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** Professor of Law, University of Pennsylvania Law School. The authors wish to thank John Duffy, Greg Mandel, Michael Carroll, Bill Araiza, and participants at the Intellectual Property Scholars Conference 2006 for helpful comments on earlier drafts.
It is by now a cliche to suggest that the United States Court of Appeals for the Federal Circuit has weakened the standards for obtaining patents. In this Article, we empirically assess that court’s performance on the ultimate question of patentability—the requirement that a patentable invention must be “nonobvious.” Our findings suggest that the conventional wisdom may not be well grounded, at least on this measure.

Nowhere is the Federal Circuit’s controversial role as the locus of judicial power in the U.S. patent system more evident than in the context of the doctrine of obviousness under 35 U.S.C. § 103. The determination of whether an invention was “obvious” to “a person having ordinary skill in the art” at the time the invention was made is the foundation of patentability—and thus at the very core of the patent bargain. And the issue’s status as a question of law, as well as the spare statutory language, means that the law of obviousness is entirely a creation of the courts.

In the study reported here, we systematically examined the Federal Circuit’s doctrine of obviousness. Using empirical data collected from a novel data set spanning more than fifteen years of jurisprudential pronouncements, we suggest that the Federal Circuit has developed a doctrine in this area that is relatively stable and appears reasonably predictable. Indeed, contrary to much recent commentary, these results suggest that the Federal Circuit’s doctrinal tool kit—especially the much-discussed (and oft-maligned) “teaching, suggestion, or motivation” test for combinations of references—has not had a significant observable effect on the results of obviousness cases at that court.

Although this study falls short of painting a complete picture of the Federal Circuit’s performance with respect to patentability, the view that emerges is of a modern jurisprudence of obviousness that is more stable, more consistent, and more flexible than has been heretofore understood. These results, then, should give pause to those who argue for a radical reshaping of the Federal Circuit’s doctrine under 35 U.S.C. § 103.
I. Introduction

Nearly twenty-five years into the intentional experiment in institutional design that created it, the United States Court of Appeals for the Federal Circuit is unquestionably the most influential player in the U.S. patent system.\footnote{See, e.g., Mark D. Janis, Patent Law in the Age of the Invisible 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"). From the creation of the Federal Circuit until April 2006, the Supreme Court has granted certiorari in only sixteen patent cases. Arthur J. Gajarsa & Lawrence P. Cogswell, III, Foreword: The Federal Circuit and the Supreme Court, 55 AM. U. L. REV. 821, 822 (2006).} And as the economic significance of patents to the national economy continues to increase,\footnote{See NAT'L RESEARCH COUNCIL OF THE NAT'L ACAD., A PATENT SYSTEM FOR THE 21ST CENTURY 18–19 (Stephen A. Merrill, Richard C. Levin & Mark B. Myers eds., 2004) [hereinafter A PATENT SYSTEM FOR THE 21ST CENTURY] (acknowledging the economic importance of patents). See generally FED. TRADE COMM’N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY (2003), available at http://www.ftc.gov/os/2003/10/innovationrpt.pdf [hereinafter TO PROMOTE INNOVATION] (addressing the appropriate balance between competition and patent policy to foster innovation); FRED W ARSHOFSKY, THE PATENT WARS (1994) (noting the critical nature of patents in economic development).} the central role played by the Federal Circuit has become increasingly visible,\footnote{See, e.g., NTP, Inc. v. Research in Motion, Ltd., 418 F.3d 1282 (Fed. Cir. 2005) (adjudicating a patent infringement lawsuit against the makers of the BlackBerry wireless email system).} pronounced,\footnote{See Christian A. Chu, Empirical Analysis of the Federal Circuit’s Claim Construction Trends, 16 BERKELEY TECH. L.J. 1075, 1098 (2001) (noting that the Federal Circuit’s reversal rate hovers around 50%).} and controversial.\footnote{See Teleflex, Inc. v. KSR Int’l Co., 119 F. App’x 282 (Fed. Cir. 2005) (vacating the district court’s grant of summary judgment on the ground of obviousness), rev’d, 127 S. Ct. 1727 (2007); see, e.g., MercExchange, L.L.C. v. eBay, Inc., 401 F.3d 1323 (Fed. Cir. 2005) (reversing the district court’s denial of a permanent injunction against infringement), vacated, 126 S. Ct. 1837 (2006); see also, e.g., Brief for the United States as Amicus Curiae at 16, KSR Int’l Co. v. Teleflex, Inc., 126 S. Ct. 2965 (2006) (No. 04-1350) [hereinafter Brief for the United States] (stating that the Federal Circuit’s obviousness jurisprudence “renders patent examination and litigation more costly, grants patent applicants unjustified rewards for disclosing non-innovative subject matter, and forecloses competitors from using the public storehouse of knowledge that should be freely available to all”); Brief of Twenty-Four Intellectual Property Law Professors as Amici Curiae in Support of Petitioner at 2, KSR Int’l Co. v. Teleflex, Inc., 126 S. Ct. 2965 (2006) (No. 04-1350) [hereinafter Professors’ Brief] (characterizing the Federal Circuit’s obviousness jurisprudence as “at odds with the statutory language, inconsistent with [the Supreme] Court’s precedent, and contrary to the goals of the patent system”). For some information concerning practitioner complaints, see, for example, Paul R. Michel, The Court of Appeals for the Federal Circuit Must Evolve to Meet the Challenges Ahead, 48 AM. U. L. REV. 1177, 1182–85 (1999) (addressing the debate over the Federal Circuit’s increasing role).} Nowhere is the importance of the Federal Circuit more apparent—and more discussed—than with respect to the standards for patentability, the fundamental requirements for obtaining a patent grant. In this context, the court is cast in two critical roles: as the oversight authority for the administrative body that grants patents (the U.S. Patent and Trademark Office (PTO)) and as the sole appellate authority for litigated disputes involving already-issued patents. In determining patentability, perhaps more than in
any other aspect of the patent system, the centralization of legal power that is the core justification for the Federal Circuit\(^6\) is brought into sharp relief.

In this study, we use a novel data set and well-tested techniques to empirically assess the Federal Circuit’s performance\(^7\) in the realm of patentability—specifically with respect to the court’s doctrine of obviousness under 35 U.S.C. § 103. That section’s requirement—that a patentable invention be nonobvious to a person having ordinary skill in the art at the time the invention was made\(^8\)—is plainly the “ultimate condition of patentability,”\(^9\) and thus lies at the core of the basic quid pro quo that is the foundation of patent theory.

Assessing the law of obviousness is not only important to understanding the institutional role of the Federal Circuit; it is also of critical (and timely) importance in its own right. The scholarly and popular literature is replete with the assertion that the standards for patentability (especially obviousness) have been dramatically weakened by the Federal Circuit.\(^10\) Important recent studies of the patent system have also fingered obviousness as a particular area of policy makers’ concern.\(^11\) And perhaps most importantly, in June 2006, the United States Supreme Court granted certiorari in KSR International Co. v. Teleflex, Inc.\(^12\) to review the Federal Circuit’s approach to obviousness, most especially that court’s requirement of a teaching, suggestion, or motivation (TSM) to combine prior art references.\(^13\)

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11. See To PROMOTE INNOVATION, supra note 2, at 8–15 (reporting the testimony and writings of a number of commentators critical of the Federal Circuit’s obviousness law); A PATENT SYSTEM FOR THE 21ST CENTURY, supra note 2, at 87–94 (identifying the court’s obviousness law as in need of change).


common thread that runs through these contemporary criticisms is that the Federal Circuit’s approach to obviousness is systematically biased in favor of patentability and thus has dramatically weakened the statutory obviousness requirement.

The results we report here suggest that much of the current commentary may overstate the concerns with the Federal Circuit’s approach to obviousness. Among other results, we find the following:

1. The Federal Circuit finds patents obvious a clear majority of the time. Overall, about 58% of all analyses result in a finding of obviousness; this trend has been increasing since 1990. This ratio does not seem to be associated with broad technological areas.

2. The Federal Circuit’s teaching, suggestion, or motivation analysis does not appear to dominate the law of obviousness. We find that the TSM analysis is used less than half of the time (45%) in obviousness analyses by the Federal Circuit. Whether the TSM analysis is used seems to have no observable effect on whether the reviewed analysis is affirmed and only a modest impact (about 5%) on whether the patent is declared obvious. Even within TSM-based cases, a majority of Federal Circuit analyses (52.4%) result in a determination of obviousness.

3. The TSM analysis appears not to be an inflexible tool biased in favor of patentability. Although we find that the rate at which the TSM analysis is applied has increased substantially during the course of the study, the rate at which TSM analyses result in determinations of obviousness has also increased significantly. Further, we document a significant increase in the number of sources that the Federal Circuit uses to analyze a TSM.

4. The Federal Circuit affirms determinations of obviousness a clear majority of the time. More than 65% of the obviousness analyses reviewed by the Federal Circuit are affirmed, and the rate at which the Federal Circuit reverses or vacates obviousness decisions by the PTO has been falling steadily.

5. The PTO seems to fare no worse than the courts when having its obviousness analyses reviewed by the Federal Circuit. The overall affirmation rate for the PTO is 64%—virtually the same as the 65% average for all cases with obviousness determinations. The affirmation rate for the PTO increased during the time period of the study.

6. The Federal Circuit’s doctrine in this area seems relatively stable. During the term of the study, the reversal rate of lower tribunals’ obviousness analyses was relatively steady. The overall rate of obviousness analyses increased, though modestly.

These findings, then, while not presenting a comprehensive picture of the Federal Circuit’s performance in implementing the standards for
patentability, do offer a significant advance in understanding over the existing literature—as well as perhaps calling some recent commentary and legal filings into question. On the whole, the jurisprudence of obviousness, as developed by the Federal Circuit, appears relatively stable and increasingly flexible. At least some data suggest that the Federal Circuit has identified the TSM doctrinal formulation as a way to consistently and coherently frame the otherwise obtuse obviousness analysis. Accordingly, this long-term systematic view may help place the current debate about the law of obviousness in a more appropriate context. Finally, beyond adding objective information concerning the trends and overall developments of the Federal Circuit's obviousness jurisprudence—and some insight into the success of the court in meeting its mandate—this study both establishes the need for future work in this area and provides suggestions for the future directions of investigation in this area.

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The balance of this Article proceeds as follows. Part II reviews the doctrinal and theoretical background of the Federal Circuit and the law of obviousness under 35 U.S.C. § 103, and outlines the current controversy surrounding the court’s development of this area of the law. It also examines the Federal Circuit’s treatment of the law of obviousness. Part III sets forth the study’s design and methodologies. Part IV reports the results of the study and offers some interpretation and discussion. And Parts V and VI consider the overall implications of the results, policy prescriptions, and future directions; while Part VII addresses the current state of the jurisprudence of obviousness after the Supreme Court’s opinion in the now famous case of KSR International Co. v. Teleflex Inc., which was argued and decided during the production of this Article.

II. The Federal Circuit and the Law of Obviousness

A. The Federal Circuit: An Exercise in Institutional Design

Even from the distance of twenty-five years, there can be little dispute over what Congress thought it was doing when it created the Court of Appeals for the Federal Circuit. By the enactment of the Federal Courts Improvement Act (FCIA) of 1982, Congress unified in the Federal Circuit

14. We provide only a review because this subject has been addressed in more depth in other places. For a more in-depth discussion of the institutional design of the Federal Circuit, see Charles W. Adams, The Court of Appeals for the Federal Circuit: More than a National Patent Court, 49 Mo. L. Rev. 43 (1984), Dreyfuss, supra note 6, and Wagner & Petherbridge, supra note 7, at 1107–24.

the appellate jurisdiction for patent cases, whether from the U.S. Patent and Trademark Office, the U.S. district courts, the Court of Federal Claims, or the Court of International Trade (ITC). It did so at a time when it was widely thought that the legal infrastructure of the patent system was in disarray. Legislators were confronted with information that the interpretation of the patent law differed in different parts of the country. Studies predating FCIA revealed that a patent was more “likely to be held valid and infringed in the Fifth Circuit than in the Seventh Circuit, and almost four times more likely to be enforced in the Seventh Circuit than in the Second Circuit.” With such a legal landscape, it comes as little surprise that forum shopping in patent law was rampant, resulting in much collateral litigation. Moreover, because the decisions of the regional circuits were not binding on one another, there was little to be done but wait for the Supreme Court to rectify the situation. This did not happen, and the testimony presented to the legislators suggested that it was very unlikely that the Supreme Court would be able to unify the disparate behaviors of the regional circuits.

In light of rare Supreme Court involvement, the Patent Office and its pre-1982 reviewing court, the Court of Customs and Patent Appeals (CCPA), operated outside the influence of the regional circuits in developing the law surrounding patentability. But the law the CCPA developed concerning whether a patent should issue could not be imposed by the CCPA on the regional circuits. This left the infrastructure of patent law in an odd place: one court, the CCPA, developing and applying standards of patentability to decide whether patents should issue, and other courts, the regional circuits,

16. The authors are of course aware of the Supreme Court’s decision in *Holmes Group, Inc. v. Vornado Air Circulation Systems, Inc.*, 535 U.S. 826 (2002), which permits appeals of some patent issues to return to the regional circuits.


19. See S. REP. NO. 97-275, at 3–6, as reprinted in 1982 U.S.C.C.A.N. 11, 13–16 (discussing reports that forum shopping was common to patent litigation).

20. See id. at 5, as reprinted in 1982 U.S.C.C.A.N. 11, 15 (discussing reports that forum shopping “increases the cost of litigation and ‘demeans the entire judicial process and the patent system as well’”).

21. It is generally thought that the most likely reason for this was the size of the Supreme Court’s docket and, perhaps, a recalcitrance to take patent cases due to their high level of legal and technical difficulty. See Adams, supra note 14, at 45 (noting a higher level of certiorari petitions at the time); Dreyfuss, supra note 6, at 6 (“Perhaps because of its own docket problems and its lack of expertise, the Supreme Court rarely reviewed the patent law decisions of the regional circuits.”). This is also consistent with the Senate Report that notes that the Supreme Court “appears to be operating at—or close to—full capacity; therefore, in the future the Court cannot be expected to provide much more guidance in legal issues than it now does.” S. REP. NO. 97-275, at 3, as reprinted in 1982 U.S.C.C.A.N. 11, 13.

22. Dreyfuss, supra note 6, at 6.

23. Id.
applying disparate standards\textsuperscript{24} to determine whether a given patent should have issued. Naturally, this led to uncertainty. Patents issued by the Patent Office under laws developed in its relationship with the CCPA were later invalidated under a regional circuit’s alternative interpretation of the same laws.\textsuperscript{25}

In the time leading up to the passage of FCIA, Congress was also confronted with testimony by representatives of technologically oriented businesses confirming that patent cases were being inconsistently adjudicated.\textsuperscript{26} Moreover, the representatives of businesses that relied on the patent system contended that the legal infrastructure of the patent law had important implications for the national economy. In particular, it was contended that the uncertainty attending the then-current patent law infrastructure was harmful to innovation, and if uncertainty in the patent system could be lessened, innovation would increase.\textsuperscript{27}

After hearing the testimony, Congress determined that national uniformity in patent law was desirable. National uniformity would bring uniformity of doctrinal development,\textsuperscript{28} doctrinal stability,\textsuperscript{29} and predictability\textsuperscript{30} to the law. The solution was FCIA, the unification of patent appeals\textsuperscript{31} under a single appellate jurisdiction.\textsuperscript{32} In sum, the vesting in the Federal Circuit of exclusive jurisdiction of patent appeals has been based on a consistent and transparent line of reasoning. First, the Federal Circuit, playing a unitary judicial role, will manage, develop, and police the patent law. Second, the imposition of this institutional design will promote a

\textsuperscript{24} See Adams, supra note 14, at 55–57 (noting the heterogeneity of regional circuit standards).

\textsuperscript{25} This observation is captured nicely by Professor Dreyfuss. See Dreyfuss, supra note 6, at 6 (indicating that the decisions of the CCPA did not receive the respect of regional courts and that the presumption of validity in regard to CCPA decisions was steadily eroded by these regional courts).

\textsuperscript{26} S. REP. NO. 97-275, at 5, as reprinted in 1982 U.S.C.C.A.N. 11, 15.

\textsuperscript{27} See id. at 6, as reprinted in 1982 U.S.C.C.A.N. 11, 16 (reporting the comments of Larry F. Manbeck, Jr., General Patent Counsel of General Electric Company, who testified that doctrinal stability has an effect on innovation and that decreasing uncertainties are important to business decision making).

\textsuperscript{28} See id. at 5, as reprinted in 1982 U.S.C.C.A.N. 11, 15.

\textsuperscript{29} See id. (“The Federal Circuit also provides a forum that will increase doctrinal stability in the field of patent law.”).

\textsuperscript{30} See id. at 6, as reprinted in 1982 U.S.C.C.A.N. 11, 16 (stating that stable and predictable law is better for the national economy).

\textsuperscript{31} It is worth noting that the record is clear that Congress does not intend that the Federal Circuit be a “specialized” court as that term is so often, and pejoratively, used. Rather, Congress was express in the alternative stating:

The Court of Appeals for the Federal Circuit will not be a “specialized court,” as that term is normally used. The court’s jurisdiction will not be limited to one type of case, or even two or three types of cases.... it will have a varied docket spanning a broad range of legal issues and types of cases.

\textit{Id.}

\textsuperscript{32} See id. at 4, as reprinted in 1982 U.S.C.C.A.N. 11, 14 (“The Court of Appeals for the Federal Circuit provides such a forum for appeals from throughout the country in areas of the law where Congress determines that there is a special need for national uniformity.”).
clearer, more stable, and predictable patent doctrine, which in turn will reduce forum shopping and improve the economic usefulness of important property rights. 33

Few would doubt that Congress’s structural goals have been met. The Federal Circuit has moved with alacrity into its role as manager, developer, and enforcer of the patent doctrine. In an inexorable fashion, it has expanded its influence over the jurisprudence in a number of doctrinal areas, including claim interpretation, 34 the standard for obviousness, 35 remedies, 36 procedural issues, 37 anticipation, 38 and inequitable conduct. 39 But while the institutional design imagined by Congress has been realized, the question remains whether the court has been successful in achieving the promise that originally motivated congressional action.

B. The Problem of Nonobviousness

Under the U.S. patent laws, patents are available for all 40 inventions that are new, useful, and nonobvious. The requirement that an invention be useful is, generally speaking, rather easy to meet. The requirement that an invention be new—that it has not previously been possessed by the public—is, if not also easy to meet, at least relatively easy to determine. The requirement that an invention be nonobvious, however, seeks to determine whether, at the time it was made, a person having ordinary skill in the art would view the invention as a sufficient technical advance over existing technology to warrant the grant of a patent. Underlying this determination is a concept that has been described by one famous jurist as being “as fugitive, impalpable, wayward, and vague a phantom as exists in the whole paraphernalia of legal concepts.” 41 Patent lawyers have called the nonobviousness requirement the “ultimate condition of patentability.” 42 Below we review the doctrinal characteristics of nonobviousness and then describe the contours of the current controversies surrounding it.

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33. Id. at 5–6, as reprinted in 1982 U.S.C.C.A.N. 11, 15–16; Dreyfuss, supra note 6, at 7.
34. See Wagner & Petherbridge, supra note 7 (discussing the Federal Circuit’s development of claim-interpretation jurisprudence).
35. See infra subpart II(B).
36. Dreyfuss, supra note 6, at 18–19.
37. See id. at 30–52 (discussing some areas where the court has wielded jurisprudential influence and concluding that the court’s success was mixed).
38. Id. at 10–11.
39. Id. at 21–22.
40. This is a necessarily sweeping statement. It should be noted that there are of course other things a patent applicant needs to do before a patent may be obtained. For example, a patent applicant must file a timely application that includes information sufficient to disclose and enable the invention. See 35 U.S.C. §§ 102, 112 (2000).
42. NONOBVIOUSNESS—THE ULTIMATE CONDITION OF PATENTABILITY, supra note 9.
I. A Primer on Obviousness. — As noted above, the law of obviousness is directed to ascertaining whether the subject matter claimed to be patentable is a sufficient advance over existing technology to warrant the grant of a patent. Although it had existed as judge-made law for many years, a formal requirement of nonobviousness first entered the statutory patent law with the Patent Act of 1952. The current formal statement of the requirement of nonobviousness is set forth in 35 U.S.C. § 103(a). It states:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The relevant statutory inquiry then is whether “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” In the years following the passage of the Patent Act of 1952, the question turned to how best to determine the answer to that inquiry. The Supreme Court addressed that question in one of its last and most meaningful cases on the issue, the seminal decision of Graham v. John Deere. There the Court set out the well-worn considerations relevant for determining obviousness. It stated:

While the ultimate question of patent validity is one of law, the § 103 condition ... lends itself to several basic factual inquiries. Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.

43. Those readers familiar with the obviousness requirement of modern patent law may wish to skip this section.
45. 35 U.S.C. § 103(a).
46. Id.
48. Id. at 17–18 (citation omitted).
The Court proceeded to acknowledge the difficulties in determining whether subject matter is obvious and stated that it expected appellate court involvement in the development of the doctrine. The Court then stressed its view that the factual inquiry set forth in its opinion was of significant importance to establishing congressionally desired uniformity and definiteness in the jurisprudence of obviousness.

The Graham factor-based analysis was not the only guidance the Court provided in setting out its functional approach to determining obviousness. The Court also examined the meaning of the language “at the time the invention was made,” citing prior case law as well as legislative reports explaining the intended meaning of the language:

It refers to the difference between the subject matter sought to be patented and the prior art, meaning what was known before as described in section 102. If this difference is such that the subject matter as a whole would have been obvious at the time to a person skilled in the art, then the subject matter cannot be patented.

These sources, according to the Court “place[d] emphasis on the pertinent art existing at the time the invention was made.”

This language plainly cautions against looking backwards to determine obviousness, which the Court noted later when considering whether (in a consolidated case) the claims of a contested patent should be considered obvious. There the Court spoke in favorable terms regarding objective evidence on nonobviousness because not only was it the sort of evidence that was “more susceptible of judicial treatment than are the highly technical facts . . . . [Such inquiries] may also serve to guard against slipping into use of hindsight . . . and to resist the temptation to read into the prior art the teachings of the invention in issue.”

Over the years the Federal Circuit has paid great homage to the decision in Graham. Not only has it consistently relied on the Supreme Court’s factor-based approach to determining the question of obviousness, it has also

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49. See id. at 18 (noting that case-by-case development lends itself well to the fact-intensive inquiry that patent cases require).
50. Id.
53. Id. at 15 (citing S. REP. No. 82-1979, at 6 (1952) and H. REP. No. 82-1923, at 7 (1952)); see also 35 U.S.C. § 102 (describing what constitutes prior art).
55. Id. at 36 (internal citation and quotation marks omitted).
56. A search of Federal Circuit opinions on LEXIS, for the period of the study using the search terms “patent /100 obvious” and “Graham” revealed 172 cases. A similar search using the terms “patent /100 obvious” and “383 U.S. 1” (the U.S. Reports citation for Graham v. John Deere) revealed 156 cases. The difference is most likely due to the court’s common usage of the term “Graham factors” to describe the analysis set forth in the Supreme Court’s opinion. See, e.g., Group One, Ltd. v. Hallmark Cards, Inc., 407 F.3d 1297, 1304 (Fed. Cir. 2005) (referring to “Graham factors” without citing to the U.S. Reports).
accepted the Supreme Court’s invitation for appellate court involvement. In that vein, it has focused its attention on developing the jurisprudence surrounding the Supreme Court’s holding that the determination of obviousness is to be ascertained at the time the invention was made.\textsuperscript{57} To ensure that the obviousness inquiry is properly temporally located, the court has used perhaps the most straightforward approach. It has, as a conceptual matter, relocated the obviousness inquiry to the “time the invention was made.”\textsuperscript{58} It then asks, in light of the contemporaneous topography of relevant prior art, whether the claimed subject matter would be apparent to or easily perceived by a person of ordinary skill in the relevant art.\textsuperscript{59}

This rather simple logical step has given rise to the kernel of the court’s contribution to the obviousness analysis set forth in \textit{Graham}: that somewhere within the full scope of the relevant prior art, the claimed subject matter must be sufficiently taught or suggested that it would have been easily perceived by a person of ordinary skill in the art. As a consequence of some of the linguistic formulations that appear in the Federal Circuit case law, the requirement that prior art make apparent the arrangement of disparate sources and teachings has come to be known as the “suggestion test” or the requirement that the prior art provide a teaching, suggestion, or motivation to collect and combine disparate sources of prior art information. For purposes of uniformity, for the remainder of the Article we will refer to the test as either “the teaching, suggestion, or motivation test” or “TSM.”

An example of the linguistic formulation of the teaching, suggestion, or motivation test, as well as an explanation of its underlying logic, is excerpted from a prominent Federal Circuit opinion.\textsuperscript{60} After explaining the controlling nature of the \textit{Graham} factors, the court states:

Measuring a claimed invention against the standard established by section 103 requires the oft-difficult but critical step of casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. . . .

Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching

\textsuperscript{57} See \textit{Iron Grip Barbell Co. v. USA Sports, Inc.}, 392 F.3d 1317, 1320 (Fed. Cir. 2004) (“We turn first to a comparison between the prior art and the claimed invention. In this inquiry, we are mindful of the repeated warnings of the Supreme Court and this court as to the danger of hindsight bias.” (citing \textit{Graham}, 383 U.S. at 36)).

\textsuperscript{58} See, e.g., \textit{In re Piascik}, 745 F.2d 1468, 1474 (Fed. Cir. 1984) (taking into account evidence of nonobviousness of an invention “at the time the invention was made”).

\textsuperscript{59} See \textit{id.} at 1475 (finding the contested patent was not obvious at the time the invention was made).

\textsuperscript{60} See \textit{In re Dembiczak}, 175 F.3d 994 (Fed. Cir. 1999) (considering a Patent Office rejection for obviousness of a patent application for an orange yard bag with a jack-o’-lantern depicted on its exterior).
or motivation to combine prior art references. See, e.g., C.R. Bard, Inc. v. M3 Sys., Inc., 157 F.3d 1340, 1352, 48 USPQ2d 1225, 1232 (Fed. Cir. 1998) (describing “teaching or suggestion or motivation [to combine]” as an “essential evidentiary component of an obviousness holding”); ... Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 297, 227 USPQ 657, 667 (Fed. Cir. 1985) (district court’s conclusion of obviousness was error when it “did not elucidate any factual teachings, suggestions or incentives from this prior art that showed the propriety of combination”). See also Graham, 383 U.S. at 18, 86 S. Ct. 684, 15 L.Ed.2d 545, 148 USPQ at 467 (“strict observance” of factual predicates to obviousness conclusion required). Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor’s disclosure as a blueprint for piecing together the prior art to defeat patentability—the essence of hindsight.61

The excerpted section shows the court’s concern with the problem of hindsight and reveals that the reason for the concern exists at least in part because of notions that there is a high risk of unfairness in using an inventor’s potential contribution to the storehouse of public knowledge as a road map to characterizing that same contribution as obvious.62 It also reveals that the court’s rationale for the teaching, suggestion, or motivation test is an “essential evidentiary component of an obviousness holding.”63

Another prescribed aspect of the teaching, suggestion, or motivation test is that it must consider the full scope of the relevant prior art. Thus, as evidenced by the linguistic formulation in In re Dembiczak, the “evidence of a suggestion, teaching or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved.”64 By casting a wide net, the Federal Circuit’s test seeks to provide the public maximum protection against the spurious issue of patents.

However, the jurisprudence suggests that the court has sought to balance the public’s interest in preventing the spurious issue of patents with the public’s competing interests in rewarding innovation and in receiving disclosure of nonobvious inventions. Thus, the court has cautioned that while the net of prior art evidence is very broad, there must still be evidence: “The range of sources available . . . does not diminish the requirement for

61. Id. at 999.
62. It is worth noting that the use of hindsight is not strictly prohibited in an obviousness analyses. See Ruiz v. A.B. Chance Co., 357 F.3d 1270, 1276 (Fed. Cir. 2004) (“While this court indeed warns against employing hindsight, its counsel is just that—a warning. That warning does not provide a rule of law that an express, written motivation to combine must appear in prior art references before a finding of obviousness.”) (emphasis added)).
63. Dembiczak, 175 F.3d at 999 (quoting C.R. Bard, Inc. v. M3 Sys., Inc., 157 F.3d 1340, 1352 (Fed. Cir. 1998)).
64. Id. (emphasis added).
actual evidence. . . . Broad conclusory statements regarding the teaching of multiple references, standing alone, are not ‘evidence.’ 65

At least facially, then, the Federal Circuit’s teaching, suggestion, or motivation test appears to foster three important values that Congress and the Supreme Court hoped would evolve in the jurisprudence of patents. By clarifying the requirement that somewhere in the prior art there must exist a teaching that would make the claimed subject matter apparent to a person of ordinary skill in the art, the court has at once improved the objectivity of the obviousness determination, making it more amenable to judicial treatment and review (objectivity and uniformity). The court has also made the test more precise in terms of giving patent challengers and the Patent Office clear guidance (a road map) on how to establish obviousness, while at the same time serving the public’s interest in promoting the likelihood that deserving patentees will obtain patents and continue making valuable disclosures (promoting innovation). In large measure, all of this has been achieved by little more than requiring a richer examination of the scope and content of the prior art.

If this seems a little too good to be true, it may be. As discussed below, there is considerable debate on whether the Federal Circuit’s development of the obviousness jurisprudence has had an overall positive effect on the patent system.

2. The Controversy of TSM.—While litigants have long challenged the requirement that the prior art include within its scope information that shows how and why a claimed combination would be obvious to a person of ordinary skill in the art, 66 it has been only fairly recently that the issue has received the current high level of national attention. The lightning rod is the Federal Circuit’s treatment of the obviousness inquiry in Teleflex, Inc. v. KSR International Co., 67 a nonprecedential opinion in which the court vacated and remanded for further fact-finding a district court’s summary judgment that the relevant claims of the patent at issue were invalid as obvious. 68

The case itself follows on the heels of two well-known reports, both of which were critical of the Federal Circuit’s obviousness jurisprudence, and both of which concluded that the way the court had developed the doctrine

65. Id.; see also, e.g., In re Rouffet, 149 F.3d 1350, 1357–58 (Fed. Cir. 1998) (requiring that the Patent Office provide evidence for its assertion that a person of ordinary skill in the art would collect and combine disparate sources of prior art); In re Fritch, 972 F.2d 1260, 1265 (Fed. Cir. 1992) (holding that the Patent Office must provide a “showing [of] some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings” (quoting In re Fine, 837 F.2d 1071, 1074 (Fed. Cir. 1988))).

66. See Gillette Co. v. S.C. Johnson & Son, Inc., 919 F.2d 720, 723 (Fed. Cir. 1990) (‘'[A]ppellant urges that the district court . . . committed legal error by requiring that a claimed combination be ‘clearly suggested’ by the prior art in order to be obvious.’”).


68. Id.
made it too easy to obtain a patent. At around the same time, the issue was raised in the popular press by, *inter alia*, the book *Innovation and Its Discontents*, which asserted that patents regularly issue despite “clear evidence of invalidity.” Moreover, contemporaneous with these events, a burgeoning body of scholarly literature was vociferously complaining about the Federal Circuit’s development of both the patent jurisprudence generally and the jurisprudence of obviousness particularly.

*KSR International* itself involves a patent directed to adjustable pedal assemblies. An adjustable pedal assembly is a device that permits a pedal (such as a gas pedal) to be adjusted in position according to the user’s preference. In the claims at issue, the adjustable pedal assemblies contain an electronic sensor that performs the function of detecting the pivot of the pedal and generating an electronic signal that corresponds to the pivot. The district court granted summary judgment, finding that the claims were invalid as obvious, and the patentee appealed. Finding that a genuine issue of material fact existed on the issue of whether a person of ordinary skill in the art would have been motivated to combine the teachings of the prior art to create the claimed subject matter, the Federal Circuit vacated and remanded for further fact-finding. The form of analysis is familiar to those who have read a number of Federal Circuit obviousness opinions. Starting with the familiar teachings of *Graham*, it then explains the requirement that the prior art, rather than the inventor’s teachings, must provide the analytical framework for determining obviousness. For purposes of comparison to *In re*
Dembiczak, the KSR International court set forth the following analytic framework:

A patent claim is obvious, and thus invalid, when the differences between the claimed invention and the prior art “are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art.” [citing, inter alia, Graham]. While obviousness is ultimately a legal determination, it is based on several underlying issues of fact, namely: (1) the scope and content of the prior art; (2) the level of skill of a person of ordinary skill in the art; (3) the differences between the claimed invention and the teachings of the prior art; and (4) the extent of any objective indicia of non-obviousness. See Graham, 383 U.S. at 17-18. When obviousness is based on the teachings of multiple prior art references, the movant must also establish some “suggestion, teaching, or motivation” that would have led a person of ordinary skill in the art to combine the relevant prior art teachings in the manner claimed.78

Consistent with the jurisprudence, the court explained that the teaching, suggestion, or motivation could be found either explicitly or implicitly, in the prior art references themselves, in the knowledge of those of skill in the art, or in the nature of the problems to be solved.79 It then examined the trial court’s opinion and determined that it had (1) improperly resolved disputed issues of fact, (2) failed to make findings on what “understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge of [the] invention to make the combination in the manner claimed,”80 (3) erred in concluding that a prior art reference should be included in the obviousness analysis when it did not address the problem solved by the patent at issue, (4) misunderstood the teachings of two other prior art references, and (5) mistakenly relied on the prosecution history in support of its argument for invalidity.81

The petition for certiorari attracted a surprising amount of attention, given that KSR International involved a relatively straightforward application of the settled law of the Federal Circuit. Perhaps the two most noteworthy amicus briefs in favor of certiorari were the Brief of Twenty-four Intellectual Property Law Professors82 (Professors’ Brief) and the Brief for the United States.83 The briefs are particularly notable for both the high quality of their authors and the rather sweeping breadth of their arguments about the Federal Circuit’s doctrine.

78. Id. at 285.
79. Id.
80. Id. at 288 (quoting In re Kotzab, 217 F.3d 1365, 1371 (Fed. Cir. 2000)).
81. Id.
82. Professors’ Brief, supra note 5.
83. Brief for the United States, supra note 5.
These briefs make a number of claims concerning the law, facts, and policy surrounding the Federal Circuit’s teaching, suggestion, or motivation test. Both briefs appear to be based on the empirical assumption that either too many patents have been issued, the rate at which low-quality patents issue is accelerating to the point that the patent system is causing greater social harm than the disclosed innovations provide social benefit, or both.\(^8\) This assumption has not been empirically demonstrated,\(^9\) but it does flow fairly easily from property theory.\(^10\) Regardless, this assumption has enjoyed a measure of popular success and must be regarded as conventional wisdom at present.\(^11\) (To be clear, we do not deny that patent quality is a serious policy concern; we simply note that the extent of the problem, and its impact, is not well understood.)

The briefs in favor of certiorari next make a causal claim: that the Federal Circuit’s obviousness jurisprudence can be linked to greater numbers of low-quality patents.\(^8\) While this has surface appeal—surely a too-low standard of patentability would impact patent quality to at least some degree—neither the briefs nor the sources supporting this view explain the causal link in any level of detail. (For example, there are clearly a great many other plausible reasons for patent-quality problems, such as

\(^8\) See id. at 16 (stating that the Federal Circuit’s application of the TSM analysis “grants patent applicants unjustified rewards for disclosing non-innovative subject matter, and it forecloses competitors from using the public storehouse of knowledge”); Professors’ Brief, supra note 5, at 10 (stating that the TSM analysis causes the issue of patent rights that have “pernicious social effects”).

\(^9\) See A PATENT SYSTEM FOR THE 21ST CENTURY, supra note 2, at 48 (“[T]he claim that quality has deteriorated in a broad and systematic way has not been empirically tested.”). Further, even those studies demonstrating a rise in patenting, or a rise in patenting intensity, fail to link such a rise with a loss of social benefits. See, e.g., id. at 29, 46–63. Indeed, empirical demonstration, while likely possible, would be very costly.

\(^10\) See, e.g., Michael A. Heller & Rebecca S. Eisenberg, Can Patents Deter Innovation? The Anticommons in Biomedical Research, 280 SCIENCE 698, 698 (1998) (explaining how multiple rights to exclude might cause an underuse of resources). It is worth noting that there is also property theory that argues against this assumption, as well as some particularized examples of empirical work that show that it may not be a serious problem. See John P. Walsh, Ashish Arora & Wesley M. Cohen, Effects of Research Tool Patents and Licensing on Biomedical Innovation, in PATENTS IN THE KNOWLEDGE-BASED ECONOMY 285, 331 (Wesley M. Cohen & Stephen A. Merrill eds., 2003) (finding, inter alia, that upstream rights have not thus far significantly inhibited product development); John P. Walsh, Charlene Cho & Wesley M. Cohen, View from the Bench: Patents and Material Transfers, 309 SCIENCE 2002, 2003 (2005) (concluding that the results of a survey of academic biomedical researchers offered “little empirical basis for claims that restricted access to IP is currently impeding biomedical research”).

\(^11\) See TO PROMOTE INNOVATION, supra note 2, at 5 (“Hearings participants raised concerns about the number of questionable patents issued. Such patents can block competition . . . and harm innovation in serious ways.” (citation omitted)); A PATENT SYSTEM FOR THE 21ST CENTURY, supra note 2, at 3 (“Over the past decade the quality of issued patents has come under frequent sharp attack . . . .”)

\(^8\) E.g., Professors’ Brief, supra note 5, at 13–14.
underfunding at the PTO, perverse incentives among prospective patentees and examiners alike, etc. 89

The next link in the logical chain among the KSR International advocates is that one particular aspect of the Federal Circuit’s obviousness jurisprudence is directly responsible for the low-quality-patent problem: the court’s TSM test. In particular, the government asserts that this test is an "inflexible rule" that presents "substantial obstacles in establishing obviousness . . . in a way that unnecessarily sustains patents that would otherwise be subject to invalidation as obvious." 90 According to the professors, it thus prevents the Patent Office from "weed[ing] out obvious patents,"91 and causes patents to issue where the combination of preexisting technologies would have been obvious to a person of ordinary skill in the art.92 It does this, according to the briefs, by requiring a "showing [that] may be difficult or impossible" to make.93 This showing emphasizes written prior art references and "all but requires both the Patent and Trademark Office and the courts to base their analyses on documentary evidence of obviousness which will often be unavailable."94 The standard ascribed to the Federal Circuit, the Professors’ Brief argues, "strays far" from the statutory standard because it looks "almost entirely to the contents of the prior art references to demonstrate obviousness."95

Thus, the construct against the Federal Circuit’s obviousness jurisprudence (especially the TSM test) takes the following form:

1. Patent quality (the lack thereof) is a serious and growing problem that is degrading the innovative output of society;
2. the Federal Circuit’s obviousness jurisprudence is a major component of this problem because it lowers the standard for patentability, making poor-quality patents easier to obtain; and

89. While there is not a consensus regarding what constitutes a low-quality patent, as a general matter a low-quality or questionable patent can be thought of as one that is likely to be invalid. See To Promote Innovation, supra note 2, at 5 ("A poor quality or questionable patent is one that is likely invalid or contains claims that are likely overly broad."). The number and importance of potential causes of low-quality patents is also debated. Others view the substantive requirement as only a factor. See A Patent System for the 21st Century, supra note 2, at 47 (citing a lowered standard for nonobviousness, fewer prior art search resources at the Patent Office, lower examiner qualifications and experience, and increased workload as other factors); cf. Lee Petherbridge, Positive Examination, 46 IDEA 174, 178 (2006) (arguing that another cause of questionable patents is poor information concerning the scope of the right sought during examination, and that given the difficulty and ambiguity associated with applying the substantive requirement, a more sensible approach to patent quality would include an enhanced focus on defining the meaning of the claims during examination).

90. Brief for the United States, supra note 5, at 12.
91. Professors’ Brief, supra note 5, at 9.
92. Id.
94. Professors’ Brief, supra note 5, at 9.
95. Id. at 5–6.
3. The Federal Circuit’s TSM test is the primary culprit with respect to the court’s obviousness jurisprudence because it renders the basic obviousness inquiry moot in many cases. Therefore, a shift away from the TSM test will improve patent quality, and thus provide general societal benefits—by limiting patentability to truly innovative inventions.

Note that this construct is not only the basic logical chain of the litigants in KSR International; it is also the foundation of the broader controversy surrounding the Federal Circuit’s modern jurisprudence of obviousness.

As we noted above, the components of the argument vary in their empirical bases. Argument 1 is perhaps empirically testable. But as the National Research Council reports, this has not been done. Argument 2—that the Federal Circuit’s law of obviousness is to blame for a large number of low-quality patents—is difficult to test directly. The Federal Circuit has been the only court in the obviousness game for twenty-five years; thus, there are no similarly situated appellate bodies with which to compare the Federal Circuit’s work in a patent system that is generally accepted as being vastly different than the one that existed at the time of Graham. Even so, the results of this study may provide at least some indirect evidence regarding how the jurisprudence of the Federal Circuit relates to the patentability of inventions: as we note below, little in these results would support this view. Similarly, while Argument 3 is not definitively answered by this study, we again find little evidence in our systematic analysis that would identify the TSM test as a driver of lower quality patents. Thus, we expect that this study will be of substantial interest—not only in the current KSR International controversy, but with regard to the larger concern of the Federal Circuit’s law of obviousness.

III. Study Design and Methodology

In view of the importance of the law of obviousness to the question of patentability and rhetoric accompanying current claims about the doctrine, we set out to gain information about the court’s performance in this area. To do so, we applied an approach with which we already had some experience: the systematic use of judicial opinions as a source of data of the content of the Federal Circuit’s jurisprudence. Since our last effort, Professors Hall and Wright have surveyed the history and application of this approach to

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96. See A PATENT SYSTEM FOR THE 21ST CENTURY, supra note 2, at 3 (“The claim that quality has deteriorated in a broad and systematic way could be, but has not been, empirically tested.”).

97. See, e.g., Wagner & Petherbridge, supra note 7, at 1126 (“[T]his study evaluates the Federal Circuit’s methodological approach to claim construction by measuring—that is, categorizing according to standardized criteria—the court’s expressions of its methodology in the opinions accompanying judicial decisions.”).
legal scholarship in an article that provides both information and insight into the process and validity of using judicial opinions as a source of data.98

A. A Primer on Content Analysis

Content analysis refers to the systematic reading and analysis of texts.99 While the approach can be applied to most texts, perhaps one of its more interesting applications in the field of law comes from its application to judicial opinions. Content analysis differs from more traditional forms of legal scholarship in that it seeks an objective understanding of a body of law, rather than an interpretation of judicial opinions that are viewed as symbolic or important. According to Hall and Wright, “[s]ystematic content analysis allows scholars to verify, analyze, or refute the empirical claims about case-law that are implicit or explicit in all branches of legal scholarship.”100

While there may be a variety of ways to approach content analysis, it likely includes four general components. These include selecting cases, coding cases, counting case contents, and analyzing case coding.101 Selecting cases refers to systematically identifying and collecting those cases likely to provide information concerning the subject of the study. Coding cases refers to the systematic application of a coding scheme designed to record features of each selected case. Once cases are coded, the features observed can be counted and relationships or patterns described and analyzed, using in some cases descriptive statistics, inferential statistics, or both. The counts collected from the cases may be analyzed in any way that is reasonable in view of the study as a whole. Among others, these might include examining connections between case outcomes and external influences, examining relationships among the factors present in a case that might show order or be predictive of a particular outcome, or as reported in this Article, testing empirical claims concerning the nature and effect of doctrine.102

There are important caveats to choosing judicial opinions as a data set, the most important of which affect not only content analysis, but also more traditional interpretive forms of legal scholarship. These include unobserved reasoning, selection bias, and strategic behavior.103 Analyzing the content of judicial opinions relies on the assumption that facts and reasoning that appear in an opinion accurately reflect those from the underlying case. However, this is a situation that may not always be true given that opinion authors are

99 Id. at 3.
100 Id. at 10.
101 Id. at 11.
102 See id. at 10 (“Systematic content analysis allows scholars to verify, analyze, or refute the empirical claims about caselaw that are implicit or explicit in all branches of legal scholarship.”).
103 See Wagner & Petherbridge, supra note 7, at 1128–30 (considering these oft-cited concerns and limitations about using judicial opinions for systematic study).
generally concerned with justifying their conclusion “by showing that it proceeds from accepted sources by legitimate, properly argued steps.” Judicial opinions are also subject to selection bias at several levels. Some types of disputes may be less likely to reach trial; others that reach trial may be less likely to generate opinions. Of those that are tried, some will not be appealed, and some when appealed may not generate an opinion. Others may generate only an unpublished opinion, which may affect the scope or depth of analysis that the court will provide. And even when opinions are published, they are subject to strategic behavior. The litigation choices of the parties can impact the facts that make it into a case; litigants, having different expectations for the outcome, may contend that the same governing doctrinal principle controls a case, making it more likely that the court will address that principle in any opinion it might author.

There is little question that these potential limitations exist to some degree in the study underlying this Article. But there are some reasons to think that they may be less significant here. In particular, as described below, this study evaluates the content of the jurisprudence itself. In that sense, it concerns itself with the facts and statements of principle and reasoning that have made it into opinions. It does not examine information external to that expressed in the text of the opinions that might impact whether an opinion would be written. For much the same reason, to the extent there is strategic behavior influencing the content of the opinions, the fact that the study may not detect it is not prohibitive. The information studied is the same information on which institutional and other players in the patent system rely every day. Its validity does not decrease through the use of a systematic and comprehensive approach to the opinions. Indeed, there may be reason to think that such an approach could place outlying opinions in relief by showing a doctrinal order and consistency not otherwise easily discernable.

B. Database Construction and Case Selection

The first step in the study was the construction of the data set. The selection criteria are defined as observable analyses of obviousness under 35 U.S.C. § 103 contained in Federal Circuit opinions between January 1, 1990, and June 1, 2005. To identify the data set, several searches of the LEXIS

105. See, e.g., FED. CIR. R. 36 (listing the conditions under which the Federal Circuit will enter a judgment of affirmance without an opinion).
106. One such external factor would be if the Federal Circuit had a policy or target of authoring a certain percentage of opinions that affirm, reverse, or vacate. The authors know of no such policy.
107. January 1, 1990, was chosen as the starting point for the following reasons: first, to reduce the size of the data set to manageable proportions; second, to limit the term of the study to more recent Federal Circuit jurisprudence; and third, to include at least fifteen years of opinions. June 1,
Federal Circuit database\textsuperscript{108} were conducted with search terms calculated to identify all possible opinions falling within the scope of the selection criteria above.\textsuperscript{109} The initial screens identified about 900 cases of potential interest. The 900 cases were then screened manually for the presence of a decision on the issue of obviousness. Cases directed to the obviousness of design patents were excluded, as were cases directed solely to obviousness-type double patenting.\textsuperscript{110} When the review was completed, 362 identified Federal Circuit opinions remained. Because the core unit of measurement here was the way the Federal Circuit analyzes obviousness, each observable analysis of obviousness was a record in the database. Thus, if an opinion analyzed three claims with separate obviousness analyses, each of those analyses was counted as a separate record. Conversely, if the court analyzed several patent claims under the same obviousness analysis, that was counted as a single record. Because multiple analyses per opinion are not uncommon (though not the norm, either), the total number of records in the database equaled 480.

C. Selecting Measurement Criteria

For this project, we were interested in gathering information about the Federal Circuit’s doctrinal performance in the area of obviousness. Accordingly, a list of measurement criteria (e.g., database fields) was developed, encompassing a list of both the data that were easily obtainable as well as data that would be useful for future analyses. The total number of fields per record is forty-three. The table in the Appendix identifies each field in the data set; what follows is a brief description.

1. Basic Information.—One set of fields (numbers 1–20 in the field listing in the Appendix) concerns the basic information about a decision of the Federal Circuit, such as the title of the case, the judges assigned, the date the opinion was issued, and so forth. The database also includes various citations, an identification of the opinion below, whether the opinion was designated as published or unpublished, whether certiorari was requested, and the overall disposition of the appeal. All of these fields were collected by computer by parsing the text files of the opinions.\textsuperscript{111}

2. Obviousness-Specific Content.—The balance of the fields (numbers 21–43 in the field listing in the Appendix) in the database was human.
coded.112 As described in more detail below, these fields addressed information relating to the Graham factors; secondary considerations; teaching, suggestion, or motivation; prior art sources; technological identity of the patents or claims at issue; the depth of analysis; the outcome (e.g., obvious); and the patent or patent-application numbers associated with the claims at issue.

**Information Relating to the Graham Factors (Fields 21–23).** In order to track the use of the legal factors outlined in *Graham v. John Deere*—the scope and content of the prior art, the differences between the invention and the prior art, and the level of ordinary skill in the art113—the coding scheme counted the presence of a discussion of each of these three factors.

**Information Relating to Secondary Considerations (Fields 24–28).** In order to track the use of the secondary considerations that “may have relevancy”114 to the obviousness determination, the coding scheme noted whether the opinion indicated that the court had applied factors such as “long-felt need,” “copying,” “commercial success,” or “unexpected results.” The analyses were also coded for how the consideration of secondary factors fit within the overall obviousness analysis—i.e., which direction it pointed (obvious/nonobvious) and whether it was dispositive.

**Information Relating to the Teaching, Suggestion, or Motivation Test (Fields 29–33).** Each record analysis was coded for the application of the TSM analysis (or lack thereof). As with the secondary considerations, the coding included an analysis of how the application of TSM applied: dispositive or not, obvious or not. The records were also coded for the sources of TSM used—i.e., the cited references, the knowledge of one of ordinary skill in the art, the nature of the problem to be solved, or other miscellaneous sources.

**Additional Information (Fields 34–43).** Each record analysis was also coded for several other factors, including the technological area of the patents or claims at issue (biotechnological, chemical, mechanical, or electronic), the depth of analysis (low, medium, or high), the outcome (obvious or nonobvious), whether the obviousness analysis of the lower tribunal was changed, the procedural posture of the case, and the patent or application numbers associated with the claims at issue.

3. **Data Collection and Coding Techniques.**—The selected cases were coded for the measurement criteria described above. As noted, many of the fields were coded mechanically via the use of purpose-built software. Where

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112. Coding was accomplished with the use of purpose-built Excel spreadsheets, wherein some portions of each record (e.g., the case title and judges) were blinded (as much as practicable) from coders so as to prevent bias. In addition, pull-down menus were utilized to minimize data-entry errors.


114. *Id.* at 18.
human coding was conducted, it was performed by the investigators of this study, both of whom are attorneys with technical backgrounds, admissions, and significant knowledge of Federal Circuit doctrine.\footnote{While we took every step to reduce the subjectivity of the coding, limiting as strictly as possible coding based on "judgment calls" or "impressions," the nature of content coding makes nearly impossible the assertion that no subjectivity remains. And while we believe that the results of our coding are replicable by at least some others with similar backgrounds and experience, the number of others capable of doing so may be relatively small. Given the technological complexity and highly factual nature of the many Federal Circuit opinions, it is quite likely that this study requires a degree of legal and technical skill that precludes most law students and non-patent lawyers from being effective coders. If so, this is an unfortunate, albeit inherent, aspect of this approach.}

An important note concerning the structure of this study bears repeating: the measurement metric is analyses, not opinions. If an opinion analyzed obviousness for claims from two different patents, that counted as two analyses. In addition, where different analyses were used for different claims of the same patent (e.g., claims one through fourteen received an analysis distinct from claims fifteen through twenty-one), additional analyses were counted.\footnote{In the situation just described, two analyses would have been counted.}

Dissents or concurrences containing obviousness analyses were treated as distinct analyses.

\section*{D. Testing for Reliability}

Evaluating the reliability of the data collection process is a crucial component of studies (such as this one) based on content analysis. That is, because the process of content analysis—reading cases and systematically categorizing them according to a defined set of criteria—is inherently subject to some level of subjectivity, rigorous efforts must be made to determine the reliability of the coding.

In this study, reliability testing of the human coding was conducted during two phases.\footnote{The machine coding, given its inherent properties, was evaluated (during the development of the software) for its ability to return the desired results.} First, the coding scheme described above was "pilot tested" during the initial development of the measurement criteria. This pilot test consisted of each coder (the investigators) coding thirty to fifty cases in the data set. The results were compared and evaluated; where applicable, alterations to the coding scheme or the instructions were made.

The second, more formal test of reliability was conducted concurrently with the coding of the data set in its entirety. The entire data set was coded by one co-investigator over the span of about three weeks. Concurrently and independently, the other co-investigator coded a random sample of 25\% of the entire data set (120 records) as a reliability test.\footnote{There is no bright-line standard for the sample size of the reliability coding, though researchers suggest that at least a ten-percent sample be used. See Stephen Lacy & Daniel Riffe, \textit{Sampling Error and Selecting Intercoder Reliability Samples for Nominal Content Categories}, 73 \textit{Journalism \\& Mass Comm.} Q. 963, 969–73 (1996). Records used in the reliability coding were chosen via computer algorithm based on the generation of random numbers.} At the conclusion of both
processes, the results were compared and the level of intercoder agreement was tracked and evaluated. Where applicable, corrections were made to the data set.

The level of intercoder agreement was calculated using Cohen’s kappa, which is a widely accepted statistical measure of the reliability of content analysis conducted by two coders. The Cohen’s kappa produces a result on a range from zero to one, with higher numbers indicating more intercoder agreement (and thus more confidence in the reliability). While there is no formal kappa result that corresponds with reliability, in general, numbers above 0.90 are considered to be quite strong, numbers above 0.80 are reasonably strong, and numbers above 0.70 are acceptable.

For the data set used in this study, the reliability of each variable was measured separately (using Cohen’s kappa). In general, the intercoder agreement was very good; the kappa statistic ranged from a high of 1.00—indicating complete agreement between the coders—to a low of 0.66—indicating some, but not especially robust, agreement. The results for the major variables discussed in detail in Part IV are set forth in the table below.

<table>
<thead>
<tr>
<th>Field</th>
<th>Cohen’s (\kappa)</th>
<th>Implied Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSM_Application</td>
<td>0.91</td>
<td>Very reliable</td>
</tr>
<tr>
<td>Technology</td>
<td>0.98</td>
<td>Very reliable</td>
</tr>
<tr>
<td>Result</td>
<td>0.94</td>
<td>Very reliable</td>
</tr>
<tr>
<td>Disposition</td>
<td>0.95</td>
<td>Very reliable</td>
</tr>
<tr>
<td>Posture</td>
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<td>Very reliable</td>
</tr>
</tbody>
</table>

119. Jacob Cohen, *A Coefficient of Agreement for Nominal Scales*, 20 EDUC. & PSYCHOL. MEASUREMENT 37 (1960). There are other statistical tests that can be used, and some methodologists debate the pros and cons of each. Cohen’s kappa was selected for its relative ease of calculation and general acceptance. See Hall & Wright, *supra* note 98, at 39–40 (noting that the most common statistical test is Cohen’s kappa).

120. Cohen’s kappa is expressed as \(\kappa = \frac{p_o - p_e}{1 - p_e}\), where \(p_o\) is the proportion of agreed-upon judgments, and \(p_e\) is the expected proportion of agreed-upon judgments (those caused by chance).


122. TSM_Other (Field 33) and Procedural Posture (Field 42).

123. Depth (Field 39). Note that this variable is not used in this Article.
IV. Results and Discussion

The overall goal of this study is to contribute to a burgeoning body of literature that addresses the effectiveness of the Federal Circuit at meeting the goals mandated by Congress at the time of the court’s creation.\textsuperscript{124} As we described above,\textsuperscript{125} this is a very complex task that should be undertaken not only with considerable effort and expertise, but also deliberately. Ultimately, it must involve a broad array of issues and topics. Moreover, in the early stages, it should be made as objective as possible. Normative approaches can be enriched when they are based on greater information. It is for this reason that we performed a systematic evaluation of the critical patentability doctrine of obviousness. However, the law of the ultimate determinant of patentability is itself necessarily complicated, and the data set of judicial opinions is a rich source of understanding of the nature of the jurisprudence—so rich, in fact, that it is not the purpose of this Article to present and discuss all that this source of information reveals. What is reported here is only a partial picture, addressing some very timely and relevant issues concerning the Federal Circuit’s jurisprudence.

The data presented in this Part include descriptive statistical information collected from the Federal Circuit database described in Part III. The data comprise information pertaining to results, e.g., result tallying, as well as information directed to the content of the Federal Circuit’s jurisprudence. By way of overview, this Part begins by considering the results from the perspective of what they show concerning the clarity and stability of the doctrine, and later moves to those results describing our findings concerning the teaching, suggestion, or motivation test.

A. The Stability and Clarity of the Doctrine

Congress,\textsuperscript{126} the innovation community, and the Supreme Court\textsuperscript{127} have all recognized the importance of doctrinal stability in the patent law. The results of this study provide several measures of doctrinal stability, most of which seem to suggest a fairly stable and predictable doctrine.

One measure of stability is the frequency with which an appellate court affirms or reverses the judgments of the tribunals it reviews.\textsuperscript{128} We examined the frequency with which the Federal Circuit affirmed, reversed, or vacated

\begin{footnotesize}
\begin{enumerate}
\item See supra subpart II(A).
\item See supra Part III.
\item See supra subpart II(A).
\item See Graham v. John Deere Co. of Kan. City, 383 U.S. 1, 18 (1966) ("We believe that strict observance of the requirements laid down here will result in that uniformity and definiteness which Congress called for in the 1952 Act.").
\item As Circuit Judge Rader noted in dissent from the Federal Circuit’s famous Cybor Corp. v. FAS Technologies, Inc., 138 F.3d 1448, 1476 (Fed. Cir. 1998), opinion: "[T]his reversal rate, hovering near 50%, is the worst possible. Even a rate that was much higher would provide greater certainty."
\end{enumerate}
\end{footnotesize}
the decision of the lower tribunal on the question of obviousness.\textsuperscript{129} Table 1 shows the results.

<table>
<thead>
<tr>
<th>Result</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affirm</td>
<td>312</td>
<td>65.0%</td>
</tr>
<tr>
<td>Reverse</td>
<td>110</td>
<td>22.9%</td>
</tr>
<tr>
<td>Vacate</td>
<td>57</td>
<td>11.9%</td>
</tr>
</tbody>
</table>

These results show that the Federal Circuit authored analyses affirming judgments 65% of the time. On the other side of the ledger, the court reversed a judgment only 22.9% of the time. This suggests that for the period of the study reviewed tribunals were correctly adjudicating the question of obviousness approximately three times for every one time they got it wrong.\textsuperscript{130} Moreover, the observed three-to-one ratio is conservative. Because of Federal Circuit Rule 36, which permits the issuance of judgments of affirmation without opinion,\textsuperscript{131} there are additional cases in which the court agreed with the tribunal being reviewed.\textsuperscript{132} Therefore, the actual number of instances where the court affirmed is higher. The true ratio thus favors affirmances even more strongly.

If the results of analyses that vacated the reviewed tribunal are included, the rate of rejection of lower court judgments increases to 34.8%.\textsuperscript{133} Although we often included decisions that were vacated, e.g., when plotting the reversal-rate trends in Figure 1,\textsuperscript{134} we did so with an eye towards being conservative. A Federal Circuit holding vacating a decision on obviousness usually indicates that the Federal Circuit cannot have confidence in the judgment of the lower tribunal, not whether the judgment will ultimately prove to be correct. Thus, in some cases where the Federal Circuit vacates a judgment, that judgment will be properly reentered after the Federal Circuit’s guidance is observed, while in others a different judgment will be entered. Whether that should constitute a “reverse,” when considering the stability of

\textsuperscript{129} This includes all obviousness analyses in the database and thus combines the dispositions of the PTO, district courts, the Court of Federal Claims, and the ITC.

\textsuperscript{130} It should be noted that this requires an assumption that the authors find reasonable. The measurement metric for the study is analyses, not claims, cases, or patents. Thus, one must assume that the number of analyses/opinions reversing a judgment is, on the whole, close to the same as the number of analyses/opinions affirming a judgment.

\textsuperscript{131} FED. CIR. R. 36.

\textsuperscript{132} See, e.g., In re Kretchman, 125 F. App’x 1012, 1012 (Fed. Cir. 2005) (affirming, with Rule 36, the Board of Patent Appeals and Interferences’ rejection of the applicant’s claims for obviousness).

\textsuperscript{133} See supra Table 1.

\textsuperscript{134} See infra Figure 1.
the doctrine, is a matter that can be debated. It does show some kind of difficulty at the lower tribunal in managing the issue of obviousness. It is reasonable to think that in at least some cases this is a consequence of doctrinal confusion, although there may be nondoctrinal reasons as well. Having presented both sides, we will leave readers to form their own judgments. Whether a reader prefers the view of 22.9% (reverse) or 34.8% (reverse or vacate), the number of cases affirmed was still 65.0%, which even standing alone suggests some success in achieving stability and clarity in the doctrine.

We note that the interpretation of the meaning of reversal rates by appellate courts is, as we have described elsewhere, an uncertain exercise at best. Indeed, in our earlier analysis of the claim-construction doctrine, we expressed doubts concerning the causal link between reversal rates and the Federal Circuit’s doctrinal performance. This is because a reversal rate is determined by many variables, including the performance of lower tribunals, decisions by parties on whether or not to appeal, etc.—making the link between a measured rate of reversals and the court’s performance difficult to determine. In this case, while our general skepticism remains, we do believe that the reversal rates for obviousness analysis provide significant information. First, we can compare the reversal rate of obviousness analyses to measures of baseline rates of reversals in other patent cases. Second, given the information we earlier reported concerning claim construction—where we, in essence, found a link between high reversal rates and doctrinal confusion—we have something of a comparative baseline for obviousness. Third, the reversal rate analysis directly addresses the criticism that the Federal Circuit has used the obviousness analysis (especially the TSM test) as a tool to dominate lower tribunals. So although we are cautious in our claims that the reversal rates demonstrate a solid causal link to Federal Circuit doctrinal performance, we think that in these circumstances the value of reporting and analyzing them easily offsets their potential to confuse the question.

In this regard, we find that the likelihood of the court to reverse on the question of obviousness compares favorably to the court’s likelihood to reverse across all issues. One study places the likelihood of the Federal Circuit to reverse in written opinions across all issues in patent cases at 47.3%. The lower incidence of reversals (or reversals and vacates) in obviousness analysis suggests—at the very least—that the Federal Circuit’s

135. For example, 35% of summary judgments were vacated. See infra Table 2. As the accompanying discussion notes, this number may well reflect gambling in view of the economics of litigation and efforts to modify the law rather than a lack of stability, or even uncertainty, in the law.

136. See Wagner & Petherbridge, supra note 7, at 1127–28.

137. Id.

138. See Chu, supra note 4, at 1097–99 (reporting the results of a study on the Federal Circuit’s reversal rate on all issues in patent cases that covered a twenty-eight month period between January 1998 and April 2000).
doctrinal stability is no worse (and may well be better) than for many other issues in patent law.\textsuperscript{139}

Likewise, the court’s performance on obviousness is notable in view of reported reversal rates for other areas of its jurisprudence. Considering the issue of claim interpretation, Chu reports that the Federal Circuit found error in a district court’s claim interpretation approaching 50% of the time.\textsuperscript{140} Moore reports that over a period of four years and eight months in the mid-1990s, “[d]istrict court judges decided at least one claim construction issue wrong in 33% of all appealed patent cases.”\textsuperscript{141} Circuit Judge Rader calculated that in 1997, the year before the Federal Circuit’s \textit{Cybor} decision, the Federal Circuit reversed almost “40% of all claim constructions.”\textsuperscript{142} Thus, in view of the court’s performance with respect to claim interpretation, the court’s performance in the area of obviousness doctrine reflects somewhat greater predictability and certainty.

In light of the frequency with which the court reversed or vacated lower tribunals, we examined how these results were distributed over time. To get a perspective of the overall reversal rate over time, we calculated a twenty-analysis lagged average of cases that were either reversed or vacated for the entire data set. The results are depicted in Figure 1 below.

\textsuperscript{139} Like the 22.9% reversal rate that we find, the 47.3% reversal rate reported by Chu does not take into account cases affirmed under Rule 36. Chu finds that Rule 36 affirmances accounted for the disposition of one-fifth of the patent cases during the twenty-eight month period. Including this information, Chu finds that the overall reversal rate for the period studied was 36.6%. \textit{Id.} at 1099–100. A separate study examining the Federal Circuit’s reversal rate over all issues reports a 22% reversal rate for district court patent cases. \textit{See} Kimberly A. Moore, \textit{Judges, Juries, and Patent Cases—An Empirical Peek Inside the Black Box}, 99 \textit{Mich. L. Rev.} 365, 396–97 (2000) (reporting reversal rates from 1993–1998). While this rate seems to align closely with the 22.9% rate that we report for the individual issue of obviousness, the 22.0% rate reported by Moore is arrived at very differently than the values reported here and those reported by Chu. For example, the Moore rate excludes data from appeals from the Patent Office while taking into account summary affirmance. \textit{See id. at 380} (reporting that the data for the study were compiled by the Administrative Office of the U.S. Courts consisting of “a population of tried cases from 1983 to 1999”); \textit{id. at 396} (stating that the data represents “district court reversal rates for all cases appealed to the Federal Circuit” (emphasis added)). Including appeals from the Patent Office provides a more complete picture of the Federal Circuit’s treatment of the doctrine, while excluding appeals that were summarily affirmed would increase the rate reported. Thus, perhaps the most that can be said regarding obviousness based on the 22% reversal rate evident in the Moore study is that, excluding appeals from the PTO, the Federal Circuit’s overall reversal rate for obviousness that we report is similar to the rate at which the court reverses district courts in all patent cases. Overall, we think this suggests substantial stability in the doctrine of obviousness, for it does not differ substantially from the court’s reversal rate across all issues and the court decides a great number of other issues.

\textsuperscript{140} However, the error was not outcome determinative in all cases. \textit{See} Chu, \textit{supra} note 4, at 1100–03.


\textsuperscript{142} \textit{Cybor Corp. v. FAS Techs., Inc.}, 138 F.3d 1448, 1476 (Fed. Cir. 1998) (Rader, J., concurring in the judgment).
Figure 1 reveals that the moving rate at which the Federal Circuit was likely to reverse or vacate a trial court remained fairly steady over the last fifteen years. This tends to suggest some level of doctrinal stability, particularly in view of the fact that the overall frequency of the court either reversing or vacating the lower tribunal was 34.8%, a value that aligns very well with the lagging rate throughout the course of the study.

The cases presenting the analyses that were the basis of the study came from a variety of procedural backgrounds. Figure 2 below shows the distribution of procedural backgrounds of the analyses that formed the data set for the study.

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143. The ordinate represents a twenty-analysis lagged average of the percentage of analyses reversed or vacated, plotted against the number of analyses. On the abscissa, the analysis number moves from left to right (1990–2005). The trendline superimposed on the graph has an $r^2 = 0.013$, $t_{obs} = 2.500$, which indicates statistical significance at the $p = 0.050$ level.
Figure 2 shows that the Federal Circuit most frequently authored an obviousness analysis when it was addressing an appeal from the Patent Office (41.8% of the analyses). Analyses from summary judgments, bench trials, and jury trials were all observed with a very similar frequency (14.4%, 18.6%, and 24.6%, respectively).

The question of obviousness is one of law. However as set forth above, the doctrine has important factual underpinnings. One potential measure of the factual influence on a doctrine is an inquiry into the level of deference a reviewing court gives to the reviewed tribunal. One way to probe the level of deference is to examine the likelihood that the appellate tribunal will affirm or reverse depending on the posture of the case. Table 2 presents the dispositions shown in the court’s analyses distributed in accordance with the procedural postures dominant in the study.

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144. The number for analyses after jury trials is the sum of JMOL-deny + JMOL-grant = 19.8% + 4.8% = 24.6%.

145. See supra section II(B)(1).

146. For example, the Graham factors are viewed by the Federal Circuit as questions of fact. McGinley v. Franklin Sports, Inc., 262 F.3d 1339, 1349 (Fed. Cir. 2001). So too, whether the prior art contains within it a teaching, suggestion, or motivation to combine is also a question of fact. In re Lee, 277 F.3d 1338, 1342-43 (Fed. Cir. 2002).
Table 2: Procedural Posture Versus Dispositions (n = 480)

<table>
<thead>
<tr>
<th></th>
<th>Affirmed</th>
<th>Reversed</th>
<th>Vacated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bench Trial</td>
<td>75.3%</td>
<td>15.7%</td>
<td>9.0%</td>
</tr>
<tr>
<td>JMOL-denied</td>
<td>81.1%</td>
<td>12.6%</td>
<td>6.3%</td>
</tr>
<tr>
<td>JMOL-granted</td>
<td>47.8%</td>
<td>43.5%</td>
<td>8.7%</td>
</tr>
<tr>
<td>PTO</td>
<td>64.1%</td>
<td>28.8%</td>
<td>7.1%</td>
</tr>
<tr>
<td>Summary Judgment</td>
<td>39.7%</td>
<td>25.0%</td>
<td>35.3%</td>
</tr>
</tbody>
</table>

The results of Table 2 suggest that, consistent with the Supreme Court’s guidance in *Graham*, the doctrine has deeply factual foundations. The results show that the Federal Circuit was substantially more likely to affirm a lower tribunal’s decision on the question of obviousness if it engaged in fact-finding. When a bench trial was held, the Federal Circuit was likely to affirm 75.3% of the time. The rate was even higher (81.1%) for cases that had been given to a jury and judgment as a matter of law (JMOL) had not been granted. Patent Office adjudication fared only slightly worse than trials in courts. And, as one might expect, where an analysis is highly fact dependent, the court reversed or vacated summary judgments on the question

147. The Federal Circuit’s performance when reviewing an obviousness determination following a bench trial is consistent with what others have observed for the court’s review of bench trials across all issues. See Moore, *supra* note 141, at 17 (reporting an affirmance rate of 77% for bench trials on the issue of validity). Chu reports affirmation rates for bench trials across all issues for his twenty-eight-month study that are somewhat less at 56%. See Chu, *supra* note 4, at 1152 tbl.B-2. The three most probable explanations for the difference between Chu and Moore are the time periods examined, their comparative breadth, and the presence of claim-construction data in the rate reported by Chu.

148. The numbers of our study are harder to compare to this rate, as prior studies have not distinguished between cases where the district judge enters judgment notwithstanding the verdict, or otherwise as a matter of law, and cases where the trial judge does not. However, the numbers are generally consistent. For jury trials Moore reports an affirmance rate for validity issues of 78%. Moore, *supra* note 141, at 17. Chu reports jury affirmation frequency for “Jury trial or JMOLs” across all issues for his twenty-eight-month study that is “somewhat less at 45%.” Chu, *supra* note 4, at 1152 tbl.B-2. There are at least four possible explanations for this. One is the different sampling periods. Another is the comparative breadth of the studies. A third is that, as Chu explains, all reviews of a judgment following a jury trial (including JMOL-granted) are included in the 45% number. Finally, a fourth is the presence of claim-construction data in the rate reported by Chu.

of obviousness over 60% of the time. Note that the court reversed or vacated JMOL-granted judgments 52.3% of the time, suggesting, by this measure at least, that the court may be wary of judgments where a lower court has taken the fact-finding function from the jury.

The examination of the functionality of the Federal Circuit’s approach to different dispositions provides another measure of the stability and clarity of the doctrine of obviousness. The cases that parties put on presumably reflect their understanding of the relevant legal principles. These understandings in turn influence the trial body’s understanding of the law and are reflected in the evidence presented to the jury. They also affect jury instructions, the trial body’s discretionary case management, and the likelihood that the court will grant JMOL. If the law is well understood and transparent, there should be little to complain about for the losing party other than the contention that the fact finder took an erroneous view of the facts. Consistent with general principles of appellate review, appellate courts do not retry facts; instead, they apply some level of deference to the determinations of the fact finder. Thus, with a fact-dependent doctrine such as obviousness, one should expect that a clearer, more stable doctrine will produce a relatively low reversal rate. On the other hand, where the law is not clear or stable, on review, the appellate court should more frequently find evidentiary decisions improperly made, jury instructions inadequate or erroneous, or cases simply lacking evidence sufficient to support their outcome. Accordingly, one measure of the clarity and stability of the Federal Circuit’s jurisprudence on obviousness is the frequency with which the court reverses the judgments of lower tribunals after the issues have been fully aired in the context of the purported governing law. Unless the court is normally unable to discern the correct application of the law and in such cases will affirm as a default, the less likely the court is to reverse, the more likely it is that the doctrine is clear and stable.

Table 2 shows that the Federal Circuit affirmed the judgment entered after a bench trial 75.3% of the time and affirmed the conclusions of a jury 81.1% of the time. This is suggestive that the doctrinal law of obviousness is both stable and clear. As the Supreme Court made clear in Graham, the inquiry into the question of obviousness is deeply factual.\[^{150}\] The breadth of the factual inquiry, the likelihood that any of a variety of factors can influence the ultimate determination, and the many moving parts of the obviousness inquiry are all good indicators that there will often be genuine issue(s) of material fact that will need to be resolved before a judgment of obvious or nonobvious can be rendered.

The conclusion that the doctrine of obviousness is relatively clear and stable is not inconsistent with the results concerning summary judgment. First of all, as noted above, the doctrine of obviousness is deeply factual, and

a variety of different facts can affect the ultimate judgment. With a higher likelihood of material facts and a rule that permits those facts to come from sources as textually unsupported as testimony concerning the knowledge and skill in the art, it is increasingly likely that genuine issues of material fact will exist in a case. Naturally, this makes it less likely for summary judgment to be appropriate on the issue of obviousness.151

Thus, the result seen in Table 2, that the Federal Circuit affirms only 39.7% of summary judgments, is consistent with the existence of a highly factual doctrine. Moreover, the low affirmation levels are not necessarily strong indicators of instability or lack of clarity. Obviousness requires a complicated and highly technical trial—a situation that is only exaggerated as more patent law issues are presented in a case. The economics of summary judgment often encourage the parties, and perhaps even more enthusiastically the lower courts,152 to attempt summary judgment.153 Thus, one likely explanation for the court’s low affirmation rates for summary judgments on the issue of obviousness is that we are seeing the court in one of its other congressionally envisioned roles—the doctrinal enforcer.

When summary judgment cannot be easily achieved on the facts of a case, another approach for litigants or courts is to attempt to modify the law. This approach has the promise of attenuating any legally required fact-finding by the interposition of layers of dispositive questions that either eliminate certain facts from the realm of materiality or, alternatively, make dispositive those facts that are undisputed. In light of the Federal Circuit’s strong tendency to affirm after a trial, and given the economics of summary judgment, it is quite possible that what Table 2 shows is the Federal Circuit repelling attempts to modify the functional approach set forth by the Supreme Court in Graham.

151. The critical reader should note that this situation could be expected to be amplified as TSM is used more frequently. See infra subpart IV(B) (describing the increased use of TSM). It is a logical result of the Federal Circuit’s requiring evidence of TSM to establish obviousness. See supra section II(B)(1). Assuming that the textual TSM is a relatively rare event, TSM must come from other sources. One common source is expert testimony describing the relevant scope, content, knowledge, and skill in the relevant art. To sustain summary judgment, the nonmovant would have to do little more than secure an expert who would contest the movant’s expert’s interpretation or description of the art.

152. There may be other reasons as well. The first is the presumption of validity. See 35 U.S.C. § 282 (2000) ("A patent shall be presumed valid."). If the lower court is going to guess, it might well align its guess with the relevant presumptions. Secondly, those with a high level of knowledge of the doctrine are probably aware that it is sometimes perceived (usually erroneously) that there may be subrules that prohibit an obvious finding, and perhaps fewer perceived subrules (in light of Graham) that direct toward a finding of obviousness. It is probably not uncommon for particularly inexperienced lower courts to become convinced that such subrules exist. Although, if true, such a phenomenon suggests at least some lack of clarity in the doctrine.

There are other reasons to think this is likely true. One way to examine the stress on the doctrine as a whole, as well as the Federal Circuit’s role in policing it, would be to examine the rate at which the court reversed or vacated summary judgment over time. This is shown in Figure 3 below.

Figure 3: Reversal Rate of Summary Judgments

The results in Figure 3 reveal that the Federal Circuit dramatically increased the rate at which it reversed or vacated a summary judgment throughout the period studied. This may suggest that, during the course of the study, the doctrine came under increasing pressure. If so, these data may reveal that the Federal Circuit has rigorously and consistently rebuffed efforts to eliminate or reduce the factual quality of the inquiry. This is potentially a prime example of the Federal Circuit playing exactly the role envisioned for it. On the other hand, stress placed on the doctrine in this matter may reflect some degree of lack of clarity or instability. If, for example, parties and lower tribunals really thought that summary judgment was legally appropriate, and these appeals were not attempts to be miserly with respect to party and judicial resources, it could suggest that the Federal Circuit is miscommunicating the doctrine to some degree. Moreover, what seems to be an increasing requirement by the court for input from fact finders

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154. The ordinate represents a ten-analysis lagged average of the percentage of analyses reversed or vacated, plotted against the number of analyses. On the abscissa, the analysis number moves from left to right (1990-2005). The trendline superimposed on the graph has a \( r^2 = 0.74 \), \( r_{obs} = 12.87 \), which indicates statistical significance at the \( p = 0.01 \) level.
could reflect that the court has limited the legal component of the obvious inquiry so that it is now very thin.

The Patent Office reversal rate\(^{155}\) was lower than expected. However, during the period of the study, the Federal Circuit altered its standard of review of PTO fact-finding in obviousness cases from “clear error” to “substantial evidence,”\(^{156}\) which is perceived as more deferential. In an effort to better understand the temporal nature of the likelihood of reversal at the PTO during the period studied, we examined the moving reversal rate. This is depicted in Figure 4.

Figure 4: Reversal Rate of Patent Office Obviousness Analyses\(^{157}\)

Figure 4 reveals that the rate at which the Federal Circuit was likely to reverse or vacate the Patent Office decreased over the course of the study. As the informed reader is aware, nearly every obviousness decision of the PTO that is reviewed by the Federal Circuit is a decision by the Board of Patent Appeals and Interferences that the disputed claims are obvious. Because of the posture of the appeals, the clear inference from this is that the PTO is more accurately determining that claims are obvious.

The fact that the PTO has fared better at establishing obviousness tends to suggest that the law of obviousness is getting clearer—or at least that it is

155. See supra Table 2 (showing a 28.8% reversal rate).
157. As in Figure 1, the ordinate represents a twenty-analysis lagged average of the percentage of analyses reversed or vacated, plotted against the number of analyses. On the abscissa, the analysis number moves from left to right (1990–2005). The trend line superimposed on the graph has an \(r^2 = 0.13\), \(t\text{-obs} = 5.14\), which is statistically significant to a level of \(p = 0.01\).
getting no less clear. In particular, the increased success of the Board suggests that it is developing a better understanding of when claims are obvious, developing a better understanding of how to articulate that determination in its opinions in a manner that is less likely to cause the court to think that the Board has erred, or both. Because the source of the Board’s guidance on how to identify and define obvious claims is the jurisprudence of the Federal Circuit, one inference is that the court has communicated to the Board how to more effectively identify and establish obvious claims.

Given that the Federal Circuit has been roundly criticized for weakening the standards of patentability, we examined the frequency with which the court reached either an obvious or a nonobvious outcome. Table 3 shows the frequency with which the court held claims either obvious or nonobvious.

<table>
<thead>
<tr>
<th>Result</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obvious</td>
<td>244</td>
<td>57.8%</td>
</tr>
<tr>
<td>Nonobvious</td>
<td>178</td>
<td>42.2%</td>
</tr>
</tbody>
</table>

Here we found that Federal Circuit review resulted in an outcome of obvious 57.8% of the time. This is a clear majority of the analyses. Note that to accommodate the fact that a result was still pending in fifty-seven decisions where the court vacated a judgment on obviousness, we excluded those results from the calculations underlying Table 3. We did not follow the ultimate disposition of the vacated cases. At least one did return for Federal Circuit review, and the disposition was therefore eventually captured, but the quantity of cases returning appears to be quite low. In any event, given the nature of the coding, there is little reason to think the return of a case from remand could have any significant distortive impact on the study results.

At least one reported study has concluded that at the Federal Circuit “obviousness has become particularly disfavored.” In view of that study,
the high frequency of obvious outcomes observed here was a bit of a surprise. Having reached an outcome of obvious nearly 60% of the time that it tested the issue, the Federal Circuit seems to have little problem finding claims obvious.

There are several differences between the two studies that make comparing them difficult. For example, the study reported here looked at Federal Circuit opinions from 1990–2005, while the prior study looked at Federal Circuit decisions for two separate two-year periods, one occurring before the period addressed by the study reported here. In addition, this study compares neither the ratio of obviousness to overall invalidity nor the Federal Circuit’s obvious outcomes to the obvious outcomes reached by the regional circuits. However, the fact that the Federal Circuit reaches an obvious outcome nearly 60% of the time that it addresses the issue seems at least somewhat inconsistent with the notion that the importance of obviousness is on the wane.

There are several ways that the results from these two studies can comfortably coexist. Perhaps the most straightforward—and consistent with the results of this study—is that the law of obviousness has gotten clearer. It may be just as important, but parties are better able to judge whether to litigate or appeal the question. This would reduce the likelihood that it appears as a decided issue in a Federal Circuit opinion. It would also explain the comparatively low rate of reversal on the issue at the Federal Circuit described above. If so, the ratio relative to other doctrines with which obviousness appears in Federal Circuit opinions may not be decisive on the importance of the doctrine or whether it is disfavored. To the contrary, it is at least equally likely evidence of the Federal Circuit’s success in cleaning up the doctrine.

162. It also is at least possible that the 1994–1995 information could be correct for that period, but because of the size of the sample, a relatively poor reflection of the overall activity of obviousness at the Federal Circuit.

163. Note that this rate is even lower when the issue is tried. See supra Table 2.

164. Another possible explanation is that parties prefer to use other doctrines to invalidate patents when they can. Anticipation is conceptually simpler, making it easier to explain to a judge or jury. As fields get crowded and patenting becomes heavy, it may be more likely that there is anticipatory art. If, as is generally thought, the Patent Office does a poor job at locating prior art, “real” prior art searching may await litigation. Then, it may be learned that there is anticipatory art, and the case is litigated on that issue. Also, other doctrines may have ascended over time.

165. One of the reasons it was thought that the Federal Circuit was needed was the high rate of regional circuit invalidity that Professor Lunney documents. See supra subpart II(A). Other studies address the rate of invalidity before the creation of the Federal Circuit. See American Patent System: Hearings Before the Subcomm. on Patents, Trademarks, and Copyrights of the S. Comm. on the Judiciary, 84th Cong. 176–85 (1956) (statement of P.J. Federico) (reporting that from 1948 to 1954, the percentage of patents found valid and infringed in the circuit courts of appeals was 18% when patents counted more than once were excluded); GLORIA K. KOENIG, PATENT INVALIDITY: A STATISTICAL AND SUBSTANTIVE ANALYSIS 4–41 (rev. ed. 1980) (reporting a likelihood of noninvalidity before the creation of the Federal Circuit of around 35%); see also Jungrson v. Ostby & Barton Co., 335 U.S. 560, 572 (Jackson, J., dissenting) (“[T]he only patent that is valid is one which this Court has not been able to get its hands on.”).
Yet another way to measure stability is across the varying technologies that are reflected in the cases for which the court authors analyses. The structure of the study permits the examination of the Federal Circuit's performance based on the technology involved in the analyses. The overall distribution of analyses based on technology is shown in Figure 5.

Figure 5: Frequency of Analyses Involving Particular Technologies

![Technology Breakdown](image)

Figure 5 captures the entire data set and shows the distribution of analyses authored by the Federal Circuit based on technology. As is apparent, a majority of the cases involved the mechanical arts (63.0%), while the chemical and electronic arts were relatively similarly represented (15.1% and 13.1%, respectively). The biotechnological arts were the least prevalent in Federal Circuit obviousness analyses, comprising only 8.8% of the analyses present in the data set.

To investigate whether the Federal Circuit disproportionately finds claims pertaining to certain arts nonobvious, we examined the frequency distribution of results based on the identity of the art involved in the analysis. Table 4 shows the distribution.
As noted above, in the study as a whole, the mechanical, chemical, electronic, and biotechnological arts were distributed at frequencies of 63.0%, 15.1%, 13.1%, and 8.8%, respectively. As Table 4 shows, when we asked whether the disposition of these analyses were obvious or nonobvious, we discovered a nearly uniform distribution of obvious and nonobvious outcomes between the mechanical (57.1% obvious/42.9% nonobvious), chemical (58.7% obvious/41.3% nonobvious), and biotechnological arts (58.3% obvious/41.7% nonobvious). The electronic arts differed somewhat, showing 46.9% obvious outcomes and 53.1% nonobvious outcomes. With the possible exception of the electronic arts, these results are pretty self-explanatory. Federal Circuit analyses of different technologies lead to the same frequency of obvious dispositions. This is consistent with the overall frequency of an obvious disposition, which is 57.8%. Thus, although these categories are clearly quite general, these results are consistent with the basic idea that the court has developed a generally stable and consistent doctrine.

In sum, the weight of the evidence suggests that the Federal Circuit has been fulfilling Congress’s promise to develop an obviousness doctrine that reduces uncertainty. The Federal Circuit’s frequency of reversal is not the “worst possible” 50% and compares favorably to its activity in other areas of the doctrine. Moreover, the court’s reversal rate on the issue of obviousness has remained steady throughout the course of the study. As might be expected for a highly factually complex doctrine, summary judgment is rarely affirmed, but jury trials and bench trials are affirmed over three-quarters of the time. In addition, the rate at which the Federal Circuit reverses the Patent Office has declined, suggesting that one of the patent system’s most important institutional players is getting better at identifying and rejecting obvious claims. When one additionally considers that the court is more likely to reach an outcome of obvious as opposed to an outcome of

<table>
<thead>
<tr>
<th>Technology</th>
<th>Obvious</th>
<th>Nonobvious</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio</td>
<td>58.3%</td>
<td>41.7%</td>
</tr>
<tr>
<td>Chemical</td>
<td>58.7%</td>
<td>41.3%</td>
</tr>
<tr>
<td>Electronic</td>
<td>46.9%</td>
<td>53.1%</td>
</tr>
<tr>
<td>Mechanical</td>
<td>57.1%</td>
<td>42.9%</td>
</tr>
</tbody>
</table>

166. See supra Figure 5.
167. See supra Table 3.
168. See supra Table 1 and accompanying discussion.
169. See supra Figure 1.
170. See supra Table 2.
nonobvious, the data suggest both that the court does not have a “pro-patentee” bias on the question of obviousness and that lower tribunals are capable of establishing the obviousness of disputed claims.

B. The Relationship Between TSM and Obviousness

As noted above, a considerable controversy has arisen concerning the Federal Circuit’s interpretation of the statutory requirement that the obviousness inquiry be temporally located “at the time the invention was made.” In particular, the interpretation requires an evidentiary showing that, more likely than not, somewhere within the prior art there is information that provides a teaching, suggestion, or motivation to collect and arrange disparate pieces of prior art to meet the claimed subject matter.

Given this controversy, we examined the application of TSM throughout the course of the study. As discussed in more detail below, the results were revealing, showing that TSM has no apparent effect on the likelihood of the Federal Circuit to affirm and little to no apparent effect on the likelihood of the court to reach an obvious disposition. Moreover, as we describe below, the results show that while the application of TSM has increased over the course of the study, the rate of a nonobvious outcome for cases involving the application of TSM declined.

To investigate the effect of the Federal Circuit’s TSM test on its overall obviousness jurisprudence, we first examined the frequency with which the application of TSM corresponded to a reversal of the lower tribunal.

Table 5: Disposition Versus Application of TSM Analysis (n = 480)

<table>
<thead>
<tr>
<th></th>
<th>TSM Applies</th>
<th>TSM Does Not Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affirm</td>
<td>65.3%</td>
<td>65.0%</td>
</tr>
<tr>
<td>Reverse</td>
<td>21.3%</td>
<td>24.3%</td>
</tr>
<tr>
<td>Vacate</td>
<td>13.4%</td>
<td>10.6%</td>
</tr>
</tbody>
</table>

Table 5 shows that the Federal Circuit reversed the lower tribunal 21.3% of the time when TSM applied. This rate of reversal was very similar to the rate of reversal observed when TSM was not a feature of the Federal Circuit’s analysis (24.3%). In addition, TSM was not observed to substantially alter the frequency with which the court was likely to vacate a judgment during the period studied. One of the most interesting features of this observation is that the court affirms quite frequently (65.3%) when

171. See supra subpart II(B).
173. See supra Table 5 (noting a less than 3% difference in the frequency of vacating judgments between when TSM applies and when it does not).
TSM applies, a frequency of affirmance that is not appreciably different from analyses that did not feature TSM (65.0%).

Table 6: TSM Analysis Versus Results (Excludes Vacated Dispositions, \( n = 187 \))

<table>
<thead>
<tr>
<th>TSM Applies</th>
<th>Obvious</th>
<th>Nonobvious</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>52.4%</td>
<td>47.6%</td>
</tr>
</tbody>
</table>

Table 6 shows the distribution of an obvious or nonobvious outcome in analyses that showed a TSM analysis.

By comparing Tables 3 and 6, it appears that the presence of TSM in an analysis slightly decreased the frequency with which the court reached an obvious disposition. The Federal Circuit reached an obvious disposition for the entire data set 57.8% of the time,\(^{174}\) while reaching an obvious disposition a slightly lower 52.4% of the time in cases that showed a TSM analysis.\(^{175}\) The similarity of these two results suggests that the overall rate of obvious outcomes has not been strongly affected by the presence of TSM in the doctrine.

This was true even though the rate of application of TSM steadily rose throughout the period studied. Figure 6 shows the rate at which TSM was featured in Federal Circuit opinions during the period studied.

\(^{174}\) See supra Table 3.

\(^{175}\) See supra Table 6.
Figure 6: Rate of Application of TSM\textsuperscript{176}

Figure 6 clearly shows that, as measured by Federal Circuit obviousness analyses, TSM is gaining in prominence as a part of the doctrine. The results presented here do not definitively show why this is true and there may be a number of reasons, none of which need be independent. For example, the TSM test may be an objective standard on which district courts, the Patent Office, and litigants feel they can hang their hats. If TSM can be proved, obviousness is established. If it can be refuted, a nonobvious result is more likely to be obtained. Moreover, in regard to the Patent Office, these results provide support for this proposition. Figure 4 shows that the reversal rate for appeals originating at the PTO declined over the same period during which the application of TSM was increasing. One reason for this may be that TSM provides a linguistic formulation that examiners and the Board can use to state their arguments for obviousness. If so, such improved clarity may be a very useful road map for establishing obviousness.

Another reason that TSM could be gaining prominence is the disposition of and force with which the Federal Circuit has authored a few of its TSM opinions.\textsuperscript{177} Another reason still may be the academic outcry, which

\textsuperscript{176} Here, the ordinate represents a twenty-analysis lagged average of the percentage of analyses showing a TSM analysis. The abscissa contains the number of analyses in the study as a whole. The analysis number moves from left to right (1990–2005). The trend line superimposed on the graph has an $r^2 = 0.45$, $t_{obs} = 19.33$, which is statistically significant to a level of $p = 0.01$.

\textsuperscript{177} See, e.g., In re Dembicczak, 175 F.3d 994, 1001 (Fed. Cir. 1999) (holding that the Board did not make the required particular findings regarding the “locus of the suggestion, teaching, or motivation to combine the prior art references”); In re Roufet, 149 F.3d 1350, 1359 (Fed. Cir. 1998) (stating that the Board must specifically identify the reasons “one of ordinary skill in the art would have been motivated to select the references and combine them to render the claimed
has to some degree characterized the TSM test as an easy means to avoid an obvious outcome.\textsuperscript{178} Whatever the reason(s), however, the results show that the frequency of obvious outcomes remained stable even in the face of a significantly increasing use of TSM.\textsuperscript{179}

Although the results discussed above suggest that TSM has little impact on the overall frequency of obvious outcomes, we questioned whether the increase in the rate of TSM shown in Figure 6 corresponded to an increase in nonobvious outcomes. If TSM is a “green light” to nonobviousness, perhaps some of the vacated outcomes were converted to nonobvious outcomes by the increasing application of TSM. Figure 7 shows the rate of a nonobvious result when TSM applies.

Figure 7: Rate of Nonobviousness Results in Analyses Applying TSM\textsuperscript{180}

What we found was quite surprising. The more TSM was used, the lower the rate of nonobvious results. This finding suggests that TSM is not a

\textsuperscript{178} See supra notes 69–71 and accompanying text.

\textsuperscript{179} Compare supra Table 3, with supra Table 6 (showing that the frequency of obvious outcomes is substantially similar between those analyses that included TSM and those that did not).

\textsuperscript{180} Here, the ordinate represents a twenty-analysis lagged average of the percentage of analyses showing a TSM analysis that produced a nonobvious result. The abscissa contains the number of analyses in the study that applied TSM. The analysis number moves from left to right (1990–2005). The trend line superimposed on the graph has an $r^2 = 0.19$, $t_{\text{obs}} = 6.50$, which is statistically significant to a level of $p = 0.01$. 
great impediment to establishing obviousness. To the contrary, the more TSM appeared in Federal Circuit analyses, the less likely it was that the outcome of the analysis was nonobvious. This lends weight to the notion that TSM might be bringing a clarity to the law of obviousness that is helping rather than hindering the demonstration of obviousness. It also indicates that TSM is not a lever or tool that the Federal Circuit uses simply to be pro-patentee or to reach a nonobvious outcome.

The TSM results may also suggest that the Federal Circuit is playing the role of the enforcer. The increase in the frequency of TSM analysis may reflect that litigants have been applying pressure to the doctrine by raising it frequently. As noted above, this may reflect some uncertainty about the doctrine. The observed increase in writing on the part of the Federal Circuit may indicate that the court has moved to address the stress that a perceived or real lack of clarity may have placed on the doctrine. It may also be confirming evidence of the elevation of the doctrine to the position of a core consideration in the obviousness determination. The fact that as the appearance of TSM increased fewer cases had a nonobvious outcome suggests that what the Federal Circuit has been teaching is that TSM is not a “green light” to a nonobvious outcome. In fact, as discussed above, it may show exactly the opposite.

Consistent with this line of thinking, the results of this study appear to suggest that TSM has not brought great inflexibility or rigidity. As seen below in Figure 8, the court appears to have broadened the use of sources valuable for establishing teaching, suggestion, or motivation. This trend—in view of the fact that as the application of TSM increased, the frequency of nonobvious outcomes decreased—may indicate that the court’s writing has been directed to explaining how to use the doctrine. Figure 8 suggests that what the court is teaching is the broad use of prior art information to establish a teaching, suggestion, or motivation that makes apparent the claimed subject matter to a person having ordinary skill in the art. Thus, these data may reveal an evolving and dynamic doctrine that is responsive and functionally concerned with the concept underlying the obviousness inquiry.

181. It is less likely that it reflects Federal Circuit freelancing, as appellate courts do not generally involve themselves with issues and arguments not raised by the parties.
182. See supra Figure 3 and accompanying text.
V. Implications and Conclusions

While this study reveals a still-incomplete picture of the law of obviousness, it does permit several significant observations about how the Federal Circuit has developed the doctrine. Collectively, the results suggest that the court’s approach to patentability is not systematically biased against obviousness. They further suggest that much of the contemporary criticism of the evolution of the doctrine under the guidance of the Federal Circuit may be exaggerated. As we discuss below, the evidence from this study undermines both the assumption that TSM is negatively affecting the patent jurisprudence and the assumption that removing TSM from the jurisprudence would provide relief from any perceived increase in the grant of noninnovative patents. Moreover, the results suggest that TSM may be playing a positive role by showing litigants and lower tribunals how to establish obviousness.

Among the results that stand out in this study are:

1. The Federal Circuit affirmed the outcome of obviousness determinations a clear majority of the time.
2. The Federal Circuit found claims obvious a clear majority of the time.
3. The overall rate at which the Federal Circuit affirmed the PTO is nearly identical to the overall affirmance rate and is increasing.
4. There has been a substantial increase in the appearance of TSM analysis in Federal Circuit opinions.
5. As TSM analysis has become more prominent in Federal Circuit opinions, the rate at which the Federal Circuit affirmed or reversed the reviewed tribunal has not substantially changed.

6. The frequency of an obvious or nonobvious outcome is not substantially different in cases that include a TSM analysis and those that do not.

7. As TSM analysis has become more prominent in Federal Circuit opinions, the rate at which the Federal Circuit reached a nonobvious outcome has decreased.

8. As TSM analysis has become more prominent in Federal Circuit opinions, the rate at which the court reversed the PTO has decreased.

9. As TSM analysis has become more prominent in Federal Circuit opinions, the court has shown an increase in the number of sources on which it relies to analyze TSM.

A. The Implications of This Study for the General Doctrinal and Normative Policy-Shaping Contentions Surrounding KSR International

The results of this study provide important information concerning the general doctrinal and political contentions involved in KSR International. Before proceeding further, however, it is important to realize that this study is not, and was not designed to be, highly probative of all of them. In particular, these results do not reveal whether there are too many noninnovative patents. Indeed, to know the answer to that question requires knowing where the line between innovative and noninnovative is; only when that line is defined may one approach the question of whether there are too many noninnovative patents. Congress has defined the line as “obvious at the time the invention was made to a person having ordinary skill in the art.” The Supreme Court defined the line with the Graham factors and the guidance that the statutory language “at the time the invention was made” should be assiduously observed. If the language the Federal Circuit uses is any guide to what it actually does, the Federal Circuit has stayed reasonably true to this framework: adding—if indeed it is an addition—the requirement that somewhere within the full scope of the prior art, whether in the prior art references themselves, the knowledge of one of ordinary skill in the art, or from the nature of the problem to be solved, must be information that teaches or suggests the claimed subject matter to a person having ordinary skill in the art. Assuming, arguendo, that with the TSM requirement the Federal Circuit has made a significant change to the doctrine in terms of the strictness

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185. See In re Dembiczak, 175 F.3d 994, 999 (Fed. Cir. 1999) (listing the above factors as those that are considered).
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185. See In re Dembiczak, 175 F.3d 994, 999 (Fed. Cir. 1999) (listing the above factors as those that are considered).
of the standard, this study was not qualitatively designed to answer the question of which most closely approximates what it means to be nonobvious.

The results of this study do, however, reveal much concerning the general issues of obviousness-related patentability that surround *KSR International*.

TSM does not appear to present a “substantial obstacle” to establishing obviousness. Rather, it appears to have the flexibility to sustain obvious outcomes. If TSM is an “inflexible rule” that presents “substantial obstacles in establishing obviousness . . . in a way that unnecessarily sustains patents that would otherwise be subject to invalidation as obvious,” the “inflexibility” of the rule should be apparent at the Federal Circuit. For the same reasons, the lower tribunal would be forced by the “rule” to enter a judgment of nonobvious, so too would the Federal Circuit. The results from this study show that such is not the case. This conclusion is shown by several results. Overall, the Federal Circuit reached an obvious outcome 57.8% of the time. In cases involving TSM, the court reached an obvious outcome 52.4% of the time. This difference is quantitatively small, suggesting that there is no substantial difference in obvious outcomes when the court applies TSM. This further suggests that litigants can make the showing necessary to establish obviousness. If TSM were inflexibly biased toward nonobviousness, it seems unlikely the court could sustain such high levels of obvious outcomes.

If TSM is a pro-patentee doctrine that makes establishing nonobviousness easy, one would expect to see more of it in the case law as patentees and patent applicants try to protect or obtain patents. This study does report an increase in the rate of TSM over the last fifteen years, but it reveals a startling additional result: As the court’s use of TSM has increased, the likelihood of an analysis concluding that claims were nonobvious has decreased. This means that the increase in the use of TSM has coincided with a reduced likelihood that patentees and patent applicants will leave the Federal Circuit with nonobvious patents or claims. The fact that the more frequently the court applies TSM, the less likely it is to reach a nonobvious outcome further suggests that TSM does not present a substantial obstacle to establishing obviousness.

TSM does not appear to present a “substantial obstacle” to the Patent Office when it comes to establishing that claimed subject matter is obvious. During the course of this study, we examined the court’s review of the Patent Office, the body thought by many to be the most handicapped by the Federal

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187. *See supra* Table 3.
188. *See supra* Table 6.
189. *See supra* Figure 6.
190. *See supra* Figure 7.
Circuit’s TSM jurisprudence. As the informed reader is aware, nearly every obviousness decision of the PTO that is reviewed by the Federal Circuit is a decision by the Board of Patent Appeals and Interferences that the disputed claims are obvious. Here, the results show\(^\text{191}\) that the reversal rate for appeals originating at the PTO declined over the same period during which the application of TSM was increasing. Perhaps the most direct inference from this is that the PTO is more accurately determining that claims are obvious or perhaps more accurately explaining how it reached the determination that claims are obvious. Either inference supports the idea that the Patent Office is capable of working in the framework of TSM\(^\text{192}\). In fact, one possible implication of the results is that the TSM formulation has been helping rather than handcuffing the Patent Office. As a question of framework dynamics, such a conclusion makes sense. Because TSM somewhat objectifies the test for obviousness, it creates a target at which the Patent Office can aim. It further provides a flexible and sweeping linguistic formulation that the Office can use to characterize its findings on the question. The finding of TSM has been held by the court to be of a factual quality and, therefore, less prone to reversal. Thus, one interpretation of the results of this study is that the Federal Circuit has provided the Patent Office the road map to establishing obviousness. A situation that, in cooperation with the deferential review\(^\text{193}\) the Office receives, has given the Patent Office the upper hand over undeserving patent applicants.

If so, the same dynamic should be present in all cases where the court reviews lower courts that have similarly characterized factual findings on the question of obviousness. Thus, if the court has in fact explained to the lower courts how to establish obviousness, one would expect to see deference to the lower courts when they decide claims are obvious after making findings and

\(^{191}\) See supra Figure 4.

\(^{192}\) A critical reader should query whether the increase in the application of TSM and the corresponding decrease in nonobvious results at the Federal Circuit is a good measure of how well the Patent Office and lower courts are using TSM. For example, one might reasonably argue that the Federal Circuit’s doctrinal pronouncements influence the selection of cases that are appealed. If so, cases where a patent challenger cannot establish TSM may be less likely to be appealed on the issue of obviousness and thus would not show up in the results of this study. While such a situation could exist, however, it relies on some not-too-well-founded assumptions. One is that the missing cases contain “obvious” subject matter that cannot be characterized as being taught or suggested by the prior art. It is at least equally likely that subject matter that cannot be characterized as taught or suggested by the prior art is nonobvious. A second assumption is that the Patent Office and litigants are not interested enough in litigating and appealing claims they firmly believe to be obvious, where those claims might be difficult to put in terms of being taught or suggested by the prior art.

If the Patent Office and litigants are pulling cases with obvious claims because they cannot characterize disputed claims as either taught or suggested by the prior art, the temporal aspect of this study might have revealed a tumble in either the frequency or rate of obviousness analyses. This was not seen. In fact, the frequency of the Federal Circuit obviousness analyses increased, albeit slightly, during the period of the study, and reversal rates remained stable for the entire fifteen-year period of the study.

\(^{193}\) See In re Gartside, 203 F.3d 1305, 1311-14 (Fed. Cir. 2000) (applying the substantial evidence standard of review to PTO findings of fact).
using or providing for a TSM characterization as the explanation for the outcome. The first of these conjunctives was observed. The second was not directly tested, but enjoys some indirect support from the observation that the rate of use of TSM increased throughout the study.

Although the Federal Circuit’s TSM prescription appears more than flexible enough to sustain obviousness judgments, it is still worth considering the argument that the court virtually requires that the information that serves as the teaching, suggestion, or motivation be written in a prior art document. It should be noted that this is, of course, incorrect as a matter of law. However, we think there is a good faith argument behind the assertion: when fact finders must use TSM, they are practically unable to use it without a written prior art document containing the teaching.

This is difficult to observe from the appellate level, but at least two things suggest that the argument may be overemphasized. The first is discussed above: lots of obvious outcomes are being reached at the Federal Circuit when the court applies TSM. The second is both more subtle and more indirect. During the course of the study, the frequency with which the Federal Circuit used different sources to establish TSM increased. This indicates that the panoply of prescribed sources are being used, and since at least two of them do not require a writing (e.g., knowledge and skill of a person having ordinary skill in the art, and the nature of the problem to be solved), it is suggestive of a fairly far reaching test, one capable of exploring the full scope of the relevant prior art.

The results of this study do not support a normative argument that excising TSM from the doctrine without a more substantive change to the Graham approach or the governing statutory law will result in an increased number of obvious outcomes. Many of the results supporting this finding have been described above: for the last fifteen years the Federal Circuit has reached an obvious outcome at a fairly high rate; over the last fifteen years, there has been only the slightest difference in obvious outcomes between cases that show the application of TSM and those that do not show the application of TSM; as the Federal Circuit uses TSM more frequently, the less likely it is to achieve an outcome of nonobvious; and as the Federal Circuit uses TSM more frequently, the less likely it is to reverse the PTO. Together these results suggest that TSM may not be the “green light” to nonobviousness that has previously been supposed. If so, this finding implies that if

194. See supra Table 2.
195. See, e.g., In re Dembiczak, 175 F.3d 994, 999 (Fed. Cir. 1999) (“We have noted that evidence of a suggestion, teaching, or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved . . . .”).
196. See supra Figure 8.
197. Given the nearly total scholarly focus on TSM, we have not in this Article made an effort to describe and rule out other features of the law of obviousness that may differ between the Graham approach laid out so long ago and the contemporary doctrine.
there is a deleterious difference in substance between the framework the Supreme Court provided in *Graham* and the current doctrinal approach utilized by the Federal Circuit, we will have to look elsewhere to find it. Finally, it suggests that those who take issue with the current level of innovation required to obtain a patent have a quarrel not with the Federal Circuit, but rather with Congress.

**B. Is the Federal Circuit Succeeding?**

Here, as before, we consider that question through the lens of the court's mandate: establishing uniformity and predictability from the inconsistency and confusion that existed prior to FCIA. While there is more to learn about the law of obviousness than can be reported in this Article, this study reveals several signs that the court is, if not succeeding, moving toward meeting its mandate. Those signs are found separately in observations concerning doctrinal stability, doctrinal evolution, and doctrinal effect.

The indicators of doctrinal stability are several. The Federal Circuit has a relatively low reversal rate on the question of obviousness that has remained stable for the last fifteen years. The court affirms the decision of lower tribunals at a ratio greater than three to one. Moreover, this rate of affirmance seems independent of whether TSM is used by the court when analyzing obviousness. The court seems to have remained loyal to the factual nature of the doctrine. Following a trial of any sort, the court is very likely to affirm and very unlikely to reverse. As one would expect from the warden of a highly factual, functional determination, the Federal Circuit frequently rejects summary judgment. Finally, the court has been surprisingly consistent across general technological identities, which may indicate an ability to evenly apply the doctrine to a variety of different techno-factual situations.

Whether the doctrine is evolving to a place that is closer to or farther from stability and predictability is harder to tell. Presently, there is at least room for optimism. Based on the increasing rate at which it appears in Federal Circuit obvious analyses, there can be little question that TSM is ascending in importance. However, contrary to the common wisdom, TSM does not appear to be a green light to a nonobvious outcome. There are signals in the results of this study, including decreasing nonobvious outcomes and decreasing reversal rates at the Patent Office, that may indicate that TSM is playing a different function. One possible function may be to take at least some of the guesswork out of obviousness decision making, both at the reviewed tribunal and on appellate review. If TSM has reduced the ambiguity in deciding obviousness and somewhat objectified the analysis, that might be a welcome improvement. Perhaps now the Patent Office and the lower courts have a linguistic formulation with which to present their findings that

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the prior art makes obvious claimed subject matter, one that can be communicated to a jury or a reviewing court while simultaneously enjoying the protection of a high level of deference.\textsuperscript{199} In addition, the increase in the rate of TSM analyses suggests that the Federal Circuit is teaching more about the doctrine. In light of the outcomes, reversal rates, and observations concerning the number of sources used, what the court appears to be teaching is how to use the different sources to establish TSM. Perhaps, then, the court has done what Congress, and later the Supreme Court, could not: it has taken a very ambiguous and subjective doctrinal concept and made it more objective in a manner that shows some degree of sensitivity and fealty to its functional nature. If so, it would be a triumph not only for the Federal Circuit, but also for the concept of institutional design it reflects.

What can the Federal Circuit do better? If it intends for TSM to be a road map to obviousness, it could be more open in saying so. Thus far it looks like the court is showing the breadth and power of the approach, and is increasingly doing so. However, it has not, as far as we know, talked openly about its true potential.

VI. Conclusion and Future Directions

Although the question cannot be completely answered in this Article, it appears that the Federal Circuit has developed a robust jurisprudence surrounding obviousness. Given the ambiguity of the obviousness concept, the developed law appears fairly stable, predictable, and procedurally certain. The results of this study further suggest that the court is staying atop this issue, writing more analyses containing TSM, and in its application teaching that the test can be used to reject the assertion that claims are nonobvious. The results of this study also cast doubt on the validity of the assertion that the TSM test has paralyzed the obviousness inquiry to the point of uselessness. Indeed, some of the results reported in this Article suggest that the opposite is true. Nor does there appear to be a strong basis to excise the TSM test from the law of obviousness, and even if it were to be done, there is little basis for the expectation that more claims would be adjudicated obvious at any tribunal.

The results presented here suggest numerous avenues for further study. For example, it would be interesting to examine district court conduct in the context of TSM. Are district courts using it as the study suggests—as the bull's-eye of obviousness? How frequently does it appear in the opinions and judgments of lower tribunals? What outcomes are reached? What, if any, are the historical patterns? Are litigants and lower courts diligent when

\textsuperscript{199} While the thought of TSM playing this role is appealing, it may also be troublesome because the Federal Circuit may have handed over a significant amount of power to the Patent Office and lower courts. If it becomes too easy to establish obviousness, doctrinal clarity may begin to fade into a battle of the experts as the obviousness determinations are subsumed into (relatively) review-immune TSM determinations.
trying the issue? Do they attempt to present nondocumentary evidence of the knowledge of the PHOSITA or the nature of the problem to be solved? How frequently is the question appealed?

Does the Patent Office complain that its examiners cannot apply the TSM? While the results reported here would appear to suggest that the Office is capable of explaining how a person of skill in the art would find claimed subject matter taught or suggested by the prior art, is the task too difficult? If so, how might the standard be better tailored to assist the Office?

Other avenues of investigation could be directed to obtaining a comprehensive measure of the number of “low-quality patents.” How is a low-quality patent to be identified? What method(s) can be used to systematically identify actual or potential low-quality patents? Are the social harms that are argued to attend the large number of issued patents less than, greater than, or equal to the benefits of having a patent system?

Under the assumption that there is indeed a problem with obviousness law—and that the problem is that it is too easy to get a patent—another avenue of investigation could be some creative thinking on how to modify the patent law to better reflect the concept, while at the same time not damaging innovation in this country and preserving the justiciability of the determination.

VII. Epilogue: The Supreme Court and the Modern Obviousness Standard

While this Article was in production, the Supreme Court heard argument and decided KSR International Co. v. Teleflex Inc. In its decision the Supreme Court—reentering the area of obviousness after a hiatus of thirty-one years—unanimously reversed a Federal Circuit decision that concluded that further fact-finding was necessary to determine whether the patent claim in suit is obvious.200 But while the outcome on the merits was widely anticipated by the bar, the substance of the Court’s opinion is a remarkable surprise.

KSR International was the first time that the Federal Circuit’s teaching, suggestion, or motivation test was addressed by the Supreme Court. As articulated by the Federal Circuit, the TSM analysis requires that for a patent claim to be obvious, the prior art must include information or knowledge that shows how and why a claimed combination of preexisting elements would have been apparent to a person having ordinary skill in the relevant art.201 When the case was argued in November of 2006, the Court expressed contempt for the Federal Circuit’s development of the TSM standard. Several Justices repeatedly commented that they could not understand it,202 and one

201. See supra section II(B)(1).
202. See, e.g., Transcript of Oral Argument at 40, KSR Int’l Co., 127 S. Ct. 1727 (No. 04-1350) (calling the standard meaningless).
Justice went so far as to call the standard “gobbledygook.” Indeed, the tone of the “colloquy” was so rough and so lopsided that it led seasoned Court observers to predict a unanimous repudiation of the TSM standard and along with it the last twenty-five years of Federal Circuit jurisprudence.

But the rhetoric expressed by the Court at oral argument is belied by the opinion that ultimately emerged in the case. For the legal standard the Court embraces is little different from the TSM standard that the Federal Circuit has traditionally applied. Before the Court’s decision in this case, the Federal Circuit jurisprudence held that claims are obvious when information, knowledge, and skill in an art provided a teaching, suggestion, or motivation to combine prior art elements in the manner claimed in a patent. After tracing this “helpful insight” back forty-six years to a predecessor court to the Federal Circuit, the Supreme Court affirmed its basic principle, holding that predictable (and therefore obvious) extensions of prior art or arrangements of prior art elements are identifiable by considering “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.”

Likewise, the Federal Circuit has traditionally encouraged the broad use of prior art information to test whether claims are obvious, i.e., from prior art references, the knowledge and skill of the ordinary artisan, or from the nature of the problem to be solved. In its opinion, the Supreme Court embraced this practice, stating that an obviousness inquiry should consider the interrelated teachings of multiple patents, the knowledge and skill of the ordinary artisan, and the demands of the marketplace or design community. Indeed, the Supreme Court emphasized that this flexibility in reviewing the context of an invention was a key element of the obviousness analysis.

Also importantly, the Supreme Court now puts its weight behind the Federal Circuit’s traditional view that a decision maker must provide an explanation for how a combination of the prior art renders the patent claim at issue obvious. Thus, according to the Supreme Court, “[t]o facilitate review, the analysis should be made explicit.” Finally, confirming the basic legal standard implemented by the Federal Circuit for more than two decades, the Court expressly rejected the primary argument opponents to the standard have long voiced—that the basis of the TSM analysis is somehow

203. See Transcript of Oral Argument, supra note 202, at 41 (“[The TSM analysis] is gobbledygook. It really is, it’s irrational.”).
204. See supra section II(B)(1).
205. KSR Int’l Co., 127 S. Ct. at 1741.
206. Id.
207. See supra Figure 8.
208. KSR Int’l Co., 127 S. Ct. at 1740–41.
209. See supra section II(B)(1).
210. KSR Int’l Co., 127 S. Ct. at 1741 (citing In re Kahn, 441 F.3d 977, 988 (Fed. Cir. 2006)).
inconsistent with the guidance the Court long ago provided in *Graham v. John Deere*.211

Although the Court in *KSR International* gives its imprimatur to the principle of TSM, it does see error in the Federal Circuit’s opinion in the actual case at hand. In particular, the Court sees in the Federal Circuit’s analysis a too-rigid application of the test. Note, however, that in the context of the Federal Circuit’s *KSR International* opinion, this is quite unremarkable. The designation of the opinion as nonprecedential suggests that it was directed to the parties in the context of the specific case.212 Thus, one would not expect it to contain a full, nuanced exposition of the law of obviousness, nor would one expect much of an application of the doctrine beyond that strictly required by the particular factual and legal context of the case. In a jurisprudential sense, however, this approach—generally upholding the basis of the TSM approach, while condemning its application in this case—allows the Court to emphasize its most critical advice regarding the law of obviousness. Namely, when a decision maker examines the content and teachings of the prior art for information or knowledge that shows how and why a claimed combination would have been apparent to a person having ordinary skill in the relevant art, the court should endeavor to remain flexible in its approach. A decision on the question of obviousness, notes the Court, should reflect both an effort to maintain a liberal view of sources of information relevant to an obviousness analysis, as well as a searching consideration of how prior art information may be understood and applied by a person of ordinary skill in the art. As stated by the Court:

> The obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents. The diversity of inventive pursuits and of modern technology counsels against limiting the analysis in this way.213

Finally, we note that in many ways, the Supreme Court’s opinion in *KSR International* raises as many questions as it answers. We point out a few below.

**Doctrinal Questions.** How, if at all, must the Federal Circuit’s TSM analysis jurisprudence change to reflect the new teachings? In our view, the TSM analysis emerges from *KSR International* largely intact, as long as it is applied in ways that maintain flexibility. This suggests that it is unlikely that the Federal Circuit will seek to make any significant doctrinal change.

211. See *KSR Int’l Co.*, 127 S. Ct. at 1741 (“There is no necessary inconsistency between the idea underlying the TSM test and the *Graham* analysis.”).

212. See FED. CIR. R. APP. P. 47.6(b) (indicating that opinions designated as nonprecedential may not be cited as precedent by parties other than for purposes of estoppel or law of the case).

The Supreme Court and Patent Policy. Is the Supreme Court moving toward a more hands-off approach in its use of policy to shape patent law? A number of the Court’s recent opinions are notable for including in their analysis broad discussions of patent policy.\textsuperscript{214} In contrast, the \textit{KSR International} opinion is bereft of the broad policy discussions that have animated other recent patent decisions. Moreover, the opinion fails to meaningfully address the important concern of hindsight bias (a critical issue in obviousness analysis). Does this suggest a step back by the Court from its recent foray into shaping the patent law? Has the Court decided that patent policy is either too difficult or too intractable to serve as an effective analytical tool for the most significant patent issues? At present, it is too early to tell, but the absence of any substantial discussion of patent policy in the \textit{KSR International} opinion does raise this question.

Decision Making by the Supreme Court. How did the Court move from viewing the TSM standard as “gobbledygook” to declaring it a “helpful insight?” The answer will probably never be completely clear. One view, consistent with the analysis in this Article, is that the promises made in the rhetoric leading up to the case were simply not fulfilled when the Court took a close look at the law. That is, notwithstanding overbroad statements concerning the rigidity of the Federal Circuit’s doctrine and a causal link between the TSM analysis and low-patent quality, the facts simply did not support the claims. This view is also consistent with other contemporaneous articles analyzing the Federal Circuit’s obviousness law,\textsuperscript{215} and was a point forcefully made by several academics\textsuperscript{216} and pursued by advocates before the Court in the run-up to the \textit{KSR International} decision.\textsuperscript{217}

The ultimate influence of the Supreme Court’s opinion on the law of obviousness will need to await future interpretations and applications by the Federal Circuit. On its face, however, the opinion preserves the core


\textsuperscript{215} See Christopher A. Cotropia, \textit{Nonobviousness and the Federal Circuit: An Empirical Analysis of Recent Case Law}, 82 NOTRE DAME L. REV. 911, 952–53 (2007) (summarizing findings that “should, at the very least, give pause to recent calls to modify or do away with the suggestion test and the Federal Circuit’s recent nonobviousness jurisprudence”); Gregory Mandel, \textit{Patently Non-Obvious II: Experimental Study on the Hindsight Issue Before the Supreme Court in KSR v. Telex}, 9 YALE J.L. & TECH. I, 38 (2007) (“The study reported here, however, reveals that even if the non-obvious standard is too low, it is not because of the Federal Circuit’s suggestion test. The suggestion requirement simply does not appear to reduce the likelihood of an invention being held obvious.”).

\textsuperscript{216} Brief of Business and Law Professors as Amici Curiae in Support of the Respondents at 2, \textit{KSR Int’l Co.}, 127 S. Ct. 1727 (No. 04-1350) (“We conclude that while the analysis is imperfect, and aspects of the Court of Appeals’ caselaw should be clarified, [the TSM] approach provides the best available analytic framework for implementing the statutory and constitutional goals of the nonobviousness requirement.”).

\textsuperscript{217} See Transcript of Oral Argument, \textit{supra} note 202, at 36 (“[T]he Federal Circuit has made quite clear that its test is inclusive, and we think that that establishes that it’s not necessary to add some new sort of undetermined test . . . .”).
principle that already guides the Federal Circuit’s case law. Moreover, the interim guidance from the Patent Office appears to take the same view. Thus, while the Court’s *KSR International* opinion may well muddy the waters of patentability for a time as the early obviousness cases work their way through the Federal Circuit, we do not expect that the case will work a serious upset to the settled expectations of the innovation community in the United States.

Appendix

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