

HOW FEDERAL CIRCUIT JUDGES VOTE IN PATENT VALIDITY CASES[†]

JOHN R. ALLISON* & MARK A. LEMLEY**

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I. INTRODUCTION

Legal realism is alive and well among patent lawyers. Patent lawyers—at least those who regularly practice before the Federal Circuit—are firmly convinced that the outcome of their case depends on the panel they draw. They prepare “judge charts” outlining how each judge has voted on each of the relevant cases. They summarize the state of the law by “counting noses”—that is, by seeing how many different judges (and which ones) have signed off on a controversial legal doctrine. And they tailor their oral arguments to particular judges, because they think that who is on the panel matters greatly to the outcome.¹

We recently studied the outcomes of every final written patent validity decision at both the district court and Federal Circuit levels between 1989 and 1996.² The study produced a variety of interesting statistics on patent validity questions. Using the dataset from that study, and matching it with the panels serving on each appellate

† © 2000 John R. Allison & Mark A. Lemley.

* Spence Centennial Professor of Business Administration, Graduate School of Business, University of Texas at Austin.

** Professor of Law, Boalt Hall, University of California at Berkeley; of counsel, Fish & Richardson P.C.

1. Indeed, the Federal Circuit is sufficiently cognizant of this possibility that the court refuses to divulge the names of the judges on any given panel until the morning of oral argument. See Mary L. Jennings, *Should Advocates Be Informed of the Identities of Members of Judicial Panels Prior to Hearings?*, 6 FED. CIR. BAR. J. 41 (1996) (noting this practice); see also Hon. Howard T. Markey, 100 F.R.D. 499, 511-12 (1983) (“It isn’t necessary to notify counsel regarding who will be sitting; and it is a little demeaning, frankly . . . when lawyers go running around psychoanalyzing judges by reading the tea leaves in their opinions ahead of time.”). In our experience, this may have forced attorneys to prepare and brief their case more broadly, but it has not prevented them from working feverishly to match their oral argument to the panel they draw.

2. See John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AM. INTELL. PROP. L. ASS’N Q.J. 185 (1998).

case, we describe in this paper how individual Federal Circuit judges voted in patent validity cases during that period.

The results may surprise many patent litigators. While there are some interesting differences in voting patterns, our overall conclusion is that the votes of Federal Circuit judges during this period defied easy description. Judges do not fit easily into “pro-patent” or “anti-patent” categories, or into “affirmers” and “reversers.” We think this is a good thing for the court system.³ Still, there are some interesting facts to be found in the data.

II. DESCRIPTION OF THE STUDY

A. Population

The population for this study is described in detail in our prior study, and we refer the reader there for a full description.⁴ In brief, the population we chose for this study includes all written, final patent validity decisions by the Federal Circuit reported in the U.S.P.Q. during an almost eight-year period from early 1989 through 1996. This is a population, not a sample: every opinion is included, whether or not it was designated “for publication” under the Federal Circuit rules. However, the population is limited to validity decisions relating to issued U.S. patents. It does not include infringement decisions, unenforceability decisions, internal appeals from the PTO, or appeals from the United States International Trade Commission. Further, the population is limited to *final* validity decisions, and does not include cases that remand the validity issue for further factfinding. Finally, the measure of our study is by patent, not by case. Thus, if a judge votes to hold two different patents invalid in a single opinion, that single opinion counts as two different invalidity findings in our study.⁵

3. As one Federal Circuit judge wrote to us after reading our prior study, “I am not sure whether the article will affect the way I make decisions: in fact, I think it will not, as I like to think I am neutral when it comes to issues like pro or con patent . . .” This strikes us as an eminently sensible position.

We are also conscious of Judge Wald’s caution that “[j]udging is a complex, case-specific, and subtle task that defies single-factor analysis; reducing the process to the level of checking a box on a ballot discredits the responsibility with which federal judges have been entrusted.” Hon. Patricia M. Wald, *A Response to Tiller and Cross*, 99 COLUM. L. REV. 235 (1999). We think our findings are perfectly consistent with this hypothesis, and it is certainly not our intention to suggest that any judges vote in a mechanical or predictable way.

4. See Allison & Lemley, *supra* note 2, at 194-205.

5. Strictly speaking, the appropriate measure of a decision in a patent case should be claim by claim. However, as we reported in our earlier study, courts almost never hold one claim of a patent valid and a second claim of the same patent invalid. See *id.* at 227-28 (such “claim disaggregation” occurred in only one case during the period 1989 through 1996). Thus, the two measures are essentially equivalent.

For each of the Federal Circuit decisions in the population, we have collected a variety of information about the decision.⁶ For purposes of this study, we measured several new variables:

- We define “participation” in a case as a judge having served on the panel that produced a decision in our population, and having either written or signed onto the majority opinion, or written or signed onto a concurrence or dissent. In most cases, a single opinion on a single patent involved the participation of three judges. However, some cases are decided by more than three judges (*en banc* opinions), and some cases involve the participation of only two Federal Circuit judges (because the third judge sat by designation from another court).
- We define the writing of an “opinion” regarding the validity of a patent to include not only majority opinions, but also concurrences and dissents. For obvious reasons, majority opinions and dissents are treated differently in determining whether a particular judge wrote an opinion finding validity or invalidity. A dissenting vote is normally counted as a vote opposite the majority opinion (thus, an opinion dissenting from a finding of validity is considered an opinion in favor of validity). However, where the dissent is on an unrelated issue, it has not been counted in the total.⁷

B. Methodology and Limitations

We used two different statistical approaches to evaluate the data we have collected. Because we have defined a population and included all the members of that population in our data set, the normal tests designed to evaluate the statistical significance of data do not apply. Within the population, all the numbers we reproduce here are by definition “statistically significant.”⁸ Thus, the majority of the data we discuss are descriptive statistics about the population, such as what percentage of patents a particular judge voted to hold invalid and how many jury verdicts a particular group of judges affirmed. These descriptive statistics also include data relating one variable to another, for example, comparing how judges appointed at different times voted in validity cases. These statistics are interesting for what they reveal about the population of Federal Circuit validity decisions

6. The complete list of data we evaluated can be found at *id.* at 198-201.

7. In one case, Judge Newman both wrote the majority opinion as to the validity of a patent on some issues, and dissented from that opinion. After evaluating the opinions, we have treated that vote as effectively being a dissent.

8. This is a term of art. Unlike a sample study, all differences found in a population study are statistically significant. Such differences may nevertheless be small enough for the reader to consider them practically unimportant.

during a recent eight-year period. As a matter of statistical inference, however, they do not *predict* anything about future cases.

Because we are also interested in the predictive significance of the data we have collected, we have also evaluated certain questions in the data set in a second way. This second approach defines our population as a subset of an indeterminate “superpopulation” consisting of final reported Federal Circuit patent validity decisions across a range of time. We then apply the techniques of statistical inference to the population to test a number of hypotheses about the relationship between various factors in the superpopulation. We detail the results in the next Part.

There are of course many limitations and biases inherent in a study of this type. We describe a number of these in detail in our prior study.⁹ Among the most important caveats from that study are the subject matter bias introduced by excluding appeals from the PTO, the high rate of affirmance resulting from our exclusion of remands from the population,¹⁰ and the presence of multiple causative facts specific to particular cases which can’t effectively be taken into account in a study of this type.¹¹ This last point is particularly important. We test the final outcome of the case. Judges may agree on the final outcome even though they disagree on the reason. Thus, the coarseness of the data we test here may mask some substantive legal differences among the judges.¹²

An additional bias may result from the nature of the appellate process. Courts of appeals are more likely to write and publish opinions in cases in which they reverse the district court than in cases in which they affirm, for the simple reason that at least some affirmances can rely heavily on the prior opinion of the district court. To some extent we control for this bias, since our study includes written opinions designated “not for publication” as well as published opinions. However, our study does not include one-word or one-paragraph “summary affirmances” that are not published in U.S.P.Q.¹³ Because summary affirmances are more likely than summary reversals,

9. *See id.* at 202-05.

10. In particular, this may bias the analysis of whether particular judges are likely to defer to the district court. A judge who was generally unwilling to reverse outright, but who frequently voted to remand a case for further fact-finding, might appear in the study to have a high affirmance rate because of the exclusion of remands.

11. On the other hand, one of the biases we noted in the prior study—the exclusion of unwritten decisions by juries—is not a problem for this study, which focuses only on Federal Circuit decisions.

12. This is less of a problem than it might be, however, because we also test each of the grounds for holding a patent valid or invalid. *See infra* Part III.F.

13. *See* Fed. Cir. R. 36 (providing for summary affirmances).

studying only cases in which an opinion was written may give a skewed perspective of the actual disposition of cases.¹⁴

Finally, an important new caveat results from the nature of this study. We are evaluating the results reached by individual judges. We do not consider it possible or appropriate to define a “superpopulation” of past and future decisions by that particular judge. The decisions of an individual judge can be influenced by a myriad of factors, either personal or specific to the case at hand. As a result, we wish to emphasize that *we are not attempting to predict how individual judges will vote in the future*. Rather, we offer only descriptive statistics regarding how those judges have voted in the past. Those who use our descriptive statistics to predict future decisions do so at their own risk, and should understand that their projections from this data do not carry any particular statistical weight.

III. RESULTS

A. *Judges in the Population*

Twenty-two Federal Circuit judges (active or senior status) participated in at least one final patent validity decision during the period of our study.¹⁵ As of this writing (October 1999), nine active judges¹⁶ and five senior judges¹⁷ in our study remained on the bench. Some of the judges in our study participated in relatively few cases, for a variety of reasons: some died or left the bench sometime after the study began; others were appointed during the period of the study; still others took senior status and did not have a full docket during this period. As a result, seven of the judges in the study participated in fewer than ten decisions during this period.¹⁸ The remainder participated in somewhere between ten and forty-two decisions in our population. Of the twenty-two participating judges, eighteen wrote at least one opinion included in our study.¹⁹ The me-

14. This problem could also affect the data on patent validity, but only if it were the case that the Federal Circuit were more likely to summarily affirm district court decisions of validity than decisions of invalidity.

15. They are: Judges Archer, Baldwin, Bennett, Bissell, Bryson, Clevenger, Cowen, Friedman, Lourie, Markey, Mayer, Michel, Miller, Newman, Nichols, Nies, Plager, Rader, Rich, Schall, Skelton, and Smith.

16. They are: Judges Mayer, Newman, Michel, Plager, Lourie, Clevenger, Rader, Schall and Bryson. Judges Gajarsa, Linn, and Dyk were appointed to the bench on or after July 31, 1997, after the ending date of our study, and did not participate in any cases in our population. Judge Rich died in June 1999, after this study was completed but before it was published.

17. They are: Judges Cowen, Skelton, Friedman, Smith and Archer. Judge Gibson, currently senior status, did not participate in any cases in our population.

18. They are: Judges Baldwin (3), Bissell (4), Cowen (8), Miller (2), Nichols (1), Skelton (5) and Smith (8).

19. The judges who did *not* write an opinion are Judges Cowen, Friedman, Miller, and Skelton.

dian number of opinions was fairly low, however. Only six judges wrote ten or more opinions.²⁰ The full list of participations and opinions is reprinted in Table 1.

TABLE 1
Participation and Authorship of Opinions

Judge	# participating	Majority/ Concurrence	Dissent	Total Authored
Archer	36	7	2	9
Baldwin	3	2	0	2
Bennett	16	2	0	2
Bissell	4	1	2	3
Bryson	11	2	0	2
Clevenger	31	8	0	8
Cowen	8	0	0	0
Friedman	10	0	0	0
Lourie	42	31	0	31
Markey	21	11	0	11
Mayer	31	5	1	6
Michel	38	10	1	11
Miller	2	0	0	0
Newman	41	20	4	24
Nichols	1	0	1	1
Nies	21	5	0	5
Plager	20	2	1	3
Rader	29	8	2	10
Rich	23	12	0	12
Schall	15	2	0	2
Skelton	5	0	0	0
Smith	8	1	0	1

20. They are: Judges Lourie (31), Markey (11), Michel (11), Newman (24), Rader (10) and Rich (12).

In addition to analyzing the votes of individual judges, we also defined groups of judges on three different grounds. First, we distinguished those judges appointed to the bench before the creation of the Federal Circuit from those appointed thereafter. Because some have argued that the Federal Circuit was created to strengthen patent rights, it is possible to argue that judges appointed to the Federal Circuit should tend to be more “pro-patent” than judges already on the bench at the time of its creation. Distinguishing pre-1982 and post-1982 appointments allows us to evaluate this supposition. When the Federal Circuit was created in 1982, sitting judges from the Court of Customs and Patent Appeals and the Court of Claims were appointed to the new court. Eleven of the twenty-two judges in the study were appointed to the Federal Circuit in this way, and constitute the group of judges “appointed before 1982.”²¹ The remaining eleven judges were appointed to the Federal Circuit directly after 1982.²²

Second, we defined a group of judges with some patent background or experience before joining the court, and distinguished them from judges without any such patent background. Generally speaking, we defined a judge as having a patent background if they had regularly practiced patent law, or if they had scientific or technical expertise. Six of the twenty-two judges in the study had a patent background; fifteen did not.²³ We should emphasize that this division is made only on the basis of patent law experience prior to joining the court, not on any expertise developed since that time. One might

21. They are: Judges Baldwin, Bennett, Cowen, Friedman, Markey, Miller, Nichols, Nies, Rich, Skelton, and Smith.

22. They are: Judges Archer, Bissell, Bryson, Clevenger, Lourie, Mayer, Michel, Newman, Plager, Rader and Schall.

23. The judges with patent law backgrounds are:

Judge Baldwin, who has a degree in biology and served on the Court of Customs and Patent Appeals from 1968 until 1982;

Judge Lourie, who has an advanced degree in chemistry, was corporate counsel for SmithKline Beecham, practiced and wrote about patent law before his appointment;

Judge Markey, who has an advanced degree in patent law, practiced patent law before his appointment, wrote about patent law, and served on the Court of Customs and Patent Appeals from 1972 until 1982;

Judge Newman, who has an advanced degree in chemistry, was a research chemist and a patent lawyer before her appointment;

Judge Rader, who was counsel to the Senate subcommittee on patents, copyrights and trademarks, and has written on patent law; and

Judge Rich, who helped draft the 1952 Patent Act, taught and practiced patent law, and served on the Court of Customs and Patent Appeals from 1956 until 1982.

We based this information on our review of judicial biographies in 2 ALMANAC OF THE FEDERAL JUDICIARY Fed. Cir. 1-15 (1999); MARIE T. HOUGH ET AL., THE AMERICAN BENCH: JUDGES OF THE NATION (5th ed. 1989/1990); and our conversations with former law clerks to the judges.

We did not include Judge Nies in this group, because while she had prior intellectual property experience, it was apparently not patent-related.

plausibly argue that judges with a patent background will approach patent cases differently than those without such a background.

Finally, we divided judges into two groups based on the political party of the president that appointed them. We have labeled these groups “Republican” and “Democrat,” though we emphasize that it is the *President’s* party affiliation, and not necessarily the judge’s, that is recorded. This division reveals that the Federal Circuit was an overwhelmingly Republican court during the period of our study. Fourteen of the twenty-two judges were appointed by Republican presidents²⁴ and eight by Democratic presidents.²⁵ Six of the eight Democratic judges, however, were on senior status during the entire period of the study. Of the remaining two, one (Judge Nies) died shortly after the study period ended, and the other (Judge Bryson) was appointed only near the end of the period studied.²⁶ As a result, Republican-appointed judges accounted for 349 out of 416 participations in the study (83.9%) and wrote 132 out of 143 opinions (92.3%).²⁷

B. Patent Law Specialization

One of the most striking findings about Federal Circuit decisions in validity cases is the apparent specialization of the court. A relatively small number of judges have taken responsibility for writing a large proportion of the patent opinions the court produces.

Our study includes 416 “participations” and 143 opinions altogether. Participation in a patent case is presumably random, determined on the basis of which judges happen to be assigned to a panel. But by measuring the number of patent validity opinions a judge writes, we can get a sense of that judge’s level of involvement in patent law.

Judges appointed before 1982 wrote about the same percentage of opinions as judges appointed after 1982. Judges appointed before 1982 accounted for 118 out of 416 participations in the study (28.4%), and for 34 out of 143 opinions (23.8%)—slightly less than would be predicted by chance. By contrast, judges who had patent experience

24. They are: Judges Archer, Bennett, Bissell, Clevenger, Lourie, Markey, Mayer, Michel, Miller, Newman, Plager, Rader, Rich, and Schall.

25. They are: Judges Baldwin, Bryson, Cowen, Friedman, Nichols, Nies, Skelton, and Smith.

26. President Clinton has appointed three additional active judges since this study ended (Judges Gajarsa, Linn and Dyk).

27. Because the court is so heavily Republican, we have not attempted the sort of partisan analysis of decisions that Tiller and Cross have done elsewhere. *See, e.g.*, 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 (1998). In any event, we suspect that determinations of patent validity are not often ones that stir the partisan spirit. *Cf.* Wald, *supra* note 3, at 237 (“A large proportion of [D.C. Circuit] cases have no apparent ideology to support or reject at all.”).

before joining the court accounted for only 159 out of 416 participations (38.2%), but wrote 90 out of 143 opinions (62.9%). This fact strongly suggests that judges with patent experience are more likely to be assigned to write the majority opinion.²⁸ The data are presented in Table 2.

TABLE 2
Participation and Authorship of Opinions

Judge	# participating	Majority/ Concurrence	Dissent	Total Authored
Pre-82	118	33	1	34
Post-82	298	96	13	109
Patent Back	159	84	6	90
No Patent Back	257	45	8	53

This pattern continues when one looks at individual judges on the court. A few judges seem to write opinions in a disproportionate number of cases. Among patent-experienced judges, for example, Judge Lourie wrote opinions in 31 out of the 42 cases in which he participated (73.8%). Judge Markey wrote 11 opinions in 21 cases (52.4%), Judge Newman wrote 24 opinions in 41 cases (58.5%), and Judge Rich wrote 12 opinions in 23 cases (52.2%). By contrast, Judge Plager wrote only 3 opinions in 20 cases (15.0%), Judge Schall wrote 2 opinions in 15 cases (13.3%), and Judge Mayer wrote 6 opinions in 31 cases (19.4%).

The result is that—at least if we measure influence by opinions²⁹—a relatively small number of judges have a significant influence on the course of patent validity law. Judge Lourie and Judge Newman between them wrote 55 out of the 143 opinions in the study (38.5%); just five judges (Judges Lourie, Newman, Rich, Michel and Markey) wrote 89 out of the 143 opinions (62.2%).

C. Validity

One of the most common assumptions among patent lawyers is that different judges have different inclinations to uphold the validity of a patent. We tested the groups we identified, as well as indi-

28. While some of this difference could perhaps be explained by the greater interest of such judges in writing concurrences and dissents, the numbers are even more striking if one counts only majority opinions. Judges with patent experience wrote 89 out of 129 majority opinions (69.0%).

29. On opinion-writing as a measure of judicial influence, see William M. Landes, Lawrence Lessig, & Michael Solimine, *Judicial Influence: A Citation Analysis of Federal Courts of Appeals Judges*, 27 J. LEGAL STUD. 271 (1998).

vidual judges, to see whether their validity votes differed significantly.

Among the groups we identified, validity votes were remarkably consistent. Judges appointed before 1982 voted to hold a patent valid 62 times out of 118, or 52.5% of the time. Judges appointed after 1982 voted to hold a patent valid 164 times out of 298, or 55.0% of the time. While judges appointed to the Federal Circuit, with its widely asserted pro-patent orientation,³⁰ did vote slightly more often to uphold the validity of a patent than their predecessors, the numbers are quite similar. The Federal Circuit *did* hold patents valid much more often than its predecessor courts,³¹ but the difference cannot be attributed to judges appointed to that court at different times.

Nor is there a significant difference in the voting patterns of judges with and without patent experience. Judges with prior patent experience voted to uphold the validity of the patent 92 times out of 159, or 57.9% of the time, while judges without patent experience voted to hold a patent valid only 134 times out of 257, or 52.1% of the time. While judges with patent experience were somewhat more likely to find a patent valid than judges without such experience, the difference is not major. It certainly doesn't appear to justify any robust conclusions on the role of patent expertise in influencing outcomes.

In the superpopulation, we tested two hypotheses relating to group validity voting patterns:

Hypothesis 1. There is no difference in the likelihood that judges appointed before 1982 and judges appointed after 1982 will vote to hold a patent valid rather than invalid.

We used the *Chi*-square test, and the p-value for hypothesis 1 was 0.621, indicating that we could not reject this hypothesis and therefore could not confidently predict that year of appointment influenced validity voting.³²

30. See, e.g., Rochelle Cooper Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, 64 N.Y.U. L. REV. 1 (1989); Donald R. Dunner, *The United States Court of Appeals for the Federal Circuit: Its First Three Years*, 13 AIPLA Q.J. 185 (1985); Robert P. Merges, *Commercial Success and Patent Standards: Economic Perspectives on Innovation*, 76 CAL. L. REV. 803, 822 (1988).

31. Our prior study found that patents were held valid in the courts 54% of the time. Allison & Lemley, *supra* note 2, at 205. Decisions by the Federal Circuit upheld validity approximately 52% of the time. See *id.* at 241, Table 15 (counting affirmances and reversals of trial court validity and invalidity decisions). By contrast, prior studies showed only about a 35% validity rate. See GLORIA K. KOENIG, PATENT INVALIDITY: A STATISTICAL AND SUBSTANTIVE ANALYSIS 4-18 to 4-19, 4-22 to 4-23 (rev. ed. 1980).

32. A hypothesis can be rejected with 95% confidence if the p-value is less than 0.05, and with 90% confidence if the p-value is less than 0.1. P-values greater than 0.1 indicate that the null hypothesis cannot be rejected.

Hypothesis 2. There is no difference in the likelihood that judges with a patent law background and judges without such a background will vote to hold a patent valid rather than invalid.

The p-value for hypothesis 2 was 0.466, indicating that we could not reject this hypothesis and therefore could not confidently predict that patent law experience influenced validity voting.

We also investigated the voting patterns of individual judges. Here, too, it was very difficult to categorize judges as either “pro” or “anti”-patent. Of the fourteen judges who participated in more than 10 validity decisions, the majority came quite close to the average validity participation rate of 54.3%.³³ [The complete votes and percentages are detailed in Table 3]. There were only a few outliers. On the side of invalidity, Judge Mayer voted to hold a patent valid in only 12 cases out of thirty-one, or 38.7%, and Judge Markey voted to hold a patent valid in only nine cases out of twenty-one, or 42.9%. On the side of validity, Judge Newman voted to hold a patent valid in thirty-one cases out of forty-one, or 75.6%, Judge Plager voted to hold a patent valid in fourteen cases out of twenty, or 70.0%, and Judge Rader voted to hold a patent valid in nineteen cases out of twenty-nine, or 65.5%. Even these outliers don’t seem to support the characterization of the judges involved as necessarily “pro” or “anti”-patent, particularly given the small number of cases for each judge. Rather, the numbers suggest to us that a judge’s opinions about patent validity are complex and case-specific and are not prone to generalization.

We tested the following hypothesis in the superpopulation:

Hypothesis 3. There is no difference in the likelihood that Judges Archer, Baldwin, Bennett, Bissell, Bryson, Clevenger, Cowen, Friedman, Lourie, Markey, Mayer, Michel, Miller, Newman, Nichols, Nies, Plager, Rader, Rich, Schall, Skelton, or Smith will vote to hold that a patent is valid rather than invalid.

The p-value for hypothesis 3 was 0.404, indicating that we could not reject this hypothesis and therefore could not confidently predict that individual judges vote differently in validity cases.

33. This rate differs slightly from the overall decision rate identified in the first study because we are measuring participations, not cases, as the denominator. The ratios may differ because some decisions included a dissent, because some cases were decided en banc, and because some cases were decided with the participation of only two Federal Circuit judges.

TABLE 3
Votes on Validity

Judge	# participating	# patent valid	% patent valid
Archer	36	18	50.0
Baldwin	3	1	33.3
Bennett	16	8	50.0
Bissell	4	2	50.0
Bryson	11	6	54.5
Clevenger	31	16	51.6
Cowen	8	5	62.5
Friedman	10	7	70.0
Lourie	42	21	50.0
Markey	21	9	42.9
Mayer	31	12	38.7
Michel	38	18	47.4
Miller	2	1	50.0
Newman	41	31	75.6
Nichols	1	1	100.0
Nies	21	11	52.4
Plager	20	14	70.0
Rader	29	19	65.5
Rich	23	11	47.8
Schall	15	7	46.7
Skelton	5	4	80.0
Smith	8	4	50.0
Pre-82	118	62	52.5
Post-82	298	164	55.0
Patent Back	159	92	57.9
No Patent Back	257	134	52.1

A similar story can generally be told of the opinions written by individual judges, although there is a curious exception. Of the six judges who wrote ten or more opinions on patent validity in our study, four wrote opinions on both sides with roughly equal frequency. [The complete statistics for each judge can be found in Table 4]. But two judges were outliers in opinion writing: Judge Markey, only three of whose eleven opinions upheld the validity of a patent (27.3%), and Judge Newman, who wrote twenty-four opinions, *all twenty-four* upholding the validity of a patent (100.0%). What is notable about these judges is not only that they are outside the norm,

but that their written opinions were more skewed towards one outcome than their overall voting patterns.

We tested the following hypothesis in the superpopulation:

Hypothesis 4. There is no difference in the likelihood that the Federal Circuit will find a patent valid rather than invalid when Judges Archer, Baldwin, Bennett, Bissell, Bryson, Clevinger, Lourie, Markey, Mayer, Michel, Newman, Nies, Plager, Rader, Rich, Schall, or Smith writes the court's majority opinion.

The p-value for hypothesis 4 was 0.001, indicating that the hypothesis was rejected with great confidence. We can therefore predict that who writes the majority opinion *is* related to whether the court finds the patent valid.³⁴

Despite a small number of judges with patterns that deviate from the norm, the pattern we discern in Federal Circuit judges' votes as to validity is not one of a court divided on broad questions of validity.³⁵ Rather, the overwhelming majority of judges show no leaning whatsoever for or against the validity of the patent. And those few judges who did tend to vote one way or the other for the most part showed only a modest tendency in that direction.

TABLE 4
Opinions on Validity

Judge	Total Authored	# writing & valid	% writing & valid
Archer	9	3	33.3
Baldwin	2	0	0.0
Bennett	2	2	100.0
Bissell	3	2	66.7
Bryson	2	2	100.0
Clevenger	8	3	37.5
Cowen	0	0	0.0
Friedman	0	0	
Lourie	31	15	48.4
Markey	11	3	27.3
Mayer	6	1	16.7

34. What the hypothesis does not tell us is the precise nature of that relationship. One obvious explanation is that some judges are more likely than others to write opinions upholding the validity of the patent. However, analysis of judicial opinion patterns is complicated by the fact that the panel assigns a majority opinion to a particular judge after the panel as a whole has decided the outcome of the case. As a result, an alternative explanation is that certain judges are more likely to be *assigned* opinions in cases in which the panel has decided to hold a patent valid.

35. It does not, of course, mean that the Federal Circuit is not divided on particular questions of patent law.

Michel	11	6	54.5
Miller	0	0	
Newman	24	24	100.0
Nichols	1	1	100.0
Nies	5	3	60.0
Plager	3	2	66.7
Rader	10	4	40.0
Rich	12	7	58.3
Schall	2	0	0.0
Skelton	0	0	
Smith	1	0	0.0
Pre-82	34	16	47.1
Post-82	109	62	56.9
Patent Back	90	53	58.9
No Patent Back	53	25	47.2

D. Affirmance

We also tested the tendency of various judges and groups of judges to affirm the decision of the finder of fact. In our first study, we found an overwhelmingly high Federal Circuit affirmance rate: 86.3% of the district court decisions were affirmed, at least in part, while only 17.1% were reversed at least in part.³⁶ This high affirmance rate is an artifact of the population we have chosen, which excludes cases that are remanded for further proceedings, and therefore includes only outright reversals in the reversal statistics. For ease of comparison, we have measured the affirmance rates for individual judges and groups of judges against the benchmark participation rate of 83.6% affirmed.³⁷

Judges appointed before 1982, and those without patent experience, were slightly more likely to vote to affirm the district court than their opposite numbers. Judges appointed before 1982 voted to affirm in 103 cases out of 118, or 87.3%, while judges appointed after 1982 voted to affirm in 245 cases out of 298, or 82.2%. Judges with prior patent experience voted to affirm in 127 cases out of 159, or

36. See Allison & Lemley, *supra* note 2, at 240 & Table 14. These numbers total more than 100% because in some cases the Federal Circuit both affirmed *and* reversed the district court on different validity issues.

37. This rate differs slightly from the overall affirmance rate identified in the first study because we are measuring participations, not cases, as the denominator. The ratios may differ because some decisions included a dissent, because some cases were decided en banc, and because some cases were decided with the participation of only two Federal Circuit judges.

79.9%, while judges without prior patent experience voted to affirm in 221 cases out of 257, or 86.0%.

We tested the following hypotheses in the superpopulation:

Hypothesis 5. There is no difference in the likelihood that judges appointed before 1982 and judges appointed after 1982 will vote to affirm the district court.

The p-value for hypothesis 5 was 0.363, indicating that we could not reject this hypothesis and therefore could not confidently predict that year of appointment influenced the likelihood of affirmance.

Hypothesis 6. There is no difference in the likelihood that judges with a patent law background and judges without such a background will vote to affirm the district court.

The p-value for hypothesis 6 was 0.165. This indicates that we could not reject this hypothesis, and therefore cannot confidently predict that judges with patent law background are less likely to affirm the district court.

One can construct a plausible rationale for the modest differences that do exist in the numbers. Judges appointed to a patent-specific court, or judges with a patent background, may be more willing to substitute their judgment for that of the district court. What is striking to us, though, is not the differences but the similarities in affirmance rate. As with validity, it appears that what differences do exist in the deference groups of judges give to district courts are not major, at least when it comes down to the final decision to affirm or reverse.

That same pattern holds for the voting records of individual judges. Of the fourteen judges who voted in more than 10 cases, a majority of them were quite close to the overall affirmance participation rate of 83.6%. [The complete votes and percentages are detailed in Table 5]. There were only a few outliers. On the high affirmance side, Judge Markey voted to affirm in twenty out of twenty-one cases, or 95.2%; Judge Bennett voted to affirm in fifteen out of sixteen cases, or 93.8%; Judge Clevenger voted to affirm in twenty-nine out of thirty-one cases, or 93.6%, and Judge Mayer voted to affirm in twenty-eight out of thirty-one cases, or 90.3%. On the low affirmance side, Judge Newman voted to affirm in only thirty out of forty-one cases, or 73.2%. As with the validity votes, these outliers are notable for how close they are to the norm, suggesting that one cannot simply characterize particular judges as favoring or opposing deference to the finder of fact.

We tested the following hypothesis in the superpopulation:

Hypothesis 7. There is no difference in the likelihood that Judges Archer, Baldwin, Bennett, Bissell, Bryson, Clevenger, Cowen, Friedman, Lourie, Markey, Mayer, Michel, Miller, Newman, Nich-

ols, Nies, Plager, Rader, Rich, Schall, Skelton, or Smith will vote to affirm the district court.

The p-value for hypothesis 7 was 0.069. This indicates that the hypothesis can be rejected with 90% confidence, though not with 95% confidence. In other words, we can weakly predict that individual judges vary significantly in the likelihood that they will vote to affirm the district court.

TABLE 5
Votes on Affirmance

Judge	# participating	# affirming	% affirming
Archer	36	30	83.3
Baldwin	3	3	100.0
Bennett	16	15	93.8
Bissell	4	2	50.0
Bryson	11	9	81.8
Clevenger	31	29	93.5
Cowen	8	8	100.0
Friedman	10	10	100.0
Lourie	42	33	78.6
Markey	21	20	95.2
Mayer	31	28	90.3
Michel	38	32	84.2
Miller	2	2	100.0
Newman	41	30	73.2
Nichols	1	0	0.0
Nies	21	17	81.0
Plager	20	16	80.0
Rader	29	23	79.3
Rich	23	18	78.3
Schall	15	13	86.7
Skelton	5	2	40.0
Smith	8	8	100.0
Pre-82	118	103	87.3
Post-82	298	245	82.2
Patent Back	159	127	79.9
No Patent Back	257	221	86.0

A similar story can generally be told of the opinions written by individual judges, although as with validity there is a curious pattern. Of the six judges who wrote ten or more opinions on patent validity in our study, three wrote opinions affirming with a frequency close to

the norm. [The complete statistics for each judge can be found in Table 6]. But three judges were outliers in opinion writing: Judge Markey, all eleven of whose opinions affirmed the district court (100.0%), Judge Rich, only nine of whose twelve opinions affirmed the district court (75%), and Judge Newman, only fourteen of whose twenty-four opinions affirmed the district court (58.3%). What is notable about these judges is not only that they are well outside the norm, but that (as with validity decisions) their written opinions were more skewed away from the norm than their overall voting patterns.³⁸

We tested the following hypothesis in the superpopulation:

Hypothesis 8. There is no difference in the likelihood that the Federal Circuit will affirm the district court when Judges Archer, Baldwin, Bennett, Bissell, Bryson, Clevinger, Lourie, Markey, Mayer, Michel, Newman, Nies, Plager, Rader, Rich, Schall, or Smith writes the court's majority opinion.

The p-value for hypothesis 8 was 0.249, indicating that we could not reject this hypothesis—and therefore could not confidently predict that the court would vote differently in affirming or reversing the district court when different judges wrote the majority opinion.³⁹

Despite the fact that a few judges deviated from the norm, the pattern we discern in Federal Circuit judges' decisions to affirm or reverse is not one of a court divided on the question of the general deference to give to the district court. Rather, the overwhelming majority of judges are rather close to each other in their affirmance rates. And those few judges who did tend to vote one way or the other generally showed only a modest tendency in that direction.

38. It is also worth noting that two of the Judges who were outliers in opposite directions on validity opinions (Judges Markey and Newman) were also outliers on affirmance opinions.

39. As noted previously, decisions on who writes a majority opinion are generally made after the outcome of the case has been decided. The caveat about causation raised in that footnote is also applicable here.

TABLE 6
Opinions on Affirmance

Judge	Total Authored	# writing & affirm	% writing & affirm
Archer	9	7	77.8
Baldwin	2	2	100.0
Bennett	2	1	50.0
Bissell	3	1	33.3
Bryson	2	2	100.0
Clevenger	8	8	100.0
Cowen	0		
Friedman	0		
Lourie	31	27	87.1
Markey	11	11	100.0
Mayer	6	3	50.0
Michel	11	10	90.9
Miller	0		
Newman	24	14	58.3
Nichols	1	0	0.0
Nies	5	3	60.0
Plager	3	3	100.0
Rader	10	8	80.0
Rich	12	9	75.0
Schall	2	2	100.0
Skelton	0		
Smith	1	1	100.0
Pre-82	34	27	79.4
Post-82	109	85	78.0
Patent Back	90	71	78.9
No Patent Back	53	41	77.4

E. Finder of Fact

As a subset of affirmance decisions, we also tested whether groups of judges were more likely to affirm the findings of juries or judges. We defined three groups of “finders of fact”: juries, judges ruling after a bench trial, and judges ruling on pretrial motions.⁴⁰ We found very few differences between judges appointed before 1982 and those appointed after 1982 in how they dealt with different finders of fact. As

40. In one instance, the ruling was also made on a JMOL motion. We have excluded this patent from this calculation.

previously noted, judges appointed before 1982 were somewhat more likely to affirm than judges appointed after 1982. But that modest difference—a spread of about 4 percentage points—was consistent across all finders of fact. [A complete listing of how groups of judges voted can be found in Table 7 below].

TABLE 7
Votes on Affirmance by Finder of Fact

Judge	Jury Faced	Jury affirmed	% Jury affirmed	Bench faced	Bench affirmed	% Bench affirmed
Pre-82	42	36	85.7	56	51	91.1
Post-82	87	72	82.8	127	111	87.4
Patent Back	51	40	78.4	72	64	88.9
No Patent Back	78	68	87.2	111	98	88.3

Judge	Pretrial faced	Pretrial affirmed	% Pretrial affirmed
Pre-82	16	13	81.3
Post-82	76	60	78.9
Patent Back	32	22	68.8
No Patent Back	60	51	85.0

Judges with patent experience, by contrast, differed notably from their counterparts in how they responded to finders of fact. Judges with patent experience were less likely to defer to a jury finding. They affirmed in 40 out of 51 jury votes (78.4%), compared with 68 out of 78 votes (87.2%) for judges without patent experience. The differences are even greater with respect to pretrial motions. Judges with patent experience voted to affirm a pretrial ruling in 22 out of 32 cases (68.8%), while judges without patent experience voted to affirm a pretrial ruling in 51 out of 60 cases (85.0%). This result might be intuitive—judges with greater expertise in an area may simply be less likely to defer to a decision within their area of expertise that they think is wrong. Curiously, however, no similar relationship can be found for bench trials. In fact, judges with patent experience were almost exactly as likely to affirm a bench trial ruling than judges without patent experience: they voted to do so 64 out of 72 times

(88.9%), compared with 98 out of 111 times (88.3%) for judges without patent experience.⁴¹

These findings are weakly consistent with the hypothesis that judges with patent experience are more likely to second-guess the finders of fact. But it is difficult to explain why they would be willing to do so in reviewing jury trials and in pretrial motions, but not in reviewing bench trials. Further, the differences are simply not that great.

F. *Specific Arguments*

In our first study, we evaluated a number of different specific grounds asserted for holding a patent invalid. We have also tested how groups of judges voted on specific issues of patent law. The full results are available from the Authors; here we wish to call out only a few results.

There is a modest difference in how judges with and without patent experience treated issues of best mode.⁴² Judges with patent experience voted to reject best mode arguments (and hold the patent valid on this ground) 20 times out of 27, or 74.1%; judges without patent experience voted to reject best mode arguments only 24 times out of 39, or 61.5%. This difference, while modest, might be read to suggest that judges with patent experience have a greater tolerance for errors in disclosure. However, the number of cases is not great, and the difference in results is also modest.

There is a dramatic difference in how judges appointed before and after 1982 dealt with the category of 102 prior art cases.⁴³ Judges appointed before 1982 rejected section 102 prior art arguments (and therefore upheld the validity of the patent on this ground) 20 times out of 23 (87.0%). By contrast, judges appointed after 1982 rejected section 102 prior art arguments only 39 times out of 78 (50.0%). This strikes us as an anomalous result. We see no obvious reason for such a striking difference.

Finally, there were modest differences among both groups in the treatment of obviousness. Judges appointed before 1982 voted to reject obviousness arguments (and therefore to uphold the validity of the patent on this ground) 31 times out of 61 (50.8%), while judges appointed after 1982 rejected obviousness arguments 93 times out of

41. While we identified the numbers for individual judges as well, the number of participations in each category are sufficiently small that we are reluctant to point out any differences.

42. Section 112, ¶ 1 of the Patent Act requires the patentee to disclose the "best mode" of practicing the invention of which she is aware. These cases involve an argument that a patentee failed to do so.

43. This refers to cases involving anticipation of the invention by a prior art reference disclosing the same invention. We have distinguished 102 Prior Art from cases involving 102 Non-Art, such as statutory bars under 35 U.S.C. § 102(b).

140 (66.4%). Judges with patent experience voted to reject obviousness arguments 49 times out of 72 (68.1%), while judges without patent experience rejected obviousness arguments 75 times out of 129 (58.1%). The fact that judges appointed after 1982 and judges with patent experience were more likely to hold a patent valid over an obviousness argument may be consistent with the conventional wisdom that one of the purposes of creating the Federal Circuit was to reduce obviousness rejections in the courts of appeals.⁴⁴ Again, however, the differences are not dramatic.

As a check on the importance of these findings, we also collected information on total decisions by each group for two aggregate categories, entitled "Total 112" (all enablement, written description, indefiniteness, and best mode cases) and "Total 102/103" (all 102 art, 102 non-art, and obviousness cases) respectively. In these broad categories, there is remarkable agreement between each of the major groups tested—to within two percentage points in the case of 102/103 decisions, and within a few percentage points in the case of 112 decisions. This aggregate result reinforces our suspicion that the results reported for specific types of arguments are not particularly compelling.

IV. CONCLUSION

The high degree of convergence we observe in the voting patterns of Federal Circuit judges may be surprising to some. The Federal Circuit has come under a good deal of fire as a politically divided court that issues inconsistent opinions.⁴⁵ Several high-profile disagreements have helped bolster this impression.⁴⁶ But at least on questions of patent validity, we see little evidence of ideological divisions affecting the final outcome of cases. With a very few exceptions, judges on the Federal Circuit varied little in their votes on validity issues, and in the outcomes they reached. This may be a surprise to some who are practiced at predicting how individual judges are pre-

44. To be fair, the complaints about obviousness decisions in the courts of appeals before 1982 were generally directed to the regional circuits deciding the validity of issued patents, *not* to the decisions of the CCPA. Still, the fact that one perceived goal of the Federal Circuit was to strengthen patent rights might be thought to create an incentive on the part of newer judges to favor the patentee in doubtful cases.

45. See, e.g., Matthew F. Weil & William C. Rooklidge, *Stare Un-Decisis: The Sometimes Rough Treatment of Precedent in Federal Circuit Decision-Making*, 80 J. PAT. & TRADEMARK OFC. SOC'Y 791, 793-94 (1998); Allan N. Littman, *Restoring the Balance of Our Patent System*, 37 IDEA 545, 552 (1997).

46. See, e.g., *Hilton-Davis Chem. Co. v. Warner Jenkinson Co.*, 62 F.3d 1512 (Fed. Cir. 1995) (en banc); *Markman v. Westview Instruments*, 52 F.3d 967 (Fed. Cir. 1995) (en banc); *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994) (en banc); *In re Trovato*, 42 F.3d 1376 (Fed. Cir. 1994) (reaching a conclusion inconsistent with *Alappat* without noting the conflict), *vacated*, 60 F.3d 807 (Fed. Cir. 1995) (en banc); see also Weil & Rooklidge, *supra* note 45 (identifying a number of unresolved intra-circuit conflicts).

disposed to vote. But we think it an encouraging sign that the outcome of patent validity cases in the Federal Circuit has depended on the facts of the case, and not on the composition of the panel.