A visual inspection of the table reveals that outcomes are increasingly pro-patentee as more pro-patentee judges sit on the appeal, which suggests that this methodology captures a degree of patent-related ideological decisionmaking on the court. The magnitude of the differences in voting between panels of three pro-patentee judges and three pro-challenger judges ($30.4-14.6 = 15.8\%$ difference for patent owner success, and $70.8-55.7 = 15.1\%$ difference for patent-challenger success) is slightly larger than the voting differences between panels of

three Republican appointees and three Democratic appointees in the Cross study (three Democratic appointees were 12.8% more likely to affirm a liberal ruling and 6.6% less likely to affirm a conservative ruling).¹⁴³ And although the Sunstein, Schkade, and Ellman study found a much larger absolute difference (61% liberal rulings for panels of three Democratic appointees versus 34% liberal rulings for panels of three Republican appointees, for a difference of 27%), for both their study and mine, one type of panel is approximately twice as likely as another type of panel to issue a certain type of ruling.¹⁴⁴ Both those studies analyzed only precedential opinions, however, so it is unclear what their results would have been had all cases been considered.

**Table 8: Case Outcomes by Panel Composition
(Observed Patent Ideology)**

Panel Composition	Pro-patentee	Pro-challenger	Mixed	% Pro-patentee	% Pro-challenger
PPP	88	161	40	30.4	55.7
PPC	250	664	137	23.8	63.2
PCC	216	713	132	20.4	67.2
CCC	40	194	40	14.6	70.8

I ran logistic regressions similar to those described previously but using the above-identified classifications. Although I run regressions to assess the judges individually in the next section, advantages to using the patent ideology metric include that the accompanying results are easier to compare to results obtained in other contexts for political ideology, and the patent ideology metric facilitates investigating the impact of the views of the panel as a whole.

Case-level regression: Table 9 below provides the results for an illustrative case-level regression. The only new variables provide the impact of changing the number of pro-patentee judges on the appeal by one. For example, One-to-two P refers to the impact of having two pro-patentee judges hear an appeal compared to just one.

143. See *supra* note 104 and accompanying text.

144. See *supra* note 103 and accompanying text.

The results provide strong support for the conclusion that patent ideology plays a role in decisionmaking at the Federal Circuit. According to the Table 9 model, patent owner success increases by 2.01, 1.30, and 1.50 times as the number of pro-patentee judges hearing the appeal increases from zero to one, one to two, and two to three, respectively. The first jump is highly statistically significant ($p = 0.00004$), and the other two jumps are significant at $p < 0.1$ and nearly significant at $p < 0.05$ ($p = 0.06$ and 0.06 , respectively). The middle jump is likely the smallest due to the moderating impact of having a split panel. When only validity cases are assessed, two of the three jumps are statistically significant, and the other has the correct sign.¹⁴⁵

A similar regression was run that instead utilized a single integer variable representing the number of pro-patentee judges hearing the appeal. The advantage of this approach is that the variable advantageously accounts for the fact that the values have an order and are a certain distance apart (e.g., three Republicans is one more than two), but the model assumes that each increase in the number of Republican-appointed judges has the same impact on the outcome. The former approach, as set forth in Table 9, advantageously does not embed that assumption, but the helpful informational value of the relationship between each of the values is lost (which can lead to larger p values). Under this approach, the coefficient was 1.47 and highly statistically significant ($p < 0.00001$), strongly supporting that patent ideology plays a role in decisionmaking at the Federal Circuit.

I also ran traditional logistic regression analysis for each model (i.e., without clustering) to obtain for various models an Akaike information criterion (“AIC”)—a value that can be used to compare statistical models that accounts for both how well the model performs and the model’s complexity (e.g., the number of explanatory variables), where the better model is generally the one with the lower AIC.¹⁴⁶ The AICs for these models are more than twenty lower than the analogous models utilizing

145. The p values for each respective increase are 2.37 ($p = 0.0096$), 1.22 ($p = 0.29$), and 2.99 ($p = 0.0028$).

146. See HOSMER ET AL., *supra* note 60, at ch. 4.2.

prior technical background, which indicates that these models are significantly better at explaining case outcomes.¹⁴⁷

Table 9: Regression Results Relating Observed Patent Ideology to the Patent Owner's Success Rate

Variable	Coefficient Estimate (p value)
Intercept	0.047 (< 0.00001)
PTO	0.877 (0.23)
P won before district court	18.4 (< 0.00001)
C won before district court	1.17 (0.52)
Zero-to-one P	2.01 (0.00004)
One-to-two P	1.30 (0.06)
Two-to-three P	1.50 (0.06)
2015	0.914 (0.73)
2016	1.34 (0.22)
2017	1.09 (0.73)
2018	1.14 (0.59)
2019	1.41 (0.17)
2020	0.934 (0.79)
2021	0.926 (0.79)

Vote-level regressions: Table 10 below provides the results for an illustrative case-level regression. Judge Patent Ideology refers to the observed patent ideology of the voting judge (0 = pro-challenger, 1 = pro-patentee), Zero-to-one other P and One-to-two other P respectively provide the impact on the voting judge of changing the number of pro-patentee judges hearing the appeal with the voting judge from Zero-to-one and One-to-two (these variables are discussed in more detail later).¹⁴⁸

The results show that the patent ideology of the voting judge explains decisionmaking. Specifically, a pro-patentee

147. For a discussion on how to assess the magnitude of the differences in AIC, see FRANK J. FABOZZI ET AL., *THE BASICS OF FINANCIAL ECONOMETRICS: TOOLS, CONCEPTS, AND ASSET MANAGEMENT APPLICATIONS* 400–01 (2014); KENNETH P. BURNHAM & DAVID R. ANDERSON, *MODEL SELECTION AND MULTIMODAL INFERENCE: A PRACTICAL INFORMATION-THEORETIC APPROACH* 70–71 (2d ed. 2002).

148. See *infra* Part II.B.

judge has approximately 1.67 times the odds of casting a pro-patentee vote as a pro-challenger judge. This value is larger than the corresponding value relating to technical background. When only validity cases are assessed, the coefficient increases to 2.1 ($p = 0.00008$).

Table 10: Regression Results Relating Observed Patent Ideology to Judicial Voting

Variable	Coefficient Estimate (p value)
Intercept	0.063 (< 0.00001)
PTO	0.860 (0.25)
P won before district court	16.20 (< 0.00001)
C won before district court	1.08 (0.73)
Judge Patent Ideology	1.67 (0.0001)
Zero-to-one other P	1.47 (0.007)
One-to-two other P	1.38 (0.006)
2015	0.969 (0.91)
2016	1.32 (0.27)
2017	1.07 (0.80)
2018	1.14 (0.60)
2019	1.39 (0.20)
2020	0.965 (0.89)
2021	0.953 (0.87)

In sum, by utilizing judges' observed relative patent ideologies, the above analysis shows that decisionmaking and voting at the Federal Circuit is driven somewhat by patent ideology.

Furthermore, there is a strong argument that the p values reported in this subpart should be cut in half, meaning the variables are more significant than the above-provided p values and discussion suggests. Specifically, the p values above reflect what is referred to as a two-tailed test, which allows for the possibility of an effect in both directions.¹⁴⁹ But a one-tailed test—which is used to ascertain if there is any relationship between variables in a single direction¹⁵⁰—is arguably more appropriate for the variables relating to the number of

149. See *FAQ: What Are the Differences Between One-Tailed and Two-Tailed Tests?*, UCLA ADVANCED RSCH. COMPUTING STAT. METHODS & DATA ANALYTICS, <https://perma.cc/9P3B-TL47> (last visited Nov. 12, 2023).

150. *Id.*

pro-patentee judges hearing the appeal. Indeed, as the number of pro-patentee judges increases, the patentee's chances of winning are not expected to decrease. Thus, there is a strong argument that the p values discussed above should be halved.

c. Modeling Judges Individually

Because, as a visual inspection of the data shows, decisionmaking and voting at the Federal Circuit does not appear to be perfectly captured by dividing the judges into two camps, I run both case-level and vote-level regressions without grouping the judges together. The results further support that some Federal Circuit judges are more pro-patentee than others.¹⁵¹

The difference with these regressions is that the case-level regressions included a binary variable for each judge representing whether that judge heard the appeal, and the vote-level regressions included a binary variable for each judge representing whether that judge cast the vote and additional binary variables representing which other judges sat on the appeal.¹⁵² The results of the regressions indicate that many judges vote and decide cases differently. The results also confirm that a number of judges fall in the middle of the pack.

Starting with case-level regressions, panels with at least one of the five most pro-patentee judges were between approximately two and three times more likely to rule in favor of the patentee than panels with at least one of the two most pro-challenger judges. These differences were highly statistically significant ($p < 0.002$ in all cases). The difference was at least 1.4 times (and generally larger) for the next most pro-challenger judge. Consistent with the observation that many judges fall in the middle of the pack, there were also numerous judges who were both more pro-challenger and more pro-patentee than the judges on either side. The differences

151. Summary tables of the results can be found on the Harvard Dataverse. See Reinecke, *supra* note 61.

152. For the case-level regressions, because the judges are assessed individually this time, clustering was not necessary and traditional logistic regression analysis was utilized. For the vote-level regressions, because the judges are assessed individually this time, clustering by voting judge was not necessary. Observations were still clustered by case. An exchangeable correlation structure was utilized. See *supra* note 105 and accompanying text.

were generally much larger when only validity cases were assessed.

Turning now to the vote-level regressions, the five most pro-patentee active judges had between approximately two and four times the odds of casting a pro-patentee vote than were the two most pro-challenger active judges.¹⁵³ These results are highly statistically significant ($p < 0.001$ for all). Even compared to the next most pro-challenger judge, the differences were still between 1.45 and 2.6 times. And, again, numerous judges fell in between the judges on either side. When only validity cases were assessed, the differences were generally larger. The coefficients were between 2.1 and 6.9 times for the two most pro-challenger judges, and between 1.6 and 3.9 for the next most pro-challenger judge.

Finally, because Miller and Curry found an interaction effect between political ideology and prior patent background,¹⁵⁴ I briefly explore this potential interaction. The only Republican-appointed judges with prior patent experience are Lourie, Moore, Newman, and Rader. Although Judge Lourie cast a greater fraction of pro-challenger votes than the average judge, the other three of these judges are the three who cast the greatest percentage of pro-patentee votes. On balance, although far from determinative because the number of judges in the sample who fit the criteria is small, the results are not inconsistent with the presence of an interaction between political ideology, patent background, and pro-patentee ideology. Such a correlation would be consistent with the findings by Wittlin, Ouellette, and Mandel in their survey of intellectual property attorneys that pro-patentee views were correlated both with scoring highly in hierarchy and individualism (both associated with conservatism) as well as spending a greater fraction of practice time on patent law.¹⁵⁵

d. Comparative Importance of the Law

The discussion above illustrates that some judges are more pro-patentee than others, and these differences can have a rather significant impact on the patent owner's odds of success.

153. See *infra* Table 10.

154. See *supra* note 97 and accompanying text.

155. Wittlin et al., *supra* note 81, at 1199, 1228–29.

But the impact of the judges' patent-related ideologies should not be overstated.

The variables relating to whether the patent-owner or patent-challenger won before the district court provide some information as to the strength of each party's case, because appellants generally have a weaker legal case on appeal than appellees.¹⁵⁶ As shown in the tables above, the coefficient for whether the patent owner won is very large (and highly statistically significant). The coefficient for whether the patent challenger won is very small (and not statistically significant). The reason behind this discrepancy is not because only the former tells us something about the strength of the patent owner's case. Rather, the reason is that these variables are highly correlated—that is, the two variables generally provide the same information because, in most cases, when the patent owner won before the district court, the patent challenger lost. When two variables provide essentially the same helpful information, regression analysis will tend to identify the utility of that information but will not necessarily attribute the informational value to both variables.¹⁵⁷

The difference in the odds of patent owner success when the patent owner won before the district court as compared to when the patent challenger won can be determined by dividing the two values. This difference tends to hover around fifteen, which means that the patent owner's odds of success (or, for the vote-level regressions, that a judge's odds of voting for the patent owner) are approximately fourteen times higher when the patent owner won before the district court than when the patent owner lost.

The coefficients of the variables relating to the patent ideologies of the judges, however, are smaller, hovering around approximately 1.4 to 4. Because these coefficients are so much smaller than the coefficients relating to just one indicator of the

156. See Jason Rantanen et al., *Who Appeals (and Wins) Patent Infringement Cases?*, 60 HOUS. L. REV. 289, 325 (2022); Cross, *supra* note 62, at 1500 (“Given the legal standard’s command of some measure of deference to district courts, one would expect that appellees would prevail more often than appellants if circuit court judges were adhering to the legal model.”).

157. See Jim Frost, *Multicollinearity in Regression Analysis: Problems, Detection, and Solutions*, STATS. BY JIM, <https://perma.cc/9JLX-B2PC> (last visited Nov. 12, 2023).

strength of each party's case, it appears that the strength of a party's case says more about how a case will be resolved than the patent ideology of the judges.

B. *Panel Effects*

Next, I assess whether panel effects exist at the Federal Circuit—that is, whether judges vote differently based on the preferences of the other judges on the panel.

Although it appears that panel effects have not been studied in the context of patent law or the Federal Circuit, they have been empirically studied for certain other areas of law. For many, though not all, areas of law that scholars have studied, Republican-appointed judges are more likely to cast liberal votes when sitting with Democratic-appointed judges and Democratic-appointed judges are more likely to cast conservative votes when sitting with Republican-appointed judges.¹⁵⁸ And as discussed previously, researchers have also found for many such areas of law that all-Republican-appointed and all-Democratic-appointed panels are more likely than other panels to decide a case in conformity with the panel's political ideology.¹⁵⁹

158. See EPSTEIN ET AL., *supra* note 1, at 153–205; SUNSTEIN ET AL., *supra* note 45, at 8–54; CROSS, *supra* note 3, at 148–78; Landes & Posner, *supra* note 45, at 815–21; Pauline T. Kim, *Deliberation and Strategy on the United States Courts of Appeals: An Empirical Exploration of Panel Effects*, 157 U. PA. L. REV. 1319, 1364 (2009); Jonathan P. Kastellec, *Hierarchical and Collegial Politics on the U.S. Courts of Appeals*, 73 J. POL. 345, 345–46 (2011); Sunstein et al., *supra* note 45, at 311–31; Cox & Miles, *supra* note 63, at 3; Miles & Sunstein, *supra* note 63, at 847–65; Cross, *supra* note 62, at 1504–09; Cross & Tiller, *supra* note 63, at 2171–72; Revesz, *supra* note 63, at 1756–64. See generally Emerson H. Tiller, *The Law and Positive Political Theory of Panel Effects*, 44 J. LEG. STUDS. S35 (2015). In addition to political ideology, the race and gender of fellow panel members have been shown to influence a judge's decisions in certain areas of law. See Jonathan P. Kastellec, *Racial Diversity and Judicial Influence on Appellate Courts*, 57 AM. J. POL. SCI. 167, 168 (2013); Christina L. Boyd et al., *Untangling the Casual Effects of Sex on Judging*, 54 AM. J. POL. SCI. 389, 390 (2010); Cox & Miles, *supra* note 63, at 4; Jennifer L. Peresie, Note, *Female Judges Matter: Gender and Collegial Decisionmaking in the Federal Appellate Courts*, 114 YALE L.J. 1759, 1761 (2005); Sean Farhang & Gregory Wawro, *Institutional Dynamics on the U.S. Court of Appeals: Minority Representation Under Panel Decision Making*, 20 J.L. ECON. & ORG. 299, 300 (2004).

159. See *supra* notes 103–104 and accompanying text.

Commentators have generally theorized that panel effects likely arise in split panels (i.e., panels where not all judges' ideologies align) due to a desire for collegiality and because writing a dissent every time a disagreement arises would be too time-intensive given the heavy caseloads appellate judges currently face.¹⁶⁰ Scholars have also hypothesized that panel effects for uniform panels are likely due to group polarization and due to the absence of a judge with a different ideology to act as a whistleblower.¹⁶¹

Panel effects are not always present. In relevant part, researchers have not observed panel effects in capital punishment and abortion cases despite the fact that voting is ideological in those areas of law.¹⁶² The researchers persuasively reasoned that in those contexts, "antecedent convictions must be extremely strong—strong enough to undo the group influences that occur in other types of cases. It seems clear that judges have strong beliefs about abortion and capital punishment, issues about which beliefs are often fiercely held."¹⁶³

Although it seems unlikely that judges' convictions about patent law would be as strongly held as for abortion and capital punishment, there are reasons to believe that panel effects may not be prevalent in patent cases. Because the Federal Circuit hears so many patent cases, all judges on the court quickly come to have rather significant expertise in patent law. And the judges undoubtedly believe that patent jurisprudence is important. Panel effects seem least likely when the judges are experts about the topic and when they believe that the decisions are very important. Furthermore, it has been empirically shown

160. See Landes & Posner, *supra* note 45, at 821; Sunstein et al., *supra* note 45, at 337–40; Diane P. Wood, *When to Hold, When to Fold, and When to Reshuffle: The Art of Decisionmaking on a Multi-Member Court*, 100 CAL. L. REV. 1445, 1461–62, 1461 n.98 (2012); Lee Epstein et al., *Why (and When) Judges Dissent: A Theoretical and Empirical Analysis*, 3 J. LEG. ANALYSIS 101, 103–04 (2011); Harry T. Edwards, *The Effects of Collegiality on Judicial Decision Making*, 151 U. PA. L. REV. 1639, 1666–69 (2003).

161. See Sunstein et al., *supra* note 45, at 340–44; Cross & Tiller, *supra* note 63, at 2156.

162. See SUNSTEIN ET AL., *supra* note 45, at 8–54; see also Sunstein et al., *supra* note 45, at 311–31.

163. Sunstein et al., *supra* note 45, at 306; see also SUNSTEIN ET AL., *supra* note 45, at 54–57.

that the Federal Circuit issues a comparatively large number of dissents, which is an indicator of a lack of panel effects.¹⁶⁴

On the other hand, because the Federal Circuit has nationwide jurisdiction over numerous dissimilar fields of law with little overlap (e.g., patent cases, veterans-benefits cases, government contracts cases, and government-personnel cases),¹⁶⁵ only some judges join the Federal Circuit with prior patent-related experience. At least these judges might be seen as experts in the field to whom other judges may defer. Moreover, judges with significant prior ties to patent law might care more about the development of patent law than the other judges.

There is some support for this theory. As discussed in more detail below, it has been shown that some judges on the court write a disproportionate share of patent opinions, and that could be at least in part because those judges have a stronger interest in patent law or are seen as experts in the field.¹⁶⁶ This finding led the researchers to conclude that, “[a]lthough one might hope that two other panelists would have a moderating effect on a specialized jurist, it is unclear how strong the moderating effect would be if the specialized jurist is seen as an expert in the field.”¹⁶⁷

Turning now to this study, the results support that panel effects are present at the Federal Circuit. For example, looking at Table 10, Zero-to-one other P and One-to-two other P respectively provide the impact on the voting judge of changing the number of pro-patentee judges hearing the appeal with the voting judge from zero to one and one to two. The coefficients are 1.47 ($p = 0.007$, assuming a two-sided test) and 1.38 ($p = 0.006$, assuming a two-sided test), respectively. This means that a judge is approximately 1.4 times more likely to vote pro-patentee for every pro-patentee judge hearing the appeal with the voting judge.

While the impact of a judge’s own ideology is larger than the impact of adding one pro-patent judge to an appeal, the impact

164. See Cotropia, *supra* note 133, at 803–04.

165. See Paul R. Gugliuzza, *Rethinking Federal Circuit Jurisdiction*, 100 GEO. L.J. 1437, 1443 (2012).

166. See Wasserman & Slack, *supra* note 10, at 1420.

167. *Id.*

of adding two pro-patent judges to an appeal is greater. This finding—that the judge’s own patent ideology and the patent ideologies of the other judges on the appeal are somewhat similarly predictive of patent owner success—is similar to the findings in other areas of law for which panel effects have been observed.¹⁶⁸

C. Patent Ideology and Publication

Next, I assess the interaction between patent ideology and publication of decisions. Many studies fail to address this issue at all because they exclude unpublished decisions from the analysis altogether.¹⁶⁹ The limited studies that address unpublished decisions do so in areas of law outside patent law and have reached varying conclusions about their use.¹⁷⁰

In addition to issuing both precedential and nonprecedential opinions, the Federal Circuit is rather unique among the federal courts of appeals because it issues a comparatively large percentage of summary affirmances—that is, judgments of affirmance without opinion.¹⁷¹ Such affirmances are controversial. For example, commentators have debated whether they are unconstitutional, in violation of the Patent Act¹⁷² and/or Lanham Act,¹⁷³ or otherwise improper or unwise.¹⁷⁴

168. See, e.g., Sunstein et al., *supra* note 45, at 337 (“In our data, the usual pattern involves not simply party effects but also panel effects. Indeed, the latter are as large as the former and sometimes larger.”).

169. See *supra* notes 62–65 and accompanying text.

170. See *supra* note 64 and accompanying text. In a notable exception, the authors found that “certain types of panels, in terms of judge demographics, are more likely to report their decisions than others, which means that judges of some demographic groups are likely having outsized legal influence.” Nina Varsava et al., *Judicial Dark Matter*, 91 U. CHI. L. REV. (forthcoming 2024) (manuscript at 5), <https://perma.cc/W88P-7NNA>.

171. See Dennis Crouch, *Wrongly Affirmed Without Opinion*, 52 WAKE FOREST L. REV. 561, 584 (2017) (“[T]he Federal Circuit is facing a crisis of public confidence . . . compounded by the court’s masked jurisprudence—hidden in the large number of summary affirmances.”); *id.* at 562 (arguing that the Federal Circuit’s “practice of no-opinion judgments runs contrary to . . . [b]oth the Patent Act and the Lanham Act”).

172. 35 U.S.C. §§ 1–390.

173. 15 U.S.C. §§ 1051–1141n.

174. See, e.g., Crouch, *supra* note 171, at 562, 584; Gugliuzza & Lemley, *Can a Court Change the Law*, *supra* note 64, at 804 (expressing skepticism over any argument that summary affirmances are illegal); see also, e.g.,

In the context of the Federal Circuit, Paul Gugliuzza and Mark Lemley studied Federal Circuit patentable subject matter decisions between June 20, 2014—when the Supreme Court decided *Alice Corp. v. CLS Bank Int'l*,¹⁷⁵ an influential patentable subject matter decision—and June 19, 2017. They found some evidence that judges most likely to cast a patent validity vote in a patentable subject matter case are also most likely to summarily affirm a finding of patent invalidity in such a case.¹⁷⁶ Their findings suggest that judges might be using summary affirmances to quietly dispose of appeals that might otherwise create precedent that they would not like.¹⁷⁷

It is unclear, however, whether Gugliuzza and Lemley's findings extend to other issues in patent law. Patentable subject matter cases represent a small percentage of patent appeals,¹⁷⁸ and currently, patentable subject matter is probably the most controversial issue in patent law. Indeed, since 2010, the

Gugliuzza & Lemley, *Can a Court Change the Law*, *supra* note 65, at 805 (explaining that summary affirmances might be justified at least in part on the basis that “the Federal Circuit’s time and energy are finite”); Matthew J. Dowd, *Rule 36 Decisions at the Federal Circuit: Statutory Authority*, 21 VAND. J. ENT. & TECH. L. 857, 859–62 (2018) (arguing that summary affirmances are within the authority and discretion of the court); Chad M. Oldfather, *Writing, Cognition, and the Nature of the Judicial Function*, 96 GEO. L.J. 1283, 1314–44 (2008) (describing both potential positive and potential negative impacts of requiring a written decision); Chad M. Oldfather, *Remedying Judicial Inactivism: Opinions as Informational Regulation*, 58 FLA. L. REV. 743, 768–801 (2006) (describing advantages of requiring a written decision); Beth Zeitlin Shaw, Note, *Please Ignore This Case: An Empirical Study of Nonprecedential Opinions in the Federal Circuit*, 12 GEO. MASON L. REV. 1013, 1014 (2004) (arguing that “[n]onprecedential opinions allow judges to forego carefully worded opinions.”); Petition for a Writ of Certiorari at 6–7, *Petter Invs. v. Hydro Eng’g*, 584 U.S. 916 (2018) (No. 17-1055) (arguing that Rule 36 affirmances in appeals from district court litigation violate the Due Process Clause of the Fifth Amendment).

175. 573 U.S. 208 (2014).

176. See Gugliuzza & Lemley, *Can a Court Change the Law*, *supra* note 64, at 797–801.

177. See *id.* at 796–801, 805. Another study of claim construction cases at the Federal Circuit found that the Federal Circuit decided claim construction cases under Rule 36 without a strong regard to the experience of the district court judges. See David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223, 252 n.147, 276–77 (2008).

178. The issue of patentable subject matter was raised in only 233 of the 2037 cases in the dataset, for a total of 11.4% of appeals.

Supreme Court issued four decisions relating to patentable subject matter that radically altered the permissible scope of patent protection for computer science inventions and inventions in the life sciences¹⁷⁹—two industries that comprise a sizable portion of the U.S. economy—and numerous scholars have criticized the test as too anti-patent and/or too unpredictable.¹⁸⁰

In this subpart, I start by assessing voting patterns within each designation. Then I turn to the questions Gugliuzza and Lemley addressed surrounding use of Rule 36, but I do so for all cases.

1. Voting Patterns Within Each Designation

First, I look at the role played by patent ideology within each case designation. Tables 11 through 13 below respectively provide the judges' voting patterns for precedential, nonprecedential, and summarily affirmed decisions. For each table, the judges are listed in order of increasing probability of ruling in favor of the patent owner in a precedential opinion.

179. See generally *Alice Corp.*, 573 U.S. 208; Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 576 (2013); Mayo Collaborative Servs. v. Prometheus Labs., Inc., 566 U.S. 66 (2012); *Bilski v. Kappos*, 561 U.S. 593 (2010).

180. See, e.g., Mark A. Lemley & Samantha Zyontz, *Does Alice Target Patent Trolls?*, 18 J. EMPIRICAL LEGAL STUDS., 47, 68–73 (2021) (providing the results of an empirical study showing that the entities most likely to lose patents under the new patent eligibility jurisprudence are individual inventors and inventor-started companies); Jason D. Reinecke, *Is the Supreme Court's Patentable Subject Matter Test Overly Ambiguous? An Empirical Test*, 2019 UTAH L. REV. 581, 582 (2019) (collecting authorities); Reinecke, *supra*, at 583 (providing the results of an empirical study suggesting that the test is not as unpredictable as many commentators have suggested); see also Ben Dugan, *Mechanizing Alice: Automating the Subject Matter Eligibility Test of Alice v. CLS Bank*, 2018 U. ILL. J.L. TECH. & POL'Y 33, 78 (2018) (estimating that, at the time the Supreme Court issued *Alice*, 100,000 in-force granted patents had at least one claim that that is invalid under the doctrine established in that case).

Table 11: Judges' Voting Patterns (Precedential Cases)

	Pro P Prec	Pro C Prec	Mixed Prec	% P Prec	% C Prec
Prost	41	124	41	19.9	60.2
Dyk	39	93	35	23.4	55.7
Plager	8	16	9	24.2	48.5
Mayer	12	24	9	26.7	53.3
Bryson	21	33	22	27.6	43.4
Lourie	49	85	32	29.5	51.2
Hughes	58	101	30	30.7	53.4
Wallach	58	90	38	31.2	48.4
Reyna	77	117	39	33.0	50.2
Chen	58	67	42	34.7	40.1
Clevenger	18	21	7	39.1	45.7
Schall	15	17	6	39.5	44.7
Stoll	52	51	28	39.7	38.9
Taranto	78	66	47	40.8	34.6
O'Malley	61	53	30	42.4	36.8
Linn	17	14	7	44.7	36.8
Moore	86	69	35	45.3	36.3
Rader	11	6	5	50.0	27.3
Newman	95	56	21	55.2	32.6
Total	273	373	160	33.9	46.3

**Table 12:
Judges' Voting Patterns (Nonprecedential Cases)**

	Pro P Nonprec	Pro C Nonprec	Mixed Nonprec	% P Nonprec	% C Nonprec
Prost	45	126	33	22.1	61.8
Dyk	28	116	37	15.5	64.1
Plager	6	21	5	18.8	65.6
Mayer	10	40	4	18.5	74.1
Bryson	16	43	11	22.9	61.4
Lourie	43	145	35	19.3	65.0
Hughes	32	90	29	21.2	59.6
Wallach	30	109	25	18.3	66.5
Reyna	34	120	16	20	70.6
Chen	40	135	30	19.5	65.9
Clevenger	18	33	10	29.5	54.1
Schall	9	32	12	17.0	60.4
Stoll	38	94	24	24.4	60.3
Taranto	42	124	27	21.8	64.2
O'Malley	41	106	29	23.3	60.2
Linn	6	27	10	14.0	62.8
Moore	49	87	25	30.4	54.0
Rader	2	1	0	66.7	33.3
Newman	31	56	6	33.3	60.2
Total	176	512	126	21.6	62.9

Table 13:
Judges' Voting Patterns (Summarily Affirmed Cases)

	Pro P R36	Pro C R36	Mixed R36	% P R36	% C R36
Prost	40	242	21	13.2	79.9
Dyk	34	217	17	12.7	81
Plager	8	38	2	16.7	79.2
Mayer	11	48	5	17.2	75
Bryson	5	73	3	6.2	90.1
Lourie	25	190	14	10.9	83
Hughes	44	206	21	16.2	76
Wallach	43	205	15	16.3	77.9
Reyna	26	184	14	11.6	82.1
Chen	31	164	15	14.8	78.1
Clevenger	11	68	2	13.6	84
Schall	9	51	4	14.1	79.7
Stoll	25	145	11	13.8	80.1
Taranto	36	198	18	14.3	78.6
O'Malley	41	160	17	18.8	73.4
Linn	10	43	4	17.5	75.4
Moore	27	172	14	12.7	80.8
Rader	1	6	0	14.3	85.7
Newman	26	186	12	11.6	83
Total	151	867	70	13.9	79.7

Starting with a visual inspection of the data, and looking first at the precedential decisions, a patent-related ideological trend emerges that is similar to the trend for all cases. For example, the same three active judges cast the most pro-challenger votes (Prost, Dyk, and Lourie), and the same three active judges cast the most pro-patentee votes (Moore, O'Malley, and Newman).

The patent-related ideological trend is generally more pronounced for voting in precedential decisions. The overall range for the percentage of pro-patentee votes each judge cast grew significantly larger (from 16.4–31.1% for all cases to 19.9–55.2% for precedential cases). When all cases were assessed, eleven of the nineteen judges and six active judges

voted within $\pm 3\%$ of the mean, voting for only three active judges fell outside $\pm 5\%$ of the mean, and no judge's voting fell outside $\pm 10\%$ of the mean. For precedential cases, however, only three judges (each of which is an active judge) voted within $\pm 3\%$ of the mean, seven active judges fell outside $\pm 5\%$ of the mean, and four active judges fell at or outside $\pm 10\%$ of the mean (two on each side). The difference in pro-challenger voting behavior is generally similar.

Interestingly, all judges' proportion of pro-patentee precedential votes exceeded the judges' proportion of pro-patentee nonprecedential and summarily affirmed votes. Although the differences are generally smaller, this observation persists (other than for Judge Plager, but the number of observations for Judge Plager is small) even when looking only at unanimous affirmances (the opinions that offer an opportunity to summarily affirm a decision).

Table 14 below shows case outcomes by panel composition for precedential cases. The results show that case outcomes are increasingly pro-patentee as the number of pro-patentee judges increases. The percentage of pro-patentee votes for all panels exceeds the respective panels' pro-patentee votes for cases generally, and the extent of the differences is larger. Both the absolute and proportional differences in voting are larger than the differences found by Cross in his study and by Sunstein, Schkade, and Ellman for their study across all cases.¹⁸¹ Looking at the specific areas of law they studied, both the absolute and proportional difference in voting by all pro-patentee panels and all pro-challenger panels shows a starker divide in patent law than Sunstein, Schkade, and Ellman found for cases relating to many areas of law—including Title VII, capital punishment, abortion, and piercing the corporate veil—a similar absolute difference to ADA cases and Contract Clause cases, and a similar proportional difference to sex discrimination cases.¹⁸² The divide is less stark than for EPA cases, affirmative action cases, and campaign finance cases.¹⁸³

181. See *supra* notes 103–104 and accompanying text.

182. See Sunstein et al., *supra* note 45, at 314.

183. See *id.*

**Table 14: Case Outcomes by Panel Composition
(Observed Patent Ideology, Precedential Cases)**

	P	C	M	% P	% C
PPP	44	22	20	51.2	25.6
PPC	120	141	62	37.2	43.7
PCC	86	156	60	28.5	51.7
CCC	17	47	14	21.8	60.3

Decisionmaking in nonprecedential decisions also follows the same general trend as voting in precedential decisions but is far less dependent on panel composition. The pro-patentee voting percentages for all but four active judges, and the pro-challenger voting percentages for all but two active judges, fell within $\pm 4\%$ of the mean. The other judges fall on the side of the mean consistent with their patent ideology. Table 15 below shows case outcomes by panel composition for nonprecedential cases,¹⁸⁴ the results of which support that decisionmaking is generally less disparate for such cases, at least for mixed panels.

**Table 15: Case Outcomes by Panel Composition
(Observed Patent Ideology, Nonprecedential Cases)**

	P	C	M	% P	% C
PPP	29	54	13	30.2	56.3
PPC	59	189	46	20.0	64.3
PCC	77	206	46	23.4	62.6
CCC	11	55	19	12.9	64.7

The judges do not appear to similarly favor one party over another in decisions affirmed under Rule 36, at least not to the same degree. Instead, what is most remarkable is how similar the judges voted in such cases. The pro-patentee and pro-challenger voting percentages for all but one active judge fell within $\pm 3.7\%$ of the mean. In addition, there appears to be very little in common with judges' pro-patentee voting tendencies in precedential decisions as compared with summarily affirmed decisions. For example, for summarily affirmed cases, the two

184. Judge Clevenger was classified as pro-challenger, but, again, that classification does not meaningfully impact the results.

active judges who cast the most pro-patentee votes and the two who cast the most pro-challenger votes all voted pro-patentee at rates within 1.6% of each other and pro-challenger at rates within 3.1% of each other.

Table 16 below provides the case outcomes by panel composition for summarily affirmed cases. Any differences in voting are relatively small.

**Table 16: Case Outcomes by Panel Composition
(Observed Ideology, Summarily Affirmed Cases)**

	P	C	M	% P	% C
PPP	15	85	7	14.0	79.4
PPC	71	334	29	16.4	77.0
PCC	53	351	26	12.3	81.6
CCC	12	92	7	10.8	82.9

To test these observations more formally, I again ran various logistic regressions similar to those discussed above, but separately on precedential decisions, nonprecedential decisions, and summarily affirmed decisions.

The results of the case-level regressions indicate that outcomes in precedential decisions are influenced by patent ideology. In the regression analogous to the regression shown in Table 9 (but for precedential cases only), the respective increases in the number of pro-patentee judges hearing the appeal are respectively associated with 1.61 ($p = 0.036$), 1.43 ($p = 0.052$), and 1.85 ($p = 0.029$) times the odds of patent owner success. The same is true for the vote-level regressions. In the vote-level regression analogous to the regression shown in Table 10 (but for precedential cases only), a pro-patentee judge has, on average, approximately 1.95 ($p = 0.0006$) times the odds of casting a pro-patentee vote than a pro-challenger judge in a precedential case. The variables concerning the number of pro-patentee judges hearing the appeal with the voting judge supports that panel effects are also present in precedential cases.¹⁸⁵

185. The increases from zero to one and from one to two pro-patentee judges are associated with 1.38 ($p = 0.066$) and 1.54 ($p = 0.005$) times the odds of patent owner success.

The results also support that decisionmaking in nonprecedential decisions is somewhat less based on patent ideology, though still ideological. For the case-level regression analogous to the one in Table 9, the respective coefficients were 2.64 ($p = 0.002$), 0.90 ($p = 0.63$), and 1.8 ($p = 0.09$). For the vote-level regression analogous to the one in Table 10, a pro-patentee judge has, on average, approximately 1.4 ($p = 0.048$) times the odds of casting a pro-patentee vote than a pro-challenger judge. The variables concerning the number of pro-patentee judges hearing the appeal with the voting judge are above one (as expected), but they are not statistically significant. If, however, the test is run utilizing only one integer variable concerning the number of such judges (which, as explained previously, advantageously accounts for the fact that the values have an order and are a certain distance apart), then the value is statistically significant (1.33, $p = 0.034$).

The results further support that decisionmaking in summarily affirmed cases is not significantly explained by patent ideology, though the coefficient concerning the difference between panels with one and two pro-patentee judges is weakly significant assuming a two-sided test (1.42, $p = 0.08$). The other two increases are not significant. For the vote-level regression analogous to the one in Table 10, none of the variables concerning the patent ideology of the voting judge or the other judges hearing the appeal are statistically significant.

I further conducted linear regressions to assess the relationship between judges' voting patterns based on the precedential status of the opinion. I used judges' voting patterns for one category of cases as the outcome variable and the voting patterns for another set of cases as the explanatory variable (for a total of one data point per judge). The precedential voting patterns were strongly correlated with overall voting patterns.¹⁸⁶ Nonprecedential voting patterns were moderately

186. R-squared is a goodness-of-fit measure for linear regression models and indicates the percentage of the variance in the outcome variable that is explained by the explanatory variables. See *R-Squared Statistics*, IBM, <https://perma.cc/88NC-9DYQ> (last updated Nov. 9, 2021) (“R² summarizes the proportion of variance in the dependent variable associated with the predictor (independent) variables, with larger R² values indicating that more of the variation is explained by the model, to a maximum of 1.”). R-squared was 0.67 ($p = 0.000019$) and 0.67 ($p = 0.000018$) for the correlation between pro-patentee and pro-challenger voting percentages, respectively, when all judges were

correlated with overall voting patterns, though the effect was significantly weaker than for precedential patterns.¹⁸⁷ Virtually no correlation, and no statistically significant correlation, was found between overall voting patterns and voting patterns for summarily affirmed decisions.¹⁸⁸ The same general pattern emerged when comparing voting behavior in precedential decisions to nonprecedential or summarily affirmed decisions, though any relationships were weaker.¹⁸⁹ As with comparing all cases or precedential cases to summarily affirmed cases, no significant relationship emerges between voting in nonprecedential and summarily affirmed cases.¹⁹⁰

Figures 1 and 2 below provide graphical representations of the relationship between the active judges' observed pro-patentee voting patterns in all cases versus precedential cases (Figure 1) and precedential versus summarily affirmed cases (Figure 2), along with the best fitting line (senior judges excluded).

considered (other than Rader, for whom there was very little data once the data was broken down by precedential status). R-squared was even greater—0.95 ($p < 0.00001$) and 0.85 ($p < 0.00001$), respectively—when only the active judges were considered.

187. R-squared values for pro-patentee and pro-challenger voting patterns were 0.52 ($p = 0.0007$) and 0.29 ($p = 0.02$), respectively, with senior judges included, and 0.77 ($p = 0.0002$) and 0.29 ($p = 0.04$), respectively, with senior judges excluded.

188. R-squared values for pro-patentee and pro-challenger voting patterns were 0.026 ($p = 0.53$) and 0.046 ($p = 0.40$), respectively, with senior judges included, and 0.01 ($p = 0.74$) and 0.10 ($p = 0.31$) with senior judges excluded.

189. For the regressions comparing voting behavior in precedential and nonprecedential decisions, R-squared values for pro-patentee and pro-challenger voting patterns were 0.29 ($p = 0.02$) and 0.14 ($p = 0.13$), respectively, with senior judges included, and 0.67 ($p = 0.001$) and 0.12 ($p = 0.27$) with senior judges excluded. For the regressions comparing voting behavior in precedential and summarily affirmed cases, R-squared values for pro-patentee and pro-challenger voting patterns were 0.007 ($p = 0.74$) and 0.0004 ($p = 0.94$), respectively, with senior judges included, and 0.0004 ($p = 0.95$) and 0.10 ($p = 0.75$) with senior judges excluded.

190. R-squared values are 0.099 ($p = 0.20$) and 0.06 ($p = 0.32$) with senior judges included, and 0.03 ($p = 0.581$) and 0.03 ($p = 0.584$) with senior judges excluded.

Figure 1: Judges' Voting Patterns, All Cases Versus Precedential Cases

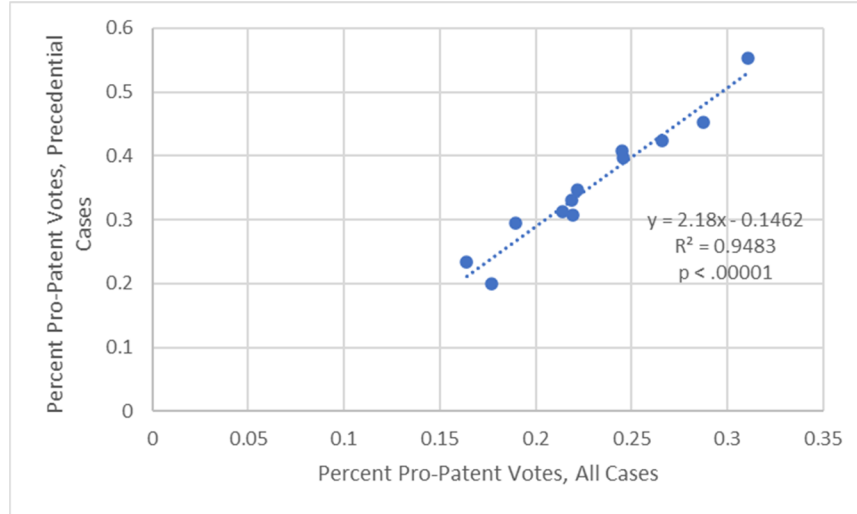
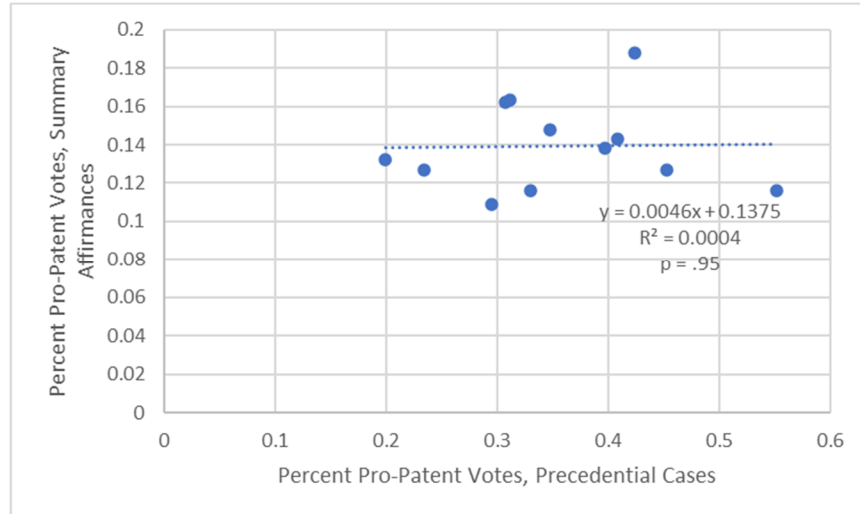


Figure 2: Judges' Voting Patterns, Precedential Versus Summarily Affirmed Cases



These results are consistent with the visual inspection of the data discussed above. The precedential decisions were, by far, the most driven by patent ideology and primarily drive the patent-related ideological trend seen when all votes are

considered. The nonprecedential votes less closely correlate with all votes or precedential votes, because those votes are not as driven by patent ideology. And the results support that there do not appear to be significant patent-related ideological voting patterns in summarily affirmed cases.

In short, the lion's share of patent-related ideological voting and decisionmaking occur in cases designated precedential. Voting and decisionmaking are less disparate in nonprecedential cases. And, at least on average, voting and decisionmaking are not explained by patent ideology in summarily affirmed cases, except when only summarily affirmed cases were assessed, split panels were weakly associated with case outcomes in the direction of the patent ideology of the majority of the judges.

2. Use of Rule 36 Summary Affirmances

I turn now to the question that Gugliuzza and Lemley studied in the context of patentable subject matter cases, but I do so for patent cases generally: Does a judge's propensity to issue a pro-patentee (or pro-challenger) vote relate to the percentage of votes in the other direction that judge casts under Rule 36? I conducted the same test as Gugliuzza and Lemley but do so for all cases. Specifically, I conducted a linear regression assessing the relationship between the two by calculating each judge's percentage of pro-patentee and pro-challenger votes (for robustness, I performed the test both utilizing each judge's overall percentage and each judge's percentage in precedential cases) and each judge's percentage of pro-patentee and pro-challenger votes in summarily affirmed cases. I then utilize regression analysis to assess the correlation between the relevant voting behavior. Also, like Gugliuzza and Lemley, I find a moderate correlation.¹⁹¹

One explanation for this finding is that judges use summary affirmances to bury decisions that come out in the opposite direction of their relative patent ideology because those cases

191. R-squared was around 0.15–0.40 depending on whether senior judges are included, whether I test propensity to issue pro-patentee votes or pro-challenger votes against the propensity to cast the opposite vote under Rule 36, and whether I compare the Rule 36 votes to precedential voting behavior or to overall voting behavior.

might otherwise create precedent that the judges would not like. But under the test utilized by Gugliuzza and Lemley, all votes are counted, even if those votes were in cases that could not have been summarily affirmed (i.e., non-unanimous cases and non-affirmances). Those votes, however, could be driving the results.

To take an extreme example, suppose a pro-patentee judge affirms all pro-patentee district court rulings but affirms only half pro-challenger district court rulings, and vice versa for a pro-challenger judge. In this scenario, the judges have the option to cast a summary affirmance in every case coming out opposite their patent ideology but only some of the cases in favor of their patent ideology. The test above, therefore, would show a relationship between voting and casting summary affirmances even if the judges were equally likely to cast a summary affirmance when given the chance.

Tables 17 and 18 below confirm that votes in non-affirmances could be driving the results. Table 17 provides the number and rate of affirmance by panel composition for pro-patentee district court decisions, and Table 18 provides the same for pro-challenger district court decisions. As shown in the tables, majority pro-patentee panels are, as expected, more likely to affirm pro-patentee district court decisions and less likely to affirm pro-challenger district court decisions.

Table 17: Outcomes by Panel Composition, Pro-patentee District Court Decisions

Panel	Affirmed	Not affirmed	% Affirmed
PPP	37	23	61.7
PPC	134	66	67.0
PCC	121	81	59.9
CCC	31	31	50.0

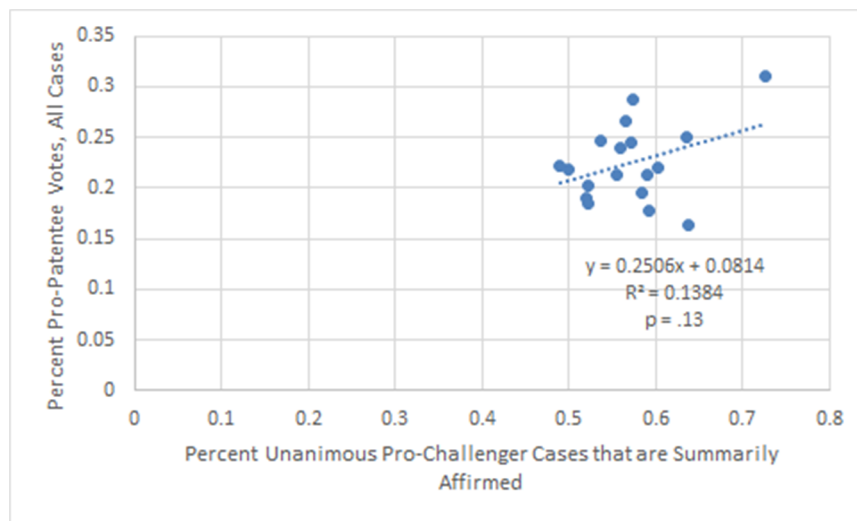
Table 18: Outcomes by Panel Composition, Pro-challenger District Court Decisions

Panel	Affirmed	Not affirmed	% Affirmed
PPP	151	54	73.7
PPC	610	156	79.6
PCC	636	128	83.2
CCC	167	17	90.8

I conducted the regressions again, but this time, I looked at the judges' propensity to summarily affirm a case in a certain direction as a percentage of total opportunities to summarily affirm (i.e., total unanimous affirmances coming out in that direction). Under these tests, no significant relationship remained. Thus, judges do not appear more likely to summarily affirm a decision coming out in the opposite direction of their patent ideology when considered as a fraction of the total number of such opportunities. Rather, it appears that the correlation from the first test is driven by the fact that judges are more likely to issue non-affirmances in the direction of their patent ideology—because those decisions must be written, judges have proportionally fewer opportunities to summarily affirm a decision coming out in favor of their patent-related ideological leanings.

Figure 3 below provides the results for one such regression, where all cases and judges (other than Judge Rader, because there was very little data) were analyzed, and pro-patentee voting was compared to the percentage of times a judge sat on a unanimous pro-challenger affirmance that was summarily affirmed. Although the equation shows a very small positive trend, the trend is not significant ($p = 0.13$). Moreover, one outlier data point (at $x = 0.73\%$, $y = 0.31\%$) is the source for the lion's share of the trend. With that outlier removed, the slope of the line becomes nearly zero (and is, conversely, slightly negative), and R-squared (which measures goodness of fit, with values near 0 meaning little association between the variables, and values near 1 meaning strong association) is essentially 0 (0.0001), strongly suggesting that there is no significant correlation.

Figure 3: Judges' Pro-patentee Voting Patterns in All Cases Versus Judges' Percentage of Unanimous Pro-challenger Cases that are Summarily Affirmed



D. Authorship

Authorship is worthy of study because the author of an opinion usually has far more control than the other judges hearing an appeal over what the opinion ends up saying and what its future impact will be. Melissa Wasserman and Jonathan Slack looked at all authored Federal Circuit opinions of all case types (broken down into thirteen categories) over a fourteen year period and found “evidence that opinion specialization is a robust part of the Federal Circuit’s practice” and that “opinion specialization occurs both in the positive and negative directions”—i.e., some Federal Circuit judges were more likely to author opinions relating to certain subject matter, including patents, than others.¹⁹²

Janicke and Ren looked at judges’ propensities to write opinions for and against the patentee and did not reject the null

192. Wasserman & Slack, *supra* note 10, at 1410, 1434. Opinion specialization appears to occur in other courts as well. See Edward K. Cheng, *The Myth of the Generalist Judge*, 61 STAN. L. REV. 519, 519 (2008) (assessing opinion specialization in the federal courts of appeals from 1995–2005).

hypothesis that the identity of the authoring judge does not affect who is the ultimate winner, but, again, it is unclear whether the lack of statistically significant finding is due to the small sample size.¹⁹³

Turning to this study, the results show that authorship of pro-patentee and pro-challenger patent opinions is even more disparate than authorship of patent opinions generally. Starting with a visual inspection of the data, Table 19 below displays the number of pro-patentee and pro-challenger majority precedential decisions each judge authored during the studied period and the total number of such writing opportunities (i.e., number of times the judge was in the majority).¹⁹⁴ The third and fifth columns respectively provide, in parentheses, how frequently the judge authored a pro-patentee or pro-challenger majority decision as a percentage of the total number of such writing opportunities for that judge. The judges are listed in order of how frequently they voted in favor of the patent owner during the studied time period.

The five active judges who voted pro-patentee the greatest percentage of the time (Newman, Moore, O'Malley, Taranto, and Stoll) collectively wrote nearly 49% of the pro-patentee precedential opinions but only 26% of the pro-challenger opinions. In contrast, the three active judges who were the least likely to vote pro-patentee (Dyk, Prost, and Lourie) collectively wrote 19% of the pro-patentee precedential opinions but 34% of the pro-challenger precedential opinions.

Judges Dyk, Prost, and Lourie each respectively authored 2.25, 4.8, and 1.4 times more pro-challenger precedential decisions than pro-patentee decisions. Conversely, Judges Moore, O'Malley, Taranto, and Stoll each respectively authored 1.5, 2, 1.6, and 1.1 times more pro-patentee precedential decisions than pro-challenger decisions, and Judge Newman authored nearly as many.

193. See Janicke & Ren, *supra* note 130, at 29–30. Once again, Janicke and Ren did find a statistically significant differences when comparing judges in the three different bands, but, as discussed above, assessing the data via the bands presents problems of endogeneity. See *supra* note 132 and accompanying text.

194. There were a small number of per curiam precedential decisions that were not included as writing opportunities because those opinions do not have an official authoring judge. See, e.g., Wasserman & Slack, *supra* note 10, at 1427.

**Table 19: Number of Precedential Majority Opinions
Joined and Written, by Winning Party**

	Pro-patentee precedential decisions in majority	Pro-patentee precedential decisions written	Pro-challenger precedential decisions in majority	Pro-challenger precedential decisions written
Dyk	37	15 (41%)	84	37 (44%)
Prost	40	12 (30%)	118	53 (45%)
Bryson	18	8 (44%)	33	13 (39%)
Lourie	49	24 (49%)	79	36 (46%)
Plager	8	2 (25%)	15	5 (33%)
Mayer	11	2 (18%)	19	1 (5.3%)
Schall	13	1 (7.6%)	17	3 (18%)
Wallach	55	12 (22%)	86	23 (27%)
Reyna	69	26 (38%)	105	46 (44%)
Hughes	57	9 (16%)	98	25 (26%)
Chen	56	16 (29%)	66	25 (38%)
Linn	17	6 (35%)	14	5 (36%)
Taranto	76	30 (39%)	65	19 (29%)
Stoll	48	21 (44%)	50	19 (38%)
Clevenger	16	0 (0%)	21	1 (4.8%)
O'Malley	56	28 (50%)	51	14 (27%)
Moore	79	39 (49%)	69	26 (38%)
Newman	46	15 (33%)	49	18 (37%)
Rader	10	4 (40%)	6	0
Totals		270		370

Table 20 below breaks down the number of pro-patentee and pro-challenger precedential decisions written by judges classified as pro-patentee or pro-challenger based on observed relative voting preferences. As shown in the table, pro-patentee judges authored more pro-patentee decisions than pro-challenger decisions, and pro-challenger judges authored more than twice as many pro-challenger decisions as pro-patentee decisions.

Table 20: Number Pro-patentee and Pro-challenger Precedential Decisions Written by Patent Ideology

Judge Classification	Pro-patentee Written	Pro-challenger Written
Pro-patentee	171	149
Pro-challenger	99	220
Pro-patentee (active judges only)	161	144
Pro-challenger (active judges only)	86	197

A more formal inspection of the results also highlights the particularly unbalanced allocation of pro-patentee or pro-challenger decisions. For example, the active judges each wrote between 5.8% and 11% of the precedential patent decisions favoring either the patent owner or accused infringer, with a standard deviation of 2.2%. Conversely, when pro-patentee and pro-challenger precedential decisions are divided and then analyzed, the range is larger (3.6–15.8% and 4.1–13.5%, respectively), as is the standard deviation (3.5% and 3.4%, respectively).

Regression analysis further supports that certain judges write a disproportionate share of pro-patentee or pro-challenger decisions.¹⁹⁵ Specifically, for the regressions, the outcome variable was either whether the patent owner or patent challenger won the appeal. The predictor variables included the basic case-related variables discussed previously along with a variable representing the observed patent ideology of the author. The dataset included all precedential opinions with an author (i.e., not summarily affirmed decisions or per curiam opinions). The results show that the patent ideology of the author is a significant predictor of patent owner and patent challenger success, which further supports that pro-patentee judges write a disproportionate share of pro-patentee opinions, and pro-challenger judges author a disproportionate share of pro-challenger opinions. I also ran regressions utilizing a separate variable for each judge in place of the variable

195. The regression results can be found on Harvard Dataverse. See Reinecke, *supra* note 61.

representing the observed patent ideology of the author, and the results again indicated that many judges write a disproportionate share of pro-challenger or pro-patentee opinions.

The reason behind this increased specialization appears in large part due to panel dependency and to dissents. Specifically, because panels with more pro-patentee judges are more likely to result in a pro-patentee ruling, and because pro-patentee judges are more likely to dissent if the ruling is pro-challenger, pro-patentee judges have more opportunities to author pro-patentee opinions than pro-challenger judges. The pro-patentee active judges took part in a greater fraction of cases that resulted in a pro-patentee precedential decision than the pro-challenger active judges (416 appeals or 59 per judge versus 252 appeals or 50 per judge). The opposite is true for the cases that resulted in a pro-challenger decision (436 appeals or 62 per judge versus 484 appeals or 96 per judge).

An additional reason for the trend, however, might be that some judges prefer to write pro-patentee decisions and others pro-challenger decisions. A visual inspection of the data suggests that this might be the case. For example, Judges O'Malley, Moore, and Taranto (three judges that voted pro-patentee a proportionately greater amount of the time) authored a much greater fraction of pro-patentee writing opportunities than pro-challenger writing opportunities (50% versus 27%, 49% versus 38%, and 39% versus 29%, respectively), whereas Judges Prost, Hughes, and Chen authored a greater fraction of pro-challenger writing opportunities (45% versus 30%, 26% versus 16%, and 38% versus 29%). These differences are rather small, however, and are not present for every judge. For example, Judge Dyk's percentages were nearly the same (42% versus 43%), and Judge Lourie wrote a slightly greater fraction of pro-patentee writing opportunities (51% versus 44%), despite the fact that these judges were both comparatively likely to cast a pro-challenger vote.

In sum, whatever the reason, not only do some judges write a disproportionate number of patent opinions (as Wasserman and Slack found), some judges further write a disproportionate share of pro-patentee and pro-challenger decisions.

III. IMPLICATIONS

Although the primary purpose of this Article is to provide and analyze new data, I briefly conclude by discussing some of the implications of the results.

There is a longstanding debate among scholars regarding whether and the extent to which voting and decisionmaking in patent cases at the Federal Circuit is too varied or, conversely, too uniform.¹⁹⁶ This debate, however, was not informed by large-scale empirical analysis concerning decisionmaking in patent cases. This Article provides empirical analysis to inform this debate.

I do not endeavor in this Article to opine on the optimal degree of uniformity. But the analysis above demonstrates that Federal Circuit judges hold a variety of views concerning patent law. Judge Newman might have been on to something when she wrote that the “differences of opinion among the judges of the Federal Circuit, are, in microcosm, the ‘percolation’ that scholars feared would be lost by a national court at the circuit level.”¹⁹⁷

It would be tempting to conclude that, in an ideal world, the law would be all that matters, and there would be no pro-patentee versus pro-challenger divide because the judges would all be ideologically uniform in the direction that more frequently gets cases “right.” But viewpoint diversity on panels promotes following the law.¹⁹⁸ In addition, although many commentators appear to have strong opinions concerning how patent law ought to work, the evidence is largely inconclusive.¹⁹⁹

196. See *supra* note 133 and accompanying text.

197. *Univ. of Rochester v. G.D. Searle & Co.*, 375 F.3d 1303, 1305 (Fed. Cir. 2004) (Newman, J., dissenting from denial of rehearing en banc); see also, e.g., Rochelle Cooper Dreyfuss, *The Federal Circuit: A Continuing Experiment in Specialization*, 54 CASE W. RESV. L. REV. 769, 775 (2004) (explaining that “some level of inconsistency in outcomes should be tolerated” because “it is helpful for judges to . . . see how different approaches operate in practice and to debate with their colleagues about which approach works best,” which must be achieved through debate “among the panels of the court”).

198. See Sunstein et al., *supra* note 45, at 348; see also Emerson H. Tiller & Frank B. Cross, Colloquy, *A Modest Proposal for Improving American Justice*, 99 COLUM. L. REV. 215, 215 (1999) (arguing that each appeals panel should include at least one Democrat and one Republican appointee).

199. See, e.g., Lisa Larrimore Ouellette, *Patent Experimentalism*, 101 VA. L. REV. 65, 75–84 (2005) (reviewing the empirical literature and concluding

A mix of views is arguably best in view of such uncertainty due to the moderating effect of viewpoint diversity.²⁰⁰ And a mix of views seems particularly important where, like here, just one court has nationwide jurisdiction over appeals in the relevant area of law, to ensure the law does not become too stale and uniform.²⁰¹ But decisionmaking based on patent ideology has its drawbacks as well. For starters, such decisionmaking leads to additional uncertainty surrounding how cases will be resolved. In addition, too much patent ideology in decisionmaking would diminish the benefits of having a specialized court because such decisionmaking leaves too little room to reason towards better results based on the judges' superior expertise.²⁰²

In addition, it seems unlikely that any particular interest group has captured the Federal Circuit. If an interest group had, it would seem that the judges would more uniformly lean in a pro-patentee or pro-challenger direction.

The results further show that there can be significant divides in the judiciary concerning an area of law that are not explained by political affiliation. This observation undercuts the assumption made by scholars in the literature that if political affiliation does not predict voting in an area of law, that area of law must either be clear and binding, or there must be a near-consensus about the appropriate principles.²⁰³

other than for certain cancer drugs, “the evidence is more ambiguous on whether patents even provide a net incentive for innovation, much less whether their total welfare effect is positive”); Bronwyn H. Hall & Dietmar Harhoff, *Recent Research on the Economics of Patents* 12 (Nat'l Bureau of Econ. Rsch., Working Paper No. 17773, 2012) (concluding that “the effectiveness of the patent system in encouraging innovation” has “proved difficult to answer empirically, largely because of the absence of real experiments”); Adam B. Jaffe, *The U.S. Patent System in Transition: Policy Innovation and the Innovation Process*, 29 RES. POL'Y 531, 531 (2000) (“[R]obust conclusions regarding the empirical consequences for technological innovation of changes in patent policy are few.”).

200. See Sunstein et al., *supra* note 45, at 349; Tiller & Cross, *supra* note 198, at 215; Mark Kelman et al., *Context-Dependence in Legal Decision Making*, in BEHAVIORAL LAW AND ECONOMICS 61, 61 (Cass R. Sunstein ed., 2000).

201. See Nard & Duffy, *supra* note 133, at 1620–26; Dreyfuss, *supra* note 197, at 775.

202. See Chad M. Oldfather, *Judging, Expertise, and the Rule of Law*, 89 WASH. U. L. REV. 847, 862–63 (2012).

203. See, e.g., SUNSTEIN ET AL., *supra* note 45, at 60–62.

Although the pro-patentee versus pro-challenger divide is not greatly explained by whether the judges have patent-related experience prior to joining the bench, there is evidence from the vote-level regressions that judges with a technical background are, on average, a bit more pro-patentee.²⁰⁴ Because the greatest expertise-related gains are likely to come from judges with prior patent-related experience, to the extent that voting and decisionmaking is tied to such experience, increasing the patent-related experience on the bench will likely also, on average, increase the degree to which the Federal Circuit is pro-patentee. Furthermore, because the Federal Circuit always comprises many judges who have prior patent experience, that fact could be one reason the Federal Circuit is pro-patentee, on average.

This study also illustrates how powerful panel effects can be, considering they persist at the Federal Circuit despite numerous reasons to believe that they may not exist in this context, including that all judges eventually become experts on patent law and undoubtedly believe that patent law is important. Considering patent cases comprise approximately half of the Federal Circuit's caseload (and likely more than half of the workload),²⁰⁵ and given the judges' likely desire to remain collegial, along with the low probability that a dissent will ultimately impact the outcome of the case, it may be that it's not possible or desirable for most judges to voice all their disagreements.

Because voting and decisionmaking is most disparate in precedential cases, and because much of the prior literature focused on precedential cases, the results in that literature might tend to overstate the impact of the identities of the judges on decisionmaking.

All judges' proportion of pro-patentee precedential votes exceeded the judges' proportion of pro-patentee nonprecedential and summarily affirmed votes.²⁰⁶ Relatedly, when analyzing panels based on the number of observed pro-patentee judges hearing the appeal, for all panel compositions, decisionmaking

204. See *supra* Table 6.

205. See Gugliuzza, *supra* note 165, at 1461 (indicating that patent cases make up 43 percent of Federal Circuit cases).

206. See *supra* Part II.C.1.

was most pro-patentee in precedential cases and most pro-challenger for summary affirmances.²⁰⁷ The reason behind these observations is unclear. One reason could be that because the Supreme Court's most influential patent decisions in recent years have favored the patent challenger,²⁰⁸ all judges (even the most pro-challenger ones) believe there is a greater need to clarify the circumstances under which a patent owner should win.²⁰⁹ Another reason might be that because, as many scholars have suggested, the Federal Circuit is pro-patentee on balance, it may be more difficult for even decidedly pro-challenger panels to issue pro-challenger precedential opinions without a threat of being reversed en banc.

Looking at the data overall, patentees win more frequently (and patent challengers less frequently) in precedential and nonprecedential written decisions than in summarily affirmed decisions. Specifically, patent owners win 22.2% of the time overall, but the values are 33.9%, 21.6%, and 13.9% in precedential, nonprecedential, and summarily affirmed cases, respectively.²¹⁰ In the context of patentable subject matter cases, Paul Gugliuzza and Mark Lemley argued that such asymmetry could, over time, skew substantive law in a pro-patentee direction and, at a minimum, provides an inaccurate picture of how the Federal Circuit decides cases.²¹¹ Based on the results here, the same could be true for patent cases more generally.

The results also support that the judges do not appear to be using Rule 36 to bury decisions that come out against their relative preferences. To the contrary, patent ideology fails to explain decisionmaking within summarily affirmed cases,²¹² which supports that the judges are utilizing summary

207. See *supra* Tables 17–18, Figure 3.

208. See *supra* note 179 and accompanying text; see also, e.g., *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 427 (2007).

209. See Gugliuzza & Lemley, *Can a Court Change the Law*, *supra* note 64, at 806 (arguing that, at least in the context of patentable subject matter decisions, the Federal Circuit may choose to designate opinions to respond to the demands of its audience).

210. The overall win rate for patent challengers is 64.7%, and that value is 46.2%, 63%, and 79.7% for each disposition type.

211. See Gugliuzza & Lemley, *Can a Court Change the Law*, *supra* note 64, at 767, 807–08.

212. If anything, judges might be slightly more likely to summarily affirm a decision coming out *in favor of* their relative patent ideology.

affirmances to dispose of easy cases for which there is little room for disagreement.²¹³ In addition, the results support that judges are not more likely to summarily affirm decisions that go against their patent ideologies, when considered as a fraction of the total number of opportunities to issue a summary affirmance. Thus, while Gugliuzza and Lemley provided some evidence that judges might be burying certain patentable subject matter cases via summary affirmance, the results here suggest that their findings might be unique to that particularly controversial area of law, or at least a limited set of areas of law. Moreover, the results show that judges are slightly more likely to summarily affirm PTAB appeals,²¹⁴ which also supports that judges are using Rule 36 appropriately, because such cases generally present questions of fact with little precedential value—i.e., case-specific questions that the court decides under a deferential standard of review.

The only (weakly) statistically significant finding relating to summary affirmances and patent ideology is that, when looking only at summarily affirmed cases, split panels with a majority pro-patentee judges were somewhat more likely to rule in favor of the patent owner than split panels with a majority pro-challenger judges.²¹⁵ Although unclear, this finding could suggest that, for split panels, the judge with the minority patent ideology sometimes agrees to side with the judges with the majority patent ideology so long as the case is summarily affirmed (so that it does not create precedent).

But it is far from clear whether this suggestion explains the data. The finding was only weakly significant and only extended to pro-patentee case outcomes. Additionally, based on this theory, we would expect split panels with a majority pro-patentee judges to summarily affirm more pro-patentee decisions than split panels with a majority pro-challenger judges. Table 21 below provides the number of pro-patentee and pro-challenger cases disposed via precedential opinion, nonprecedential opinion, and summary affirmance. While split panels with a majority of pro-patentee judges are more likely to

213. See *supra* Part II.C.2.

214. The overall summary affirmance rate was 40.2% (1088 of 2708 cases). The summary affirmance rate for PTAB appeals, however, was 47.3% (616 of 1305 cases).

215. See *supra* Part II.C.2.

summarily affirm pro-patentee cases than split panels with a majority of pro-challenger judges, the difference is not that large (56% versus 48%).²¹⁶

Table 21: Number of Unanimous Affirmances by Panel Type and Disposition

	P Prec	P Nonprec	P R36	C Prec	C Nonprec	C R36
PPP	15	6	15	15	44	85
PPC	32	24	71	88	158	334
PCC	23	35	53	99	170	351
CCC	11	6	12	29	40	92

In short, this study provides support that judges are using summary affirmances as they should: to quickly dispose of easy cases. To be sure, more research is needed to fully understand how judges utilize summary affirmances. For example, Rule 36 could be (at least arguably) misused in other ways, such as to inappropriately dodge certain legal issues.

Finally, the results indicate that authorship is more disproportionate than previously recognized, which can be problematic. Wasserman and Slack have explained that, although opinion specialization can have advantages due to the authoring judge either having or developing greater expertise in an area of law, these benefits are greatly decreased for courts that are already specialized because the judges will all gain some degree of expertise in the relevant areas of law.²¹⁷ They also explain that, because authoring judges have “a unique ability to shape the reasoning of the opinion,” a significant “concern with opinion specialization on specialized courts is that it likely increases the chances that doctrine may reflect the idiosyncratic preferences of a few judges.”²¹⁸ Another concern is that “opinion specialization in specialized courts could further intensify concerns for politicization.”²¹⁹ They reason in part that

216. Consistent with the lack of such a finding for pro-challenger cases, the panels summarily affirm pro-challenger cases at approximately the same rate (58% versus 56%).

217. See Wasserman & Slack, *supra* note 10, at 1417–21.

218. *Id.* at 1419.

219. *Id.* at 1420.

“[i]f a few judges on specialized courts also subspecialize, these judges may become overly sympathetic to the litigants they repeatedly encounter.”²²⁰

Here, because the authorship of pro-patentee opinions and pro-challenger opinions is even more disparate than authorship for patent cases generally, there may be an even greater concern that the pro-patentee and pro-challenger case law will develop to reflect the idiosyncratic preferences of just a few judges. Likewise, because pro-patentee and pro-challenger judges are writing a disproportionate number of opinions in favor of their patent ideology, that specialization could fuel increased sympathy for the litigants and case law in that direction. Moreover, because judges tend to write more opinions favoring their relative patent ideology, this authorship disparity could increase the risk that opinions will be written more broadly and more starkly in favor of the authoring judge’s patent ideology. Each of these effects could increase the divides at the court and, either in addition or alternatively, heighten the role played by the differences among the judges.

CONCLUSION

The primary purpose of this Article is to present and analyze the data concerning the impact of the identities of the judges on voting and decisionmaking at the Federal Circuit. Such data informs many important longstanding debates in patent law, including whether the experiment of providing one court with nationwide jurisdiction over patent cases is paying off, and whether summary affirmances are a useful judicial tool in the face of increasing caseloads or instead a tool that judges can use in undesirable ways. The results further show just how prevalent panel effects can be and cast doubt on certain prior assumptions in the literature, including that viewpoint differences among the judges, if they exist, would be based on political ideology.

220. *Id.*