

Causal Effects Of Patent Lawsuits On M&A Activity

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ABSTRACT

I investigate whether there exists a causal relation between result of a patent lawsuit and alleged infringer's subsequent M&A activity. I find that if the court gives an infringement decision, then the infringer sharply increases spending on focused M&A and decreases on diversifying M&A. Moreover, the infringer specifically acquires targets that have substitute patents so that it can redesign its products or form a shield against future lawsuits. Patent motivated acquisition channel is new to our literature and different than the traditional knowledge transfer channel. For the experiment, I hand collect detailed data on all patent lawsuits that were appealed to Court of Appeals for the Federal Circuit (CAFC). In this court, decisions are given by majority in randomly assigned 3 judge panels. In a setting that resembles regression discontinuity design, I use only the lawsuits where there was a dissenting judge (i.e, decision was given by 2 to 1). Since CAFC is the only appellate court for patents and has federal jurisdiction, my experiment is not subject to endogeneity problem stemmed from court selection. This is the first paper to use dissenting judge lawsuits for identification strategy. The same approach be can be generalized to other types of litigations.

JEL classifications: G34, O32, K10.

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“Last year, for the first time, spending by Apple and Google on patent lawsuits and unusually big-dollar patent purchases exceeded spending on research and development of new products, according to public filings.”

New York Times (10/8/2012) ¹

Competition in product markets gives rise to a new war arena: patent litigations. From 2010 to 2012, there was a twofold increase in the number of patent lawsuits filed in U.S. district courts². This sharp increase was also accompanied by unprecedented damage awards. For example, in 2012, jury patent infringement awards three times exceeded one billion dollars. Excessive threat of litigation also shapes firm resource allocations. In 2011, for the first time, spending by Apple and Google on patent lawsuits and patent purchases exceeded spending on R&D of its new products. Despite its growing economic significance, causal effects of patent litigations on corporate policies has not been investigated, mainly because of the lack of appropriate empirical setting.

In this paper, I fill this void in the literature and investigate the causal effects of patent litigations on M&A activity. Specifically, I ask the following questions: Does losing in a patent litigation cause an alleged infringer to make particular type of acquisitions (i.e, focused vs. diversifying)? If it does, what are the explicit transmission mechanisms? I find that if the court finds a patent infringement, then the infringer sharply increases spending on focused acquisitions and decreases spending on diversifying acquisitions. Moreover, I also find that the infringer specifically conducts patent motivated acquisitions, in which it acquires targets that have alternative patents to the ones it was found infringing. Acquired alternative patents provide the infringer the opportunity to redesign its products or form a shield against future lawsuits. The litigation caused acquisitions explain a sizable portion of the overall M&A activity; a conservative calculation demonstrates that these results explain around 8% of all focused acquisitions and around 4% of all domestic M&A transactions.

The main challenge to test these hypotheses is the endogeneity problem. Unobservable variables that drive a firm to win or lose a case may also drive the firm to make a particular type of acquisition. Therefore, a hypothetical experiment setup requires random assignment of alleged infringers to control and treatment samples. The control group should include alleged infringers who prevail in

¹“The Patent, Used as a Sword”, New York Times, October 7, 2012.

²2714 patent infringement lawsuits filed in U.S. District courts in 2010 escalated to 5423 lawsuits in 2012.

the case and are able to continue its production. Treatment group should include alleged infringers who lost the case and may need to stop producing infringing products. In this framework, the strength of the identification strategy relies on the degree that assignment to control and treatment groups is not correlated with unobservable variables of alleged infringers.

To solve this identification challenge, I propose a unique experimental setting that exploits the institutional details of the patent court system. In the U.S., a patent infringement claim is initiated in U.S. district courts. If any of the parties is not satisfied with district court decision, then it can appeal to the higher court, the Court of Appeals for the Federal Circuit (CAFC). It is the only appellate court for patent cases and has federal jurisdiction. In CAFC, cases are heard by randomly assigned 3-judge panels. The decision is given by the majority rule and the judges in the panel can dissent by writing a dissenting opinion. For my experiment, I hand collect detailed data for all cases with a dissenting judge (i.e., decisions was given by 2 to 1) to assign alleged infringers to treatment and control groups. The dissenting judge cases are rare; they make less than 0.4% of patent lawsuit universe. Therefore, I argue that assignment of alleged infringer to experiment groups is close to random and my estimations establish a causal relation.

This identification strategy is also robust to many endogeneity concerns. First, due to the unique institutional structure, CAFC is the only appellate level court for patents and is located in Washington, DC. Therefore, my experiment is not subject to selection problem due to forum shopping. This unique structure for patent appellate court is different than for other types of litigations (e.g, bankruptcy) in which parties may select a court in a favorable location. Second, it may be argued that since writing a dissenting opinion may take a significant time, a judge would dissent less in the times of high case load. Such a situation may raise endogeneity issues due to mismeasurement of the dissenting cases. However, my statistics show that there is no relation between caseload and number of dissents. Third, it may be possible that some judge may dissent less in some periods due to career concerns. However, this concern is minimal since all CAFC judges are appointed with life tenure. Fourth, it may be the case that parties may know CAFC decision due to judge’s specific orientation. However, the evidences show that it is difficult to predict CAFC decisions beforehand. [Allison and Lemley \(2000\)](#) investigates whether CAFC judges are pro-patent or anti-patent and they conclude that: “Judges do not fit easily into pro-patent or anti-patent categories, or into affirmers and reversers.”

The patent motivated acquisition hypothesis is also backed by anecdotal evidences. For example, in 2012, Google acquired Motorola for \$12.4 billion. In this transaction, Google paid \$5.5 bil. for patents, \$2.9 bil. for cash acquired and \$4bil. for Motorola business and other assets. In a couple months after the acquisition, Google sold Motorola Home Business for \$2.4 billion. Experts analyzing these transactions say that Google was never interested in Motorola business; what it wanted from the beginning was the Motorola’s Android patents to protect itself against Apple’s lawsuits³. This paper shows that Google example is not just an outlier; instead, patents are an important reason for acquisition decisions. Consistent with this argument, CRA International and K&L Gates North America senior executives survey finds that 72% of private equity respondents and 85% of corporate respondents agree that intellectual property (IP) portfolios are equally if not more important than other assets when evaluating a target (K&L Gates & CRA (2008)).

The patent motivated acquisition channel brings a new complementary perspective to the existing literature. The previous literature documents that M&As occur for technology reasons (Betton, Eckbo and Thorburn (2008); Kaplan (2000) and synergies are the main drivers of these transactions (Andrade, Mitchell and Stafford (2001)). In the traditional view, Holmstrom and Roberts (1998) discuss that M&A may be conducted because of knowledge transfer. Complementary knowledge in the target can be used to foster innovation inside the company. Bena and Li (2013) shows strong empirical evidence that synergies obtained from combining innovation capabilities are important drivers of M&A activity. Patent acquisition channel is distinct from knowledge transfer channel in that companies may already have the knowledge for production but may only need legal protection against lawsuits.

How does need for legal protection create incentives for M&A? If an alleged infringer loses the case, it may get an injunction order, which requires it to stop producing products. In addition, the infringer may also need to pay high damage awards or royalty fees⁴ (see Table X). Besides these direct legal enforcement costs, diminished reputation in the product markets may yield the infringer to lose its prospective customers. Then, an infringement decision may lead the infringer to make two different, not mutually exclusive, types of acquisitions.

³(i) “Google to Sell Motorola Home to Arris for \$2.35 Billion”, Bloomberg- Dec20, 2012. (ii) “Google to Buy Motorola Mobility for \$12.5 Billion”, Wall Street Journal.

⁴35 U.S.C §284: “Upon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer, together with interest and costs as fixed by the court.”

On the one hand, since the company may not be able to produce its products, a diversifying acquisition may be optimal for the infringer to access some unrelated industries to find a new product (Matsusaka (2001)). On the other hand, an infringer may want to conduct focused M&A to obtain alternative patents to the ones it was found infringing. These alternative patents may bring important benefits. First, if the infringer can not get a license⁵ from the patent holder or the license is not on reasonable terms, these acquired alternative patents may help the firm redesign its products and pursue its production. For example, Stratasy Ltd. states in SEC filings that⁶: “claims of intellectual property infringement successfully asserted against us may require us to redesign infringing technology...”. Second, even though a company gets a license from the plaintiff, the court’s finding of infringement increases the conditional probability that alternative patents of other companies are also infringed. Therefore, infringer may be required to get a license also from other alternative patent holders. Acquiring a patent portfolio, however, provides the opportunity to make counterclaims for the possible future plaintiffs. For example, in 2012, Facebook countersued Yahoo with patents acquired after being sued by Yahoo⁷.

This paper has several contributions to the literature. First, in this paper, I propose a new motive for M&A activity: the patent acquisition channel. This channel is distinct from the traditional knowledge transfer channel. According to the traditional view, buying patent may not be feasible. After the value of an innovation established, most of the relevant information is disclosed and a potential buyer may have no incentive to acquire. However, I show that companies may already have the knowledge but only need legal protection against lawsuits. Therefore, patent motivated acquisition channel is an important complement to the previous literature.

Second, to my knowledge, this is the first paper to show a causal effect of how patent litigations affect M&A market. Especially, given the recent increase in number of patent litigations, my experiment shows that, in a conservative calculation, this channel explains at least 4% of all domestic M&A activity. This causal relation is important also for policymakers. In 2011, Congress passed the Leahy-Smith America Invents Act (AIA), which brought the most significant change to the U.S. patent system since 1952 (Matal (2012)). Moreover, some additional fundamental reforms to

⁵Extreme Network Inc. 10-Q (May-2013): “an adverse court order or a settlement could require us, among other actions, to: obtain a royalty bearing license to sell or use the relevant technology, and that license may not be available on reasonable terms or available at all.”

⁶Stratasy Ltd. 20-F (March-2013).

⁷“Yahoo-Facebook: Brace for the countersuit”, CNN Money, March 13, 2012.

the U.S. patent law are still debated ([White House Press Release \(2013\)](#)). In the midst of these law changes, my results can help policymakers regarding possible effects of law changes on corporate finance decisions.

Third, this is the first paper to use dissenting judge decisions for identification strategy. Although I used the strategy for patent lawsuits, it can easily be generalized to other litigations such as antitrust, securities litigations, corporate governance and etc.

The remainder of this article is organized as follows. Section [I](#) provides an overview of institutional details of a patent litigation including patent enforcement and court structure. Section [II](#) describes the hand collected data and other data sources. Section [III](#) explains the main hypotheses. Section [IV](#) discusses econometric methodology and results. Section [V](#) concludes and Section [VIII](#) provides patent law glossary and other patent law related materials.

I. Institutional Background

A. *What is A Patent?*

A patent is a grant by the government, grounded in Article I, section 8, clause 8 of the U.S. Constitution, that gives the patent owner the exclusive right to make, use, offer for sale, sell, and import the invention described in the patent⁸ for a specific term⁹. In essence, a patent represents a bargain between an inventor and society: in return for inventing something new and disclosing it to the world, the inventor gets the reward of a temporary monopoly over that invention. In order to qualify for a patent, however, an invention must be new, useful, and not obvious based on what a person skilled in the field of the invention knew at the time of the invention¹⁰. The inventor must also describe to persons skilled in the art how to use the invention, and must disclose the best mode known to her for using or “practicing the invention”¹¹.

⁸35 U.S.C. §271(a)(2000).

⁹For applications filed on or after June 8, 1995, the patent term is 20 years from the filing date of the earliest U.S. application to which priority is claimed (excluding provisional applications). For applications filed before June 8, 1995 and for patents that were still in force on June 8, 1995, the patent term is either 17 years from the issue date or 20 years from the filing date of the earliest U.S. or international (PCT) application to which priority is claimed (excluding provisional applications), the longer term applying.

¹⁰35 U.S.C §102, 103.

¹¹35 U.S.C §112

B. Patent Enforcement

A patent holder who believes that someone else is making, using, selling, offering for sale, or importing a product or process that incorporates invention claimed in the patent, can sue an unauthorized party for infringement of the patent under 35 U.S.C. §281. The patentee typically seeks both money damages and an injunction¹², which stops an infringer producing infringing product, as well as awards of enhanced damages and attorneys fees¹³ because of willful infringement. In the patent litigation, accused infringers almost always defense themselves in 3 ways: i) they allege that the patent claims asserted against them are invalid for failure to comply with the patent laws, ii) their products are not infringing the underlying patent and iii) litigated patent is unenforceable because of the patentees inequitable conduct in procuring the patent from the PTO by failing to comply with the duty of candor before the PTO (Federal Judicial Center, 2009). The details of these defenses can be found in Section VIII.A.

C. Patent Litigation

In this section, I will review the possible stages of a patent litigation after plaintiff filed the initial complaint. All patent infringement suits are initiated in US District Courts. If any of the parties is not satisfied with the court verdict, then it can appeal to the higher court, Court of Appeals For the Federal Circuit (CAFC). Depending on the CAFC decision, any of the parties can request Supreme Court to hear the case. However, the Supreme Court has discretionary review process which provides the court the authority to decide which appeals they will consider from among the cases submitted to them. The Supreme Court rejects to hear the case in more than 98% of all cases appealed to it¹⁴, asserting that typically CAFC decision is final. From the year CAFC established, 1982, to 2012, the Supreme Court reviewed only 30 patent cases, making an average of 1 case/year. For this reason, CAFC is generally known as “Supreme Court of Patent Cases”¹⁵.

¹²35 U.S.C §283

¹³35 U.S.C. §284 and 285

¹⁴<http://www.uscourts.gov/educational-resources/get-informed/supreme-court/supreme-court-procedures.aspx>

¹⁵Mark D. Janis, Patent Law in the Age of the Invisible Supreme Court, 2001 Univ. of Illinois Law Rev. 387, (“The Court of Appeals for the Federal Circuit . . . has become the de facto supreme court of patents)

C.1. Lower Court: US District Courts

In the US, according to 28 U.S.C. §1331 & §1338, federal district courts have exclusive subject matter jurisdiction over patent infringement claims. Therefore, all patent infringement claims must be filed in federal district courts. Any federal district court in any jurisdiction may preside over the case, so long as the requirements of personal jurisdiction and venue are met. On this issue, the Federal Circuit has clarified that for corporate defendants, venue in a patent case generally exists wherever personal jurisdiction exists¹⁶. According to 28 U.S.C. §1391(c), the personal jurisdiction requirement is met if defendants sell, offers to sell or license a product in the underlying forum. Since majority of the public companies sell their products in most of the states, practically forum shopping is quite common in district court level. TableXVII shows the number of patent infringement claims initiated in each district court in 2005-2012 period.

C.2. Upper Court: Court of Appeals For the Federal Circuit (CAFC)

In 1975, the Hruska Commission¹⁷ submitted its report (67 F.R.D. 195 [1975]) to Congress for making a reform that would allow to decrease the number of appeals in the US judicial system. In this report, commissioners stressed a lack of uniformity in U.S. patent law across the geographical circuits and the resulting practice of forum shopping in patent cases. To address these problems, the Hruska Commission recommended that a national appeals court be established to handle patent litigations (67 F.R.D. at 371). Congress responded to these recommendations with the Federal Courts Improvement Act of 1982¹⁸, which created the United States Court of Appeals for the Federal Circuit¹⁹ under Article III of the Constitution as the sole U.S. appeals court in patent cases.

CAFC is unique among the thirteen U.S. Courts of Appeals because it is the only appellate court that has nationwide jurisdiction over certain subject matters²⁰, including patents. Moreover, since

¹⁶VE Holding Corp. v. Johnson Gas Appliance Co., 917 F.2d 1574, 1583-84 (Fed. Cir. 1990)

¹⁷Commission on Revision of the Federal Court Appellate System, Structure and Internal Procedures

¹⁸(Pub. L. No. 164, 97th Cong., 2d Sess. [April 2, 1982])

¹⁹The Federal Courts Improvement Act of 1982 established two new courts: the United States Court of Appeals for the Federal Circuit (Federal Circuit) and the United States Court of Federal Claims while terminating two courts: the United States Court of Customs and Patent Appeals (CCPA) and the United States Court of Claims

²⁰It has nationwide jurisdiction in a variety of subject areas, including international trade, government contracts, patents, trademarks, certain money claims against the United States government, federal personnel, veterans' benefits, and public safety officers' benefits claims. Appeals to the court come from all federal district courts, the United States Court of Federal Claims, the United States Court of International Trade, and the United States Court of

there is only one court, any party that is not satisfied with a district court judgement in a patent litigation should appeal the case to CAFC, which is located in Washington DC. This structure of CAFC eliminates forum shopping in appellate level for patent litigations since 1982. The authority of other courts of appeals, which have jurisdiction on other issues such as bankruptcy etc., however, is restricted by geographic location and thus there may be differing judicial standards depending on location.

The judges in CAFC are appointed by the President, with the advice and consent of the Senate. Once appointed, justices have life tenure unless they resign, retire, take senior status, or are removed after impeachment. In the court, twelve judges are appointed for active service. When eligible, judges may elect to take senior status, which permits them to continue to serve on the court while handling fewer cases than a judge in active service.

In CAFC, patent infringement appeals are heard by three judge panels, in which judges are randomly assigned among CAFC judges²¹. In a panel, verdict is given by the majority rule (i.e, agreement of 2 judges is sufficient to rise panel's judgment). If the one of the judges disagrees with the decision of majority opinion, then he or she can write a dissenting opinion, which neither creates a binding precedent nor does it become a part of case law. However, a dissenting opinion may be cited in future cases as a persuasive authority when arguing that the court's holding should be limited or overturned. If any of the judges in the panel agrees with the decision made by the majority of the court, but states different reasons as the basis for his or her decision, then he or she writes a concurring opinion. In the cases, when no absolute majority of the court can agree on the basis for deciding the case, the decision of the court may be contained in a number of concurring opinions, and the concurring opinion joined by the greatest number of judges is referred as the plurality opinion.

Appeals for Veterans Claims. The court also takes appeals of certain administrative agencies' decisions, including the United States Merit Systems Protection Board, the Boards of Contract Appeals, the Board of Patent Appeals and Interferences, and the Trademark Trial and Appeals Board. <http://www.cafc.uscourts.gov/the-court/court-jurisdiction.html>

²¹<http://www.cafc.uscourts.gov/the-court/court-jurisdiction.html>

II. Hand Collected Dataset

A. Data Sources

In this paper, I used the following data sources: BloombergLaw, WestLaw, LexMachina, Harvard Patent Database, The KPSS patent data, CapitalIQ, Compustat, CRSP and SDC M&A. In the following sections, I will describe the details of each database and explain the filters used.

B. Hand Collection of Dissenting Judge Decisions

The main database that I used for court decisions is BloombergLaw, which offers access to primary legal content, court dockets, legal filings and reports from Bloomberg legal analysts. I create my initial sample by searching all U.S. CAFC Opinions from the founding year of CAFC, 1/1/1983, to 12/31/2011 with the keywords “dissent! and patent”. This search returns 757 court opinions; 662 of these opinions are related with patent law and the rest is about other type of laws including civil procedure, trademark law, copyright law etc. 199 out of 658 cases are appeals raised from United States Patent and Trademark Office (USPTO) or International Trade Commission (ITC). Since my interest in this paper is only the appeals raised from U.S District Courts, I eliminate appeals from the other governmental offices. This filtering leaves me with 459 court opinions.

To include into my sample, I read each opinion whether it is a “dispositive” one, which means that as it leaves the Federal Circuit, at least one claim of one patent is finally adjudicated to have been infringed and not invalid or unenforceable (i.e., a win for the patent owner), or in which it has been finally determined that no claim has these characteristics (a win for the accused infringer). I include all dispositive decisions of the Federal Circuit, whether by precedential opinion, nonprecedential opinion, or per curiam affirmance without opinion under the courts Rule 36. Then, using Westlaw database, I check the history of each case to make sure that this case was not appealed to the Supreme Court or reheard in an en banc decision in a later stage. After excluding non-dissenting decisions and using these filters, I get 202 dispositive opinions, in which one of the judges have a dissenting opinion. In section [II.C](#), I give some examples of dispositive and non-dispositive decisions according to the this definition. In section [II.C.1](#), I provide an example for a dissenting judge decision.

C. Examples for Dispositive & Non-Dispositive Decisions

- **Non-Dispositive:** “Applied Medical Resources Corporation (“Applied”) appeals from a decision of the United States District Court for the Central District of California granting summary judgment of non-infringement of United States Patent No. 5,385,553 (“the ’553 patent”) in favor of United States Surgical Corporation (“U.S.Surgical”). See *Applied Med. Res. Corp. v. U.S. Surgical Corp.*, No. SA CV 03-1267 (C.D.Cal. Mar. 7, 2005) (“Applied Opinion”). Because we conclude that there are genuine issues of material fact regarding infringement of the ’553 patent given the claim construction adopted by the district court, we vacate the district court’s grant of summary judgment and remand for further proceedings consistent with this opinion.”
- **Non-Dispositive:** “Cancer Research Technology Limited and Schering Corporation (collectively, “Cancer Research”) appeal from the final decision of the United States District Court for the District of Delaware holding U.S. Patent 5, 260, 291 (“the ‘291 patent”) unenforceable for prosecution laches and inequitable conduct. [**1938] *Cancer Research Tech. v. Barr Labs., Inc.*, 679 F.Supp.2d 560 (D.Del. 2010). We reverse.”
- **Dispositive:** “This appeal is from the judgment of the United States District Court for the Western District of Virginia, Danville Division (Turk, C.J.), in a patent infringement suit brought by Milliken Research Corporation against Dan River, Inc. for infringement of Milliken’s U.S. Patents Nos. 3,254,510 and 3,277,673, to Lesley. The district court held both patents (the Lesley patents) invalid for obviousness under 35 U.S.C. Section 103. We affirm.”
- **Dispositive:** “Teva Pharmaceuticals USA, Inc. (“Teva”) appeals the final judgment of the United States District Court of Delaware, which, after a bench trial, found Merck & Co.’s (“Merck”) U.S. Patent No. 5,994,329 (issued Nov. 30, 1999) (“the ’329 patent”) not invalid as anticipated or obvious. The district court further found the ’329 patent to be enforceable, and the ’329 patent claims 23 and 37 constructively infringed by Teva’s Abbreviated New Drug Application (“ANDA”) under 35 U.S.C. Section 271(e)(2)(A) of the Hatch-Waxman Act. *Merck & Co., Inc. v. Teva Pharms. USA, Inc.*, 288 F.Supp.2d 601 (D.Del.2003) (“Merck”); *Merck & Co., Inc. v. Teva Pharms. USA, Inc.*, No. 01-CV-0048, Order (D.Del. Sept. 24, 2003) (Final Judgment Order Pursuant to Fed.R.Civ.P. 54(b)) (“Final Judgment Order”).

We disagree with the district court’s construction of the claim term “about” in claims 23 and 37 of the ’329 patent. Because we further hold claims 23 and 37 obvious in light of the prior art, we vacate the judgment of the district court and hold the claims invalid and not infringed.”

C.1. An Example of A Dissenting Case in CAFC:

In this section, I will summarize an example of a patent lawsuit²², in which one of the judges in the panel filed a dissenting opinion. In this case, General American Transportation Corp. (“GATC”) sues Cryo-Trans, Inc. in the U.S. District Court for the Northern District of Illinois to declare that it does not infringe U.S. Patent 4,704,876 (’876). The district court judge Ruben Castillo, J. ruled that patents are valid, enforceable and GATC infringed the ’876 patent. Having these findings, the judge entered a permanent injunction, prohibiting GATC using, selling, producing its alleged products and also held GATC pay Cryo-Trans, Inc. \$8,983,440 in damages.

After the District Court’s finding of infringement, GATC appealed the case claiming that ’876 patent is invalid and it did not infringe. In the appellate court, the Circuit judges Mayer, Lourie and Schall were randomly assigned to the case to investigate GATC claims. The judges Lourie and Schall ruled that patents are valid but GATC did not infringe the patent. In their majority opinion, they held that in claim construction phase the district court made an error, which caused an erroneous finding of infringement against GATC. Given that a patent infringement enforcement requires both patent validity and infringement, Lourie and Schall judgement reverses the district court ruling and find that GATC can not be hold liable for patent infringement. As a consequence, permanent injunction entered against GATC will be reversed, giving GATC its right back for using, selling, producing of its alleged products. Moreover, after CAFC finding, GATC is also relieved from paying Cryo-Trans, Inc. \$8,983,440 in damages.

Mayer, the other circuit judge in the panel, however, did not agree with Lourie and Schall findings. In his dissenting opinion, Mayer discussed that the district court correctly construed the claim limitation and it also correctly held that GATC infringed the ’876 patent. In the below, I provide quotes of this dissenting opinion as well as the majority opinion from the original court document.

²²General American Transportation Corp. v. Cryo-Trans, Inc., 93 F.3d 766.

Parties: General American Transportation Corp. (Plaintiff-Appellant) & Cryo-Trans, Inc. (Defendant-Appellee).

Rehearing Availability: Rehearing Denied; Suggestion for Rehearing In Banc Declined.

Judges in the Panel: MAYER, LOURIE, and SCHALL, Circuit Judges.

Result: Judgment Affirmed (In Part), Judgment Reversed (In Part)

Summary: “General American Transportation Corp. (“GATC”) appeals from the judgment of the United States District Court for the Northern District of Illinois in which the court held GATC liable for patent infringement, awarded Cryo-Trans, Inc. \$8,983,440 in damages, and entered a permanent injunction against GATC. *General Am. Transp. Corp. v. Cryo-Trans, Inc.*, 897 F.Supp. 1121 (N.D.Ill.1995); *General Am. Transp. Corp. v. Cryo-Trans, Inc.*, 893 F.Supp. 774 (N.D.Ill.1995). Because the court correctly held that the patent was not proved invalid, but misconstrued the claims and clearly erred in finding infringement, we affirm in part and reverse in part.”

Conclusion: “The district court erred as a matter of law in construing the claims and clearly erred in finding infringement. Accordingly, the court’s decision finding infringement, awarding damages, and entering a permanent injunction is reversed. Its conclusion concerning validity is affirmed.”

Majority Opinion: LOURIE, Circuit Judge, writes the majority opinion and SCHALL, Circuit Judge, joins.

“...GATC argues that the district court misconstrued the claim language openings through said ceiling means adjacent to each of said side walls and end walls, which led to a clearly erroneous finding of infringement. We agree. As explained below, the district court incorrectly held that openings adjacent to the side walls could also be considered to be openings adjacent to the end walls. *That error led to a clearly erroneous finding of infringement.* To ascertain the meaning of the claims, we consider the claim language, the specification, and the prosecution history. *Markman*, 52 F.3d at 979, 34 USPQ2d at 1329. Here, the claim language itself distinguishes between the openings that are adjacent to the side walls and those that are adjacent to the end walls. Specifically, the

claims require “openings ... adjacent each of said side walls and end walls,” which suggests that the openings adjacent to the side walls are structurally distinct from the openings adjacent to the end walls. The district court’s claim construction obliterated that distinction...”

Dissenting Opinion: MAYER, Circuit Judge, dissenting.

“The district court correctly construed the only claim limitation in dispute: “[T]he term ‘adjacent’ as used in the ‘876 patent means ‘not far off.’ ” The court then found that the openings nearest the end walls of General American Transportation Corporation’s (GATC) accused railcar were “adjacent” to those walls and therefore literally infringed the claim. I see no error in claim construction or in the finding of infringement....”

III. Hypotheses Development

A. Hypothesis 1: Does an alleged infringer increase focused (diversified) acquisitions after losing the lawsuit?

Why does the outcome of an infringement lawsuit drive a firm to make a focused or diversified acquisition? The main rational for this hypothesis is that if an alleged infringer loses the case, it may get an injunction order, which requires it to stop producing products. In addition, the infringer may also need to pay high damage awards or royalty fees²³ (see Table X). Besides these direct legal enforcement costs, diminished reputation in the product markets may yield the infringer to lose its prospective customers. Then, an infringement decision may lead the infringer to make two different, not mutually exclusive, types of acquisitions. On the one hand, since the company may not be able to produce its products, a diversifying acquisition may be optimal for the infringer to access some unrelated industries to find a new product. On the other hand, an infringer may want to conduct focused M&A to increase its market power or obtain alternative patents to the ones it was found infringing. Making both diversifying and focused acquisitions simultaneously may not be optimal since excessive acquisition may distract company management in its existing projects.

²³35 U.S.C §284: “Upon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer, together with interest and costs as fixed by the court.”

B. Hypothesis2: Does possible target’s having alternative patents increase chance to be acquired?

In this hypothesis, I test whether court’s finding of infringement induce companies to make patent motivated acquisitions, in which targets have alternative technology patents. The main rational for this hypothesis is that after finding of infringement, companies may need to stop producing the infringing products or redesign them by acquiring alternative technology patents. These alternative patents may bring important benefits. First, if the infringer can not get a license²⁴ from the patent holder or the license is not on reasonable terms, companies may choose to obtain similar technology patents. For example, QIWI states in SEC filings²⁵ that : “if we cannot or do not license the infringed technology on reasonable terms or substitute similar technology from another source, our revenue and earnings could be adversely impacted”. These acquired alternative patents may help the firm redesign its products and pursue its production. For example, Stratasys Ltd. states in SEC filings that²⁶: “claims of intellectual property infringement successfully asserted against us may require us to redesign infringing technology...”.

Second, acquiring a patent provides an important benefit that licensing from plaintiff or other patent holders does not. A license, is only a promise by the patent owner (the licensor) not to sue the licensee for exercising one of the patent owner’s rights. However, due to uncertainty in claim construction explained in section VIII.A.2, the court’s finding of infringement increases the conditional probability that alternative patents of other companies are also infringed. Therefore, infringer may be required to get a license also from each of the other alternative patent holders. Acquiring a patent portfolio, however, provides the opportunity to make counterclaims for the possible future plaintiffs. For example, in 2012, Facebook countersued Yahoo with patents acquired after being sued by Yahoo²⁷.

²⁴Extreme Network Inc. 10-Q (May-2013): “ an adverse court order or a settlement could require us, among other actions, to: obtain a royalty bearing license to sell or use the relevant technology, and that license may not be available on reasonable terms or available at all.”

²⁵QIWI Form 424B4 filed on May 03, 2013

²⁶Stratasys Ltd. 20-F (March-2013).

²⁷“Yahoo-Facebook: Brace for the countersuit”, CNN Money, March 13, 2012.

IV. Empirical Section

In this section, first I will explain the data collection process for matching alleged infringer names to Compustat database. Then, I will provide the rational for hypotheses and their empirical tests.

A. Collecting Alleged Infringer Information & Summary Statistics

The main problem in matching alleged infringers to Compustat database is that there is no identifier for the parties in the court documents. Simple name matching is also problematic: sometimes companies use very different abbreviations for their names. In addition, some of the companies change their names at some point in time and, more problematically, some unrelated companies gather these names. Therefore, even a good name matching algorithm that would take into account misspelling and abbreviations may match alleged infringers to unrelated companies.

To overcome these problems, specifically, I hand-match the alleged infringers names with the S&P CapitalIQ. This database has several benefits: first, it assigns each company a unique identifier and tracks all the previous names; second, it provides basic business description for each company. Therefore, I start my data construction by searching CapitalIQ for all companies that used the underlying alleged infringer name at some point in time. In some cases, I get different companies that are operating in very different industries but used the same or similar name in their life cycle. To find the appropriate match, I read the descriptions of patents in the lawsuit and business description of the companies to make sure that I correctly match. I also double check from LexMechina database if there exists any court document that has ownership document about the parties.

After matching alleged infringer names with S&P CapitalIQ unique identifiers, I drop companies that have another case decision in the 2 year interval. This filtering provides me to directly see unconfounded effect of each litigation. Then, to be able to match my sample with other standard databases, I use CapitalIQ-Gvkey identifier information in WRDS to get gvkey for each company at the time of the court decision. After getting gvkey for each of the firms, my sample has 63 public companies in the treatment sample (losers) and 48 companies in the control sample (winner). Table I shows the summary statistics for the resulting sample. In treatment group, companies

have an average assets value of \$20.18 bil, while companies in the control group have \$19.75 bil. Both groups also have similar capital structure ratios: capital expenditure/asset, leverage and cash ratio are 0.13, 0.238 and 0.09 in treatment group while control group has 0.15, 0.224 and 0.116, respectively. The last column in Table I show the t-statistics for the difference of each of these ratios. Each difference is insignificant; therefore, control and treatment samples are appropriate for hypothesis testing.

B. Pre-Hypothesis Testing: Examining Parallel Trends Assumption

To make an inference in treatment-effects framework, control and treatment samples should behave similarly in the period prior to the treatment event (the parallel trends assumption). To test for parallel trends, I compare pre-existing changes and levels of my outcome variables across firms in the control and treatment groups. Specifically, I regress levels at time (t-1) and changes in the outcome variables from time (t-1) to (t-2) to treatment dummy and firm control variables. Finding a significant coefficient in treatment dummy would mean that the necessary condition is violated. Table III shows the regression results; there is no significant pre-existing differences in either changes or levels of the outcome variables, which are quarterly spending on focused and diversifying acquisitions both scaled by assets. Therefore, in my sample, parallel trends condition is not violated.

C. Hypothesis Testing

C.1. Testing Hypothesis 1: Does an alleged infringer increase focused (diversified) acquisitions after losing the lawsuit?

To test hypothesis, first I gather all completed domestic M&As available on SDCs U.S. Mergers and Acquisitions Database between 1983-2012 period. I limit my analysis to transactions with an explicit change of control: The acquirer must purchase 50% or more of the targets shares in the transaction and own less than 50% of the target prior to the transaction. For each target and acquirer, I gather primary 4-digit SIC code of the company.

For the experimental setup, I use difference-in-difference (DID) and fixed effects regressions in 4 quarters interval of court announcement date for each alleged infringer. In DID specification

shown in Equation(1), the dependant variable refers to the amount that alleged infringer i spent on focused acquisition scaled by its total assets in the quarter t . As in [Bena and Li \(2013\)](#) and [Arikan and Stulz \(2011\)](#), I define acquisitions in which acquirer and target are in the same 2-digit SIC code as focused acquisition (i.e, related) and define others as diversifying acquisitions. In this specification, $Loser_i$ is a binary variable that takes a value of 1 if alleged infringer lost the case (i.e, found infringing) and takes 0 if it won (i.e, prevailed). $After_t$ is a binary variable denoting whether the underlying quarter is after the court announcement date. $After_t \times Loser_i$ is interaction of $After$ and $Loser$. γ_T is a year fixed effect and $X_{i,t}$ is quarterly control variables including lagged cash, lagged leverage, R&D, book-to-market (B/M), capital expenditures, return on assets (ROA), return on equity (ROE) and logarithm of assets.

$$\frac{Focused_Acq_Amount_{i,t}}{Total_Assets_{i,t}} = \lambda(After_t \times Loser_i) + \beta(After_t) + \delta(Loser_i) + \varphi X_{i,t} + \gamma_T + \varepsilon_{i,t} \quad (1)$$

$$\frac{Diversifying_Acq_Amount_{i,t}}{Total_Assets_{i,t}} = \lambda(After_t \times Loser_i) + \beta(After_t) + \delta(Loser_i) + \varphi X_{i,t} + \gamma_T + \varepsilon_{i,t} \quad (2)$$

Table IV shows the regression results of Equation (1). The interaction term $After_t \times Loser_i$ is statistically significant at 5% level. This result shows that if the court gives an infringement decision, then the infringer increases spending on focused M&A by 0.6% of its total assets in the subsequent year. In 2012, the total assets of the companies that lost a case in CAFC was more than \$ 4tril. Therefore, patent litigations induced firms to increase its focused acquisitions by \$24 bil./year. In 2012, domestic focused acquisitions was \$294bil. and total domestic M&A activity was \$585 bil. According to these statistics, even in this conservative estimation, patent infringement explain around 8.1% of focused M&A and 4.1% of all domestic M&A activity.

Next, I investigate whether losing a case has any effect on diversifying acquisitions. For infringers, a diversifying acquisition may be optimal since it may provide to access some unrelated industries to find a new product. However, given the exogenous increase in focused acquisitions (Table IV), infringers may choose to decrease diversifying acquisitions. Table V shows the regres-

sion results of equation (2), which is same as equation (1) except the dependant variable gauges the ratio of diversifying acquisitions instead of the ratio of focused acquisitions over assets. I find that after finding of infringement, companies decrease diversifying M&A by 0.24% in the subsequent year. Therefore, my overall results in DID specifications show that after finding of infringement, companies increase focused acquisitions and decrease diversifying acquisitions.

$$\frac{Focus_Acq_Amount_{i,t}}{Total_Assets_{i,t}} = \beta(After_t) + \varphi X_{i,t} + \gamma_T + \alpha_i + \varepsilon_{i,t} \quad (3)$$

Given that DID specification does not allow to use firm fixed effects due to multicollinearity, as a robustness test, I run fixed effect regressions for loser and winners separately as in equation (3). This specification helps to control time-invariant unobservable characteristics of each company and shows the effect of the court decision. One problem with fixed effect regression is that it does not capture time-varying unobservable variables. However, since analysis is conducted in 4 quarter interval of court decision date, the concern is minimal in this experimental setup. In equation (3), $After_t$ is a binary variable denoting whether the underlying quarter is after the court announcement date, α_i is the firm fixed effects and $X_{i,t}$ is quarterly control variables including lagged cash, leverage, R&D, Book to Market (B/M), Capital Expenditures, return on assets (ROA), return on equity (ROE) and logarithm of assets. Table VI and Table VII shows the regression results of Eqn. (3) for losers and winners, respectively. The results are consistent with DID results. Table VI shows that there is an increase in focused acquisition for losers. However, there is insignificant negative effect for winners as demonstrated in Table VII.

C.2. *Testing Hypothesis2: Does possible target's having alternative patents increase chance to be acquired?*

To test the hypothesis, I use conditional logit regressions as in equation (4). In this specification, for each acquirer- actual target pair, I create three acquirer-control target pairs. Control targets are propensity score matches of actual target by size and B/M for the same 4-digit SIC industries and year. Similar to data collection process employed in section IV.C.1, I gather all completed domestic M&As available on SDCs U.S. Mergers and Acquisitions Database between 1983-2012

period. I limit my analysis to transactions with an explicit change of control: The acquirer must purchase 50% or more of the targets shares in the transaction and own less than 50% of the target prior to the transaction.

$$Acquirer - Target_{ijm,t} = \alpha + \beta_1 Alternative_Patent + \beta_2 Tech_Overlap + \beta_3 X_{i,t} + \beta_4 Y_{j,t} + \gamma_m + \varepsilon_{ijm,t} \quad (4)$$

In equation (4), $Acquirer - Target_{ijm,t}$ takes the value of 1 if firm j is an actual target of acquirer i in deal m . It takes the value of zero if firm j is a matched target. γ_m is deal fixed effect. In this specification, $Tech_Overlap$ refers to different patent based measures to gauge research similarity among two firm. These measures are defined in [Bena and Li \(2013\)](#); and I explain in section [VIII.C.2](#). To derive patent-based measures, it is standard to use NBER Patent Database. However, this dataset has coverage for public company patents only from 1976 to 2006. Therefore, in this paper, I use two complementary databases that have coverage until 2010: KPSS Patent Database and Harvard Patent Database. KPSS, which was introduced in [Kogan, Papanikolaou, Seru and Stoffman \(2012\)](#), covers all patents granted between 1926 and 2010 and has information about unique patent number granted by USPTO and CRSP unique identifier permno. I use gvkey-permno linking table in WRDS to associate patents to companies and extract firm level information from Compustat database. Next, using the unique USPTO patent numbers, I merge all patents with Harvard Patent Database, which has detailed information about citing patents, patent main classes and patent subclasses. After this merge operation, for each infringer, I identify the *Alternative_Patent*. I define a patent an alternative if two patents are in the same main classification and also in the same for half of subclassifications.

For the experiment, I use M&A transactions of alleged infringers in the subsequent year to court announcement date. Since patent databases cover only public companies, I restrict my sample to public company targets. Table [VIII](#) presents the estimates of conditional logit regressions. The variable of interest in this table is the *Alternative_Patent*. Panel A shows the coefficient estimates for alleged infringers for losers and Panel B shows the estimates for winners. The Panel A coefficient

estimates for *Alternative_Patent* in Column(I) is statistically significant at 1% level. This result shows that target's having an alternative patent increases its chance to be acquired by an acquirer who has recently lost in a lawsuit. In Panel A, I also control for different *Tech_Overlap* measures that may provide synergy for the acquisition. My results are consistent with [Bena and Li \(2013\)](#); technology overlap between acquirer and target increase the likelihood of acquisition. In these regressions, estimated coefficient of alternative patent measure is also significant and fosters the argument that accessing alternative patent is an important reason for acquisition for losers.

As a robustness test, I make the same analysis in Panel A for the alleged infringers who prevailed in the case. Given that these companies do not infringe a patent and has the right to pursue production, I do not expect these companies to conduct M&A for accessing alternative patents. Panel B in Table [VIII](#) shows the results: consistent with my hypothesis, coefficient estimate of *Alternative_Patent* is insignificant and different technology overlap measures are statistically significant in 1% and 10% levels.

C.3. *Is there market reaction differences in focused vs diversifying M&A for winners vs. losers?*

This hypothesis investigates whether there exists difference in market reaction to focused and diversifying M&A that were conducted after the court announcement. To test this hypothesis, I use the regression equation in (5). In this specification, $Focused_{i,j}$ is a dummy variable indicating whether the transaction j of the acquirer i is a focused acquisition. I define acquisitions in which acquirer and target are in the same 2-digit SIC code as focused acquisition (i.e, related) and define others as diversifying acquisitions. $Loser_i$ is a binary variable that takes a value of 1 if alleged infringer is in the treatment group (i.e, found infringing) and takes 0 if an alleged infringer is in the control group (i.e, prevailed in the case). $Focused_{i,j} \times Loser_i$ is the interaction term calculated by multiplication of loser dummy and focused dummy. $Z_{i,j}$ refers to M&A control variables consisting of transaction value (in \$mil), target public status dummy, all cash dummy, acquirer market capitalization and relative size (transaction value divided by the equity market capitalization of the acquirer at the end of the fiscal year prior to the acquisition announcement).

$$AbnormalReturn_{i,j} = \beta_0 + \beta_1(Focused_{i,j} \times Loser_i) + \beta_2Focused_{i,j} + \beta_3Loser_i + \beta_4Z_{i,j} + \varepsilon_{i,j} \quad (5)$$

To calculate abnormal returns, I use three different approaches: value-weighted, equal-weighted and market model. In value-weighted (equal-weighted) approach, the abnormal returns results after subtracting the return of the CRSP value-weighted (equal-weighted) from market index from day $t = -1$ to day $t = +1$ where $t = 0$ is the acquisition announcement date. In the market model, the abnormal return is calculated by subtracting return from market-based estimate. The parameters for the market model are estimated over the $(-205, -6)$ interval.

I eliminate transactions that has value less than \$1mil. or size of the transaction is less than 1% of equity market capitalization of the acquirer at the end of the fiscal year prior to the acquisition announcement. In Eqn.(5), our variable of interest is the coefficient estimate of the interaction term, $Focused_{i,j} \times Loser_i$. Table IX shows the results: the coefficient of interaction term in value-weighted model is %0.26 and statistically significant at 1% level. These results demonstrate that after court's finding of infringement, the effort of infringers for accessing alternative technologies is valued by the financial markets.

V. Conclusion

In this paper, I investigate the causal effects of patent litigations on M&A activity. Specifically, I ask the following questions: Does losing in a patent litigation cause an alleged infringer to make particular type of acquisitions (i.e, focused vs. diversifying)? If it does, what are the explicit transmission mechanisms? I find that if the court finds a patent infringement, then the infringer sharply increases spending on focused acquisitions and decrease spending on diversifying acquisitions. Moreover, I also find that the infringer specifically conducts patent motivated acquisitions, in which it acquires targets that have alternative patents to the ones it was found infringing. Acquired alternative patents provide the infringer the opportunity to redesign its products or form a shield against future lawsuits. The litigation caused acquisitions explain a sizable portion of the overall M&A activity; a conservative calculation demonstrates that these results explain around 8% of all

focused acquisitions and around 4% of all domestic M&A transactions.

For identification strategy, I propose a unique experimental setting that exploits the institutional details of the patent court system. In U.S., a patent infringement claim is initiated in U.S. district courts. If any of the parties is not satisfied with district court decision, then it can appeal to the higher court, the Court of Appeals for the Federal Circuit (CAFC). It is the only appellate court for patent cases and has federal jurisdiction. In CAFC, cases are heard by randomly assigned 3-judge panels. The decision is given by the majority rule and the judges in the panel can dissent by writing a dissenting opinion. For my experiment, I hand collect detailed data for all cases with a dissenting judge (i.e., decisions was given by 2 to 1) to assign alleged infringers to treatment and control groups. The dissenting judge cases are rare; they make less than 0.4% of patent lawsuit universe. Therefore, I argue that assignment of alleged infringer to experiment groups is close to random and my estimations establish a causal relation.

This paper has several contributions to the literature. First, in this paper, I propose a new motive for M&A activity: the patent acquisition channel. This channel is distinct from the traditional knowledge transfer channel. According to the traditional view, buying patent may not be feasible. After the value of an innovation established, most of the relevant information is disclosed and a potential buyer may have no incentive to acquire. However, I show that companies may already have the knowledge but only need legal protection against lawsuits. Therefore, patent motivated acquisition channel is an important complement to the previous literature.

Second, to my knowledge, this is the first paper to show a causal effect of how patent litigations effect M&A market. Especially, given the recent increase in number of patent litigations, my experiment shows that, in a conservative calculation, this channel explains at least 4% of all domestic M&A activity. This causal relation is important also for policymakers. In 2011, Congress passed the Leahy-Smith America Invents Act (AIA), which brought the most significant change to the U.S. patent system since 1952 ([Matal \(2012\)](#)). Moreover, some additional fundamental reforms to the U.S. patent law are still debated ([White House Press Release \(2013\)](#)). In the midst of these law changes, my results can help policymakers regarding possible effects of law changes on corporate finance decisions.

Third, this is the first paper to use dissenting judge decisions for identification strategy. Although I used the strategy for patent lawsuits, it can easily be generalized to other litigations such

as antitrust, securities litigations, corporate governance and etc.

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VI. Tables

Table I
Summary Statistics

This table presents the summary statistics for the Control and Treatment groups used in this study. Control group consist of alleged infringers who prevailed in a dispositive decision in CAFC during 1983-2011 period. Treatment group consist of alleged infringers who was found infringing at least a patent in a dispositive opinion in the same period. Similar to [Janicke \(2006\)](#), I define a case dispositive if it satisfies the following conditions: i) as it leaves the Federal Circuit, at least one claim of one patent is finally adjudicated to have been infringed and not invalid or unenforceable (i.e., a win for the patent owner); ii) it has been finally determined that no claim has these characteristics (a win for the accused infringer). I include all dispositive decisions of the Federal Circuit, whether by precedential opinion, nonprecedential opinion, or per curiam affirmance without opinion under the courts Rule 36. Definitions of the variables are provided in the Section [VIII](#) Appendix.

	Treatment			Control			Difference (t-stat)
	Mean	Median	Std.	Mean	Median	Std.	
Assets(\$bil)	20.18	16.00	19.06	19.75	13.34	19.64	(0.76)
Leverage	.238	.223	.238	.224	.245	.120	(0.75)
Cash Ratio	.093	.081	.080	.116	.081	.103	(-0.92)
Book-to-Market	.389	.329	.369	.346	.328	.208	(0.67)
R&D Ratio	.079	.072	.048	.089	.079	.065	(-0.95)
ROA	.015	.017	.022	.012	.013	.025	(0.64)
ROE	.039	.043	.035	.038	.040	.062	(0.01)
Number of Firms	63			48			

Table II
Summary Statistics- Actual vs. Matched Targets

This table reports summary statistics of the target firms specified in Eqn 4. Actual target refers to acquisitions of alleged infringers in the subsequent 3 year to court announcement date. Control targets are propensity score matches of actual target by size and B/M for the same 4-digit SIC industries and year. The variable descriptions are as follows: Assets = ATQ. Book Leverage = Total Debt / Book Assets = (DLCQ+DLTTQ) / ATQ. Cash = Cash / Book Assets = CHEQ / ATQ. R&D = Research and development expenses (XRDQ) / lagged total assets(ATQ). Return on Assets (ROA) = Operating income before depreciation (OIBDPQ) / lagged total assets (ATQ). Return on Equity (ROE) =Income before extraordinary items/one-quarter-lagged book equity= IBQ/SEQQ.

	Actual				Control			
	N	Mean	Median	Std.	N	Mean	Median	Std.
Assets(\$mil)	100	3260.17	202.24	8674.25	300	3115.98	168.70	8764.59
Leverage	97	.231	.086	.436	289	.226	.158	.296
Cash Ratio	100	.333	.267	.281	296	.258	.144	.277
Book-to-Market	100	.505	.392	1.46	200	.504	.393	1.12
R&D Ratio	77	.048	.028	.091	185	.044	.025	.056
ROA	99	.003	.007	.109	286	.002	.005	.121
ROE	99	.003	.019	.212	286	.005	.015	1.61

Table III

Pre-Existing differences in outcome variables for treatment and control groups.

This table reports results on pre-existing differences in outcome variables for treatment (loser) and control (winner) groups. Panel A reports results on differences in pre-existing changes (trends) in these variables, and Panel B reports results on differences in levels. The first and second columns reports results for amount spent for focused and diversified acquisition scaled by assets. I define acquisitions in which acquirer and target are in the same 2-digit SIC code as focused acquisition and define others as diversifying acquisitions. In the regression $t=0$ refers to the court announcement quarter and $t=-1$ is the quarter before the court announcement date. $Loser_i$ is a binary variable that takes a value of 1 if alleged infringer is in the treatment group (i.e, found infringing) and takes 0 if an alleged infringer is in the control group (i.e, prevailed in the case). In each regression, I control company characteristics summarized in Table I. T-statistics shown in parenthesis and *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels respectively.

Dependant Variable:	Focused Acq./Asset	Diversifying Acq./Asset
	(I)	(II)
PANEL A: Changes (t-2 to t-1)		
Loser	0.016 (0.38)	-0.061 (-0.46)
Company Controls	Yes	Yes
R^2	4.3%	2.1%
N	94	94
PANEL B: Levels (t-1)		
Loser	0.050 (0.15)	-0.01 (-0.27)
Company Controls	Yes	Yes
R^2	5.3%	4.1%
N	94	94

Table IV
Do Losers Make More Focused Acquisitions? (Diff-in-Diff)

This table presents results illustrating the relationship between outcome of a patent litigation and alleged infringer’s focused M&A activity in 4 quarters interval of the court announcement date. The exact specification is defined in Eq.(1). In this DID regression, the coefficient estimates shows the estimates of the average change in focused acquisitions for control(winner) and treatment (loser) groups. The dependant variable refers to the ratio of amount that alleged infringer spent on focused acquisition scaled to the firm’s total assets. I define acquisitions in which acquirer and target are in the same 2-digit SIC code as focused acquisition and define others as diversifying acquisitions. In this specification, $Loser_i$ is a binary variable that takes a value of 1 if alleged infringer is in the treatment group (i.e, found infringing) and takes 0 if an alleged infringer is in the control group (i.e, prevailed in the case). Control group consist of all alleged infringers who prevailed in a dispositive decision in CAFC during 1983-2011 period. Treatment group consist of alleged infringers who was found infringing at least a patent in a dispositive opinion in the same period. Similar to Janicke (2006), I define a case dispositive if it satisfies the following conditions: i) as it leaves the Federal Circuit, at least one claim of one patent is finally adjudicated to have been infringed and not invalid or unenforceable (i.e., a win for the patent owner); ii) it has been finally determined that no claim has these characteristics (a win for the accused infringer). I include all dispositive decisions of the Federal Circuit, whether by precedential opinion, nonprecedential opinion, or per curiam affirmance without opinion under the courts Rule 36. $After_t$ is a binary variable denoting whether the underlying quarter is after the court announcement date. Definitions of the variables are provided in the Section VIII. Robust standard errors are reported in parentheses; *, **, and *** denote significance at the 10%, 5% and 1% level.

Dependent Variable: Focused Acquisition Amount/Assets (in percentages)								
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Loser</i> × <i>After</i>	0.150** (2.12)	0.087** (2.15)	0.103** (2.08)	0.105** (2.20)	0.104** (2.10)	0.103** (2.09)	0.089** (2.31)	0.106** (2.16)
Loser	-0.013 (-0.36)	-0.017 (-0.61)	-0.008 (-0.22)	-0.017 (-0.49)	-0.014 (-0.39)	-0.013 (-0.36)	-0.003 (-0.11)	-0.015 (-0.44)
After	-0.023 (-0.74)	-0.013 (-0.51)	-0.025 (-0.81)	-0.023 (-0.78)	-0.022 (-0.72)	-0.022 (-0.72)	-0.021 (-0.89)	-0.023 (-0.76)
<i>R&D</i>	0.466** (2.08)		0.332 (1.57)	0.407* (1.88)	0.428* (1.94)	0.467** (2.09)	0.380** (2.31)	0.415** (2.13)
Sales/Assets	0.257* (1.79)	0.187* (1.84)		0.217 (1.57)	0.252* (1.75)	0.243* (1.70)	0.235** (1.98)	0.260* (1.90)
Capex/Assets	-1.236 (-1.61)	-1.011 (-1.55)	-1.051 (-1.38)		-1.237 (-1.61)	-1.225 (-1.60)	-1.044* (-1.69)	-1.188 (-1.56)
ROA	0.754 (0.94)	0.703 (1.15)	0.697 (0.87)	0.767 (0.97)		0.277 (0.47)	0.555 (1.21)	0.588 (0.79)
ROE	-0.263 (-0.89)	-0.171 (-0.79)	-0.204 (-0.69)	-0.264 (-0.93)	-0.077 (-0.35)		-0.052 (-0.30)	-0.244 (-0.83)
B/M	-0.077 (-1.59)	-0.057 (-1.52)	-0.086* (-1.78)	-0.073 (-1.61)	-0.082* (-1.71)	-0.067 (-1.43)		-0.072 (-1.52)
Log(Assets)	-0.002 (-0.33)	-0.004 (-0.73)	-0.006 (-0.86)	-0.001 (-0.15)	-0.001 (-0.19)	-0.002 (-0.34)	-0.002 (-0.46)	
Cash/Assets	-0.055 (-0.46)	0.064 (0.70)	-0.045 (-0.38)	-0.028 (-0.24)	-0.017 (-0.16)	-0.043 (-0.36)	-0.014 (-0.17)	
N	387	571	387	401	387	387	505	389
<i>AdjR</i> ²	0.026	0.023	0.021	0.023	0.027	0.027	0.023	0.030
Year Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	NO	NO	NO	NO	NO	NO	NO	NO

t-statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table V
Do Losers Make More Diversifying Acquisitions? (Diff-in-Diff)

This table presents results illustrating the relationship between outcome of a patent litigation and alleged infringer’s diversifying M&A activity in 4 quarters interval of the court announcement date. The exact specification is defined in Eq.(2). In this DID regression, the coefficient estimates shows the estimates of the average change in diversifying acquisitions for control(winner) and treatment (loser) groups. The dependant variable refers to the ratio of amount that alleged infringer spent on diversifying acquisition scaled to the firm’s total assets. I define acquisitions in which acquirer and target are not in the same 2-digit SIC code as diversifying acquisitions. In this specification, $Loser_i$ is a binary variable that takes a value of 1 if alleged infringer is in the treatment group (i.e, found infringing) and takes 0 if an alleged infringer is in the control group (i.e, prevailed in the case). Control group consist of all alleged infringers who prevailed in a dispositive decision in CAFC during 1983-2011 period. Treatment group consist of alleged infringers who was found infringing at least a patent in a dispositive opinion in the same period. Similar to Janicke (2006), I define a case dispositive if it satisfies the following conditions: i) as it leaves the Federal Circuit, at least one claim of one patent is finally adjudicated to have been infringed and not invalid or unenforceable (i.e., a win for the patent owner); ii) it has been finally determined that no claim has these characteristics (a win for the accused infringer). I include all dispositive decisions of the Federal Circuit, whether by precedential opinion, nonprecedential opinion, or per curiam affirmance without opinion under the courts Rule 36. $After_t$ is a binary variable denoting whether the underlying quarter is after the court announcement date. Definitions of the variables are provided in the Section VIII. Robust standard errors are reported in parentheses; *, **, and *** denote significance at the 10%, 5% and 1% level.

Dependent Variable: Diversified Acquisition Amount/Assets (in percentages))

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Loser</i> \times <i>After</i>	-0.062** (-2.25)	-0.056** (-2.30)	-0.062** (-2.18)	-0.061** (-2.16)	-0.063** (-2.12)	-0.064** (-2.17)	-0.038** (-2.10)	-0.059** (-2.13)
<i>Loser</i>	-0.004 (-0.15)	0.017 (0.85)	-0.003 (-0.13)	-0.005 (-0.19)	-0.006 (-0.22)	-0.004 (-0.15)	-0.020 (-0.81)	-0.010 (-0.42)
<i>After</i>	0.053** (2.32)	0.043** (2.28)	0.053** (2.32)	0.052** (2.32)	0.054** (2.35)	0.054** (2.35)	0.019 (0.89)	0.052** (2.29)
<i>R&D</i>	0.034 (0.20)		0.022 (0.14)	0.041 (0.26)	-0.028 (-0.17)	0.035 (0.21)	-0.064 (-0.42)	-0.040 (-0.27)
<i>Sales/Assets</i>	0.023 (0.22)	-0.021 (-0.29)		0.028 (0.27)	0.015 (0.14)	0.002 (0.02)	-0.086 (-0.78)	0.012 (0.12)
<i>Capex/Assets</i>	0.288 (0.50)	0.192 (0.41)	0.305 (0.54)		0.286 (0.50)	0.304 (0.53)	0.281 (0.49)	0.322 (0.57)
<i>ROA</i>	1.202** (2.02)	0.891** (2.03)	1.196** (2.01)	1.187** (2.03)		0.502 (1.13)	0.711* (1.68)	1.024* (1.84)
<i>ROE</i>	-0.386* (-1.76)	-0.224 (-1.45)	-0.381* (-1.75)	-0.378* (-1.81)	-0.090 (-0.55)		-0.160 (-0.98)	-0.361* (-1.66)
<i>B/M</i>	0.012 (0.32)	0.021 (0.76)	0.011 (0.30)	0.010 (0.30)	0.003 (0.09)	0.026 (0.73)		0.014 (0.38)
<i>Log(Assets)</i>	-0.000 (-0.02)	0.000 (0.05)	-0.000 (-0.09)	-0.001 (-0.11)	0.001 (0.28)	-0.000 (-0.03)	0.001 (0.21)	
<i>Cash/Assets</i>	-0.075 (-0.85)	-0.062 (-0.96)	-0.074 (-0.84)	-0.079 (-0.93)	-0.015 (-0.18)	-0.057 (-0.65)	-0.007 (-0.09)	
<i>N</i>	387	571	387	401	387	387	505	389
<i>AdjR²</i>	0.010	0.003	0.012	0.012	0.002	0.004	0.001	0.013
<i>YearDummies</i>	YES	YES	YES	YES	YES	YES	YES	YES

t-statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table VI

Do Losers Make More Focused Acquisitions? (Fixed Effect Specification For Losers)

This table presents results illustrating the relationship between outcome of a patent litigation and loser's (i.e., who was found infringing in the court) focused M&A activity in 4 quarters interval of the court announcement date. The exact specification is defined in Eq.(3). In this specification, the coefficient estimates shows the estimates of the average change in focused acquisitions for loser controlling for time-invariant unobservable characteristics by firm fixed effects. The dependant variable refers to the ratio of amount that infringer spent on focused acquisition scaled to the firm's total assets. I define acquisitions in which acquirer and target are in the same 2-digit SIC code as focused acquisition and define others as diversifying acquisitions. Losers consist of all alleged infringers who were found infringing at least a patent in a dispositive opinion in 1983-2011 period. I include all dispositive decisions of the Federal Circuit, whether by precedential opinion, nonprecedential opinion, or per curiam affirmance without opinion under the courts Rule 36. $After_t$ is a binary variable denoting whether the underlying quarter is after the court announcement date. Definitions of the variables are provided in the Section VIII. Robust standard errors are reported in parentheses; *, **, and *** denote significance at the 10%, 5% and 1% level.

Dependent Variable: Focused Acquisition Amount/Assets (in percentages))								
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
After	0.100** (2.03)	0.078** (2.08)	0.092* (1.88)	0.101** (2.15)	0.099** (2.03)	0.098** (2.04)	0.072* (1.82)	0.080* (1.85)
<i>R&D</i>	1.438 (1.21)		1.722 (1.47)	1.177 (1.05)	1.497 (1.63)	1.359 (1.23)	1.375 (1.36)	1.363 (1.13)
Sales/Assets	1.056 (1.26)	0.683 (1.57)		1.015 (1.27)	1.029 (1.35)	1.063 (1.27)	0.930 (1.28)	0.924 (1.09)
Capex/Assets	-1.541 (-1.02)	-1.482 (-1.25)	-1.409 (-0.93)		-1.548 (-1.03)	-1.538 (-1.02)	-1.243 (-0.99)	-1.463 (-0.96)
ROA	-0.212 (-0.08)	-0.982 (-0.53)	1.155 (0.47)	-0.431 (-0.17)		-0.543 (-0.27)	-0.176 (-0.08)	0.599 (0.22)
ROE	-0.118 (-0.19)	0.129 (0.23)	-0.154 (-0.24)	-0.094 (-0.16)	-0.151 (-0.32)		-0.109 (-0.21)	-0.196 (-0.31)
B/M	0.014 (0.06)	0.013 (0.07)	-0.038 (-0.18)	0.034 (0.16)	0.008 (0.04)	0.029 (0.14)		-0.018 (-0.08)
Cash/Assets	0.937** (2.03)	0.738* (1.76)	0.892* (1.93)	0.917** (2.04)	0.932** (2.05)	0.942** (2.05)	0.767* (1.95)	
<i>N</i>	151	232	151	159	151	151	182	151
<i>AdjR</i> ²	0.082	0.052	0.069	0.072	0.082	0.082	0.067	0.050
Year Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Firm-Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES

t-statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table VII**Do Winners Make More Focused Acquisitions? (Fixed Effect Specification For Winners)**

This table presents results illustrating the relationship between outcome of a patent litigation and winner's (i.e, the alleged infringer who prevailed in the court) focused M&A activity in 4 quarters interval of the court announcement date. The exact specification is defined in Eq.(3). In this specification, the coefficient estimates shows the estimates of the average change in focused acquisitions of winner controlling for time-invariant unobservable characteristics by firm fixed effects. The dependant variable refers to the ratio of amount that infringer spent on focused acquisition scaled to the firm's total assets. I define acquisitions in which acquirer and target are in the same 2-digit SIC code as focused acquisition and define others as diversifying acquisitions. Winners consist of all alleged infringers who prevailed in a dispositive decision in CAFC during 1983-2011 period. I define a case dispositive if it satisfies the following conditions: i) as it leaves the Federal Circuit, at least one claim of one patent is finally adjudicated to have been infringed and not invalid or unenforceable (i.e., a win for the patent owner); ii) it has been finally determined that no claim has these characteristics (a win for the accused infringer). I include all dispositive decisions of the Federal Circuit, whether by precedential opinion, nonprecedential opinion, or per curiam affirmance without opinion under the courts Rule 36. $After_t$ is a binary variable denoting whether the underlying quarter is after the court announcement date. Definitions of the variables are provided in the Section VIII. Robust standard errors are reported in parentheses; *, **, and *** denote significance at the 10%, 5% and 1% level.

Dependent Variable: Focused Acquisition Amount/Assets								
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
After	-0.019 (-0.69)	-0.013 (-0.55)	-0.034 (-1.22)	-0.018 (-0.67)	-0.019 (-0.69)	-0.019 (-0.68)	-0.015 (-0.78)	-0.018 (-0.67)
<i>R&D</i>	0.179 (0.29)		-0.109 (-0.18)	0.230 (0.39)	0.198 (0.34)	0.190 (0.31)	0.231 (0.52)	0.189 (0.32)
Sales/Assets	1.233** (2.41)	0.464 (1.34)		1.224** (2.43)	1.240** (2.44)	1.247** (2.45)	1.026*** (2.97)	1.251** (2.48)
Capex/Assets	-1.171 (-1.10)	-1.006 (-1.03)	-1.122 (-1.04)		-1.169 (-1.10)	-1.187 (-1.12)	-0.913 (-1.17)	-1.157 (-1.10)
ROA	-0.139 (-0.11)	0.023 (0.03)	-0.472 (-0.38)	-0.113 (-0.09)		0.153 (0.20)	0.019 (0.03)	-0.101 (-0.08)
ROE	0.142 (0.30)	0.093 (0.38)	0.247 (0.52)	0.168 (0.36)	0.100 (0.34)		0.123 (0.46)	0.130 (0.28)
B/M	-0.105 (-0.93)	-0.122 (-1.31)	-0.167 (-1.52)	-0.099 (-0.90)	-0.103 (-0.93)	-0.105 (-0.94)		-0.116 (-1.10)
Cash/Assets	0.126 (0.32)	0.205 (0.64)	0.231 (0.59)	0.112 (0.29)	0.122 (0.31)	0.117 (0.30)	0.292 (1.08)	
<i>N</i>	236	339	236	242	236	236	323	238
<i>AdjR</i> ²	0.063	0.028	0.033	0.057	0.063	0.063	0.047	0.063
Year Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Firm-Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES

t-statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table VIII
Does Having Alternative Patent Increase Likelihood of Being Acquired?

This table presents key coefficient estimates that illustrate whether target's having an alternative patent to the alleged infringed patent increases likelihood of being acquired by the alleged infringer. The specification for this table is a conditional logit model and is demonstrated in equation (4). Panel A and Panel B shows the results for alleged infringers who lost and prevailed in the lawsuit, respectively. The dependent variable is equal to one for the acquirer-actual target firm pair, and zero for three acquirer-control target pairs. The control targets are selected by propensity score matching to the actual target by industry, size and B/M. The regression includes deal fixed effects. Definitions of the variables are provided in the Section VIII.C.2. Z-statistics are reported in parentheses; *, **, and *** denote significance at the 10%, 5% and 1% level.

Panel A: For Losers	(I)	(II)	(III)	(IV)
Alternative	4.092*** (2.92)	2.167** (2.26)	3.169** (2.14)	2.529** (2.35)
Target Patents		0.313** (2.12)		
Knowledge Overlap			0.301* (1.65)	
Acquirer Base Overlap				14.561* (1.69)
Target Base Overlap				11.378* (1.85)
No. of Observations	124	124	124	124
No. of Actual Deals	31	31	31	31
No. of Control Deals	93	93	93	93
Pseudo R^2	0.10	0.12	0.10	0.13
Panel B: For Winners	(I)	(II)	(III)	(IV)
Alternative	2.56 (0.06)	-4.445 (-0.01)	-4.949 (-0.01)	-5.177 (-0.01)
Target Patents		0.343*** (3.11)		
Knowledge Overlap			0.995*** (3.43)	
Acquirer Base Overlap				13.742* (2.35)
Target Base Overlap				1.237 (0.29)
Acq, Target Controls	NO	YES	YES	YES
Deal Fixed Effects	YES	YES	YES	YES
No. of Observations	140	140	140	140
No. of Actual Deals	35	35	35	35
No. of Control Deals	105	105	105	105
Pseudo R^2	0.15	0.13	0.11	0.14

Table IX
Do Focused Acquisitions For Losers Get Abnormal Returns?

This table presents results illustrating the relationship between the acquirer abnormal return and type of the acquirer (i.e, loser or winner) and type of the acquisition (i.e, focused or diversifying). The exact specification is defined in Eqn. (5). In this specification, dependent variable is cumulative abnormal announcement returns (CAR[-1,1]) of all alleged infringers' M&A transactions in 3 years after the court announcement date. CAR[-1,1] is computed between day $t = -1$ to day $t = +1$ where $t = 0$ is the acquisition announcement date. Abnormal returns are calculated in three different approaches: value-weighted, equal-weighted and market model. In value-weighted (equal-weighted) approach, the abnormal returns results after subtracting the return of the CRSP value-weighted (equal-weighted) market index over event window. In market model, the abnormal return is calculated by subtracting return from market-based estimate. The parameters for the market model are estimated over the (-205, -6) interval. I define acquisitions in which acquirer and target are in the same 2-digit SIC code as focused acquisitions and others as diversifying acquisitions. *Loser* group consist of all alleged infringers who was found infringing at least one patent in CAFC during 1983-2011 period. Winner group consist of all alleged infringers who prevailed in CAFC during the same period. *Focused* \times *Loser* is the interaction term calculated by multiplication of loser dummy and focused dummy. Dependant variable, The second columns of each approach presents estimates with additional dependent variables: transaction value (in \$mil), target public status dummy, all cash dummy, acquirer market capitalization and relative size (transaction value divided by the equity market capitalization of the acquirer at the end of the fiscal year prior to the acquisition announcement). Significance is based on White-adjusted standard errors with t-statistics are reported below each coefficient in parenthesis.

Dependent Variable: CAR[-1,1]

	<u>Value-Weighted</u>		<u>Equal-Weighted</u>		<u>Market Model</u>	
	(I)	(II)	(I)	(II)	(I)	(II)
<i>Focused</i> \times <i>Loser</i>	0.17*** (2.75)	0.26*** (2.69)	0.16*** (2.69)	0.24** (2.45)	0.15*** (2.73)	0.25** (2.59)
Loser	-0.002 (-0.45)	-0.007 (-0.99)	-0.004 (-0.90)	-0.008 (-1.14)	-0.003 (-0.11)	-0.006 (-0.80)
Focused	-0.007* (-1.72)	-0.010 (-1.55)	-0.005 (-1.30)	-0.007 (-1.12)	-0.008 (-1.18)	-0.009 (-0.92)
<i>N</i>	386	172	386	172	386	172
Other Controls	No	Yes	No	Yes	No	Yes
Adj. R^2	0.021	0.084	0.017	0.060	0.025	0.072

Table X
Some Recent Jury Damage Awards in District Courts

Date	Plaintiff	Defendant	Verdict(\$)	District	State	Judge
June-09	Centocor Inc.	Abbott Laboratories	1,672,594,000	E.D.	Tex.	Ward
March-07	Alcatel-Lucent	Microsoft	1,500,000,000	S.D.	Cal.	Brewster
Dec-12	Carnegie Mellon University	Marvell Technology	1,169,140,271	W.D.	PA	Fischer
October-12	Apple, Inc.	Samsung	1,049,343,540	N.D.	Cal.	Koh
August-12	Monsanto Company	Pioneer Hi-Bred Int'l.	1,000,000,000	E.D.	Mo.	Webber
October-10	Mirror Worlds LLC	Apple Inc	625,500,000	E.D.	Tex.	Davis
January-11	Saffran M.D.	Johnson & Johnson	482,000,000	E.D.	Tex.	Ward
February-08	Saffran	Boston Sci.	431,867,351	E.D.	Tex.	Ward
April-09	Uniloc USA Inc.	Microsoft Corp. et al	388,000,000		R.I.	Smith
November-12	VirnetX Inc.	Cisco Systems, Inc.	368,160,000	E.D.	Tex.	Davis
April-08	Alcatel-Lucent	Microsoft	368,043,056	S.D.	Cal.	Huff
May-11	Versata Software Inc.	SAP America Inc.	345,000,000	E.D.	Tex.	Folsom
April-06	Hynix	Rambus	306,900,000	N.D.	Cal.	Whyte
May-08	Medtronic	Boston Scientific	250,000,000	E.D.	Tex.	Ward
September-07	De Puy	Medtronic Sofamor	226,300,000		Mass.	Harrington
May-09	i4i LP	Microsoft Corp	200,000,000	E.D.	Tex.	Davis
December-07	C.R. Bard	Gore Assocs	185,000,000		Ariz.	Murguia
May-08	Cornell	Hewlett-Packard Co	184,044,048	N.D.	N.Y.	Rader
September-07	TGIP	AT&T	156,000,000	E.D.	Tex.	Clark
July-12	Mformation Tech.	Research In Motion	147,200,000	N.D.	Cal.	Lloyd
August-09	Versata Software Inc.	SAP America	138,641,000	E.D.	Tex.	Folsom
April-06	z4	Microsoft	133,000,000	E.D.	Tex.	Davis
May-05	Freedom Wireless	Boston Commun.	128,025,000		Mass.	Harrington
August-11	Active Video Networks	Verizon Commc'n Inc.	115,000,000	E.D.	Va.	Miller
August-12	WesternGeco, LLC	ION Geophysical Corp.	105,900,000	S.D.	Tex.	Ellison
March-10	VirnetX, Inc.	Microsoft Corp.	105,750,000	E.D.	Tex.	Davis
September-11	Medtronic Sofamor	NuVasive Inc.	101,196,000	S.D.	Cal.	Burns

Table XI
Court Outcomes

This table presents the majority decision of dispositive patent infringement cases, in which one judge filed a dissenting opinion. The data covers all adjudicated cases in CAFC from 1/1/1983 to 31/12/2011. Similar to [Janicke \(2006\)](#), I define a case dispositive if it satisfies the following conditions: i) as it leaves the Federal Circuit, at least one claim of one patent is finally adjudicated to have been infringed and not invalid or unenforceable (i.e., a win for the patent owner); ii) it has been finally determined that no claim has these characteristics (a win for the accused infringer). I include all dispositive decisions of the Federal Circuit, whether by precedential opinion, nonprecedential opinion, or per curiam affirmance without opinion under the courts Rule 36.

Result of the Case	Frequency	Percentage
Affirmed	105	51.98
Modified(In Part), Affirmed(In Part)	2	0.99
Reversed	18	8.91
Reversed (In Part), Affirmed(In Part)	52	25.74
Reversed (In Part), Vacated (In Part)	4	1.98
Vacated(In Part), Affirmed(In Part)	21	10.39
Total	202	100.00

Table XII
Some Of The Recent Large Scale Patent Acquisitions

Date	Seller	Buyer	No. of patents	Price	Price /Patent
Dec-12	Kodak	Consortium	1100	\$525 mil	\$470K
Nov-12	Rockstar	Apple	695	\$2.5 bil.	\$3.59 mil.
Jul-12	Fujifilm	Universal Display	1200	\$105 mil.	\$ 87K
Jun-12	Interdigital	Intel	1700	\$375 mil.	\$220K
May-12	Motorola Mobility	Google	17,000+	\$5.5 B	\$323 K
Apr-12	AOL	Microsoft	925	\$1.05 bil.	\$1.13 mil.
Apr-12	Microsoft	Facebook	650	\$550 mil.	\$840K
Mar-12	IBM	Facebook	750	?	
Feb-12	MOSAID	Google	200	?	
Jan-12	Real Networks	Intel	190 (+170 apps)	\$120M	\$632K
Jan-12	IBM	Google	188 (+ 29 apps)	?	
Jan-12	Adaptix	Acacia	230	\$100 mil.	\$43K
Oct-11	MOSAID	Sterling Partners	5385	\$596 M	\$110 K
Sep-11	MOSAID	Google	18	\$11 M	\$610 K
Sep-11	Core Wireless, S.a.r.l.	MOSAID	2000 (incl. apps)	N/A	
Aug-11	Glenayre Elect.	Wi-LAN	60	\$8 M	\$133 K
Aug-11	Google	HTC	9	?	
Aug-11	IBM	Google	1023	?	
Jul-11	IBM	Google	1030	?	
Jul-11	S3	HTC	235	\$300 M	\$1.3 M
Jul-11	Nortel	Rockstar Bidco Syn.	6000*	\$4.5 B	\$750 K
May-11	Hynix	Mosaid	500	?	
May-11	IBM	Google	1000	?	
Apr-11	ADC Telecomm.	HTC	82	\$75M	915 K
Mar-11	Kodak	Omnivision	850	\$65M	76 K
Nov-10	Novell	CPTN Holdings Syn.	882	\$450 M	\$510 K
Aug-10	Friendster (MOL Global)	Facebook	7 (+ 11 apps)	\$40M	\$5.7M
Apr-10	Palm	HP	1500+	\$1.2B	\$800 K

Table XIII**Composition of the Court of Appeals for the Federal Circuit (as of Sep-2013)**

The Federal Circuit may have a total of 12 active circuit judges sitting at any given time, who are required to reside within 50 miles of the District of Columbia, as set by 28 U.S.C. § 44. Judges on senior status are not subject to this restriction. As with other federal judges, they are nominated by the President and must be confirmed by the Senate. Their terms last during the “good behavior” of the judges, which typically results in life tenure. When eligible, judges may elect to take senior status. This allows a senior judge to continue to serve on the court while handling fewer cases than an active service judge. Each judge in active service employs a judicial assistant and up to four law clerks, while each judge in senior status employs a judicial assistant and one law clerk.

No	Title	Judge	Born	Active	Chief	Senior
24	Chief Judge	Randall Ray Rader	1949	1990-present	2010-present	
16	Circuit Judge	Pauline Newman	1927	1984-present		
22	Circuit Judge	Alan David Lourie	1935	1990-present		
29	Circuit Judge	Timothy B. Dyk	1937	2000-present		
30	Circuit Judge	Sharon Prost	1951	2001-present		
31	Circuit Judge	Kimberly Ann Moore	1968	2006-present		
32	Circuit Judge	Kathleen M. O'Malley	1956	2010-present		
33	Circuit Judge	Jimmie V. Reyna	1952	2011-present		
34	Circuit Judge	Evan Wallach	1949	2011-present		
35	Circuit Judge	Richard G. Taranto	1957	2013-present		
36	Circuit Judge	Raymond T. Chen	1968	2013-present		
37	Circuit Judge	Todd M. Hughes	1966	2013-present		
19	Senior Circuit Judge	Haldane Robert Mayer	1941	1987-2010	1997-2004	2010-present
21	Senior Circuit Judge	S. Jay Plager	1931	1989-2000		2000-present
23	Senior Circuit Judge	Raymond Charles Clevenger III	1937	1990-2006		2006-present
25	Senior Circuit Judge	Alvin Anthony Schall	1944	1992-2009		2009-present
26	Senior Circuit Judge	William Curtis Bryson	1945	1994-2013		2013-present
28	Senior Circuit Judge	Richard Linn	1944	1999-2012		2012-present

Table XIV**List of Former Judges in Court of Appeals for the Federal Circuit (as of Sep-2013)**

The Federal Circuit may have a total of 12 active circuit judges sitting at any given time, who are required to reside within 50 miles of the District of Columbia, as set by 28 U.S.C. § 44. Judges on senior status are not subject to this restriction. As with other federal judges, they are nominated by the President and must be confirmed by the Senate. Their terms last during the “good behavior” of the judges, which typically results in life tenure. When eligible, judges may elect to take senior status. This allows a senior judge to continue to serve on the court while handling fewer cases than an active service judge. Each judge in active service employs a judicial assistant and up to four law clerks, while each judge in senior status employs a judicial assistant and one law clerk.

No	Judge	Born/Died	Active service	Chief Judge	Senior status	Reason for termination
<hr/>						
1	Don Nelson Laramore	1906-1989	-	-	1982-1989	death
2	Giles Sutherland Rich	1904-1999	1982-1999	-	-	death
3	James Lindsay Almond, Jr.	1898-1986	-	-	1982-1986	death
4	Oscar Hirsh Davis	1914-1988	1982-1988	-	-	death
5	Arnold Wilson Cowen	1905-2007	-	-	1982-2007	death
6	Philip Nichols, Jr.	1907-1990	1982-1983	-	1983-1990	death
7	Byron George Skelton	1905-2004	-	-	1982-2004	death
8	Phillip Benjamin Baldwin	1924-2002	1982-1986	-	1986-1991	retirement
9	Howard Thomas Markey	1920-2006	1982-1991	1982-1990	-	retirement
10	Marion Tinsley Bennett	1914-2000	1982-1986	-	1986-2000	death
11	Shiro Kashiwa	1912-1998	1982-1986	-	-	retirement
12	Jack Richard Miller	1916-1994	1982-1985	-	1985-1994	death
13	Daniel Mortimer Friedman	1916-2011	1982-1989	-	1989-2011	death
14	Edward Samuel Smith	1919-2001	1982-1989	-	1989-2001	death
15	Helen Wilson Nies	1925-1996	1982-1995	1990-1994	1995-1996	death
17	Jean Galloway Bissell	1936-1990	1984-1990	-	-	death
18	Glenn Leroy Archer, Jr.	1929-2011	1985-1997	1994-1997	1997-2011	death
20	Paul Redmond Michel	1941-	1988-2010	2004-2010	-	retirement
27	Arthur J. Gajarsa	1941-	1997-2011	-	2011-2012	retirement

Table XV
Dissent Rates of Judges in CAFC

This table represents the number of panel attendance, dissenting opinion and percentage of dissents for each of CAFC judges from 1983 to 2011. The search was conducted in WestLaw database with the following keywords: “DIS(Judge Name) & PA(Judge Name) & TO(Patent)”.

No	Judge	Number of Panel Attendance	Number of Dissent	Percentage of Dissent
<hr/>				
1	Don Nelson Laramore	0	0	-
2	Giles Sutherland Rich	349	11	0.03
3	James Lindsay Almond, Jr.	0	0	-
4	Oscar Hirsh Davis	150	16	0.11
5	Arnold Wilson Cowen	91	3	0.03
6	Philip Nichols, Jr.	82	5	0.06
7	Byron George Skelton	110	1	0.01
8	Phillip Benjamin Baldwin	159	5	0.03
9	Howard Thomas Markey	271	4	0.01
10	Marion Tinsley Bennett	109	5	0.05
11	Shiro Kashiwa	66	4	0.06
12	Jack Richard Miller	113	10	0.09
13	Daniel Mortimer Friedman	345	7	0.02
14	Edward Samuel Smith	197	12	0.06
15	Helen Wilson Nies	254	18	0.07
16	Pauline Newman	977	155	0.16
17	Jean Galloway Bissell	113	3	0.03
18	Glenn Leroy Archer, Jr.	385	9	0.02
19	Haldane Robert Mayer	672	68	0.10
20	Paul Redmond Michel	703	22	0.03
21	S. Jay Plager	377	14	0.04
22	Alan David Lourie	909	41	0.05
23	Raymond Charles Clevenger III	547	24	0.04
24	Randall Ray Rader	948	36	0.04
25	Alvin Anthony Schall	626	19	0.03

Table XVI
Dissent Rates of Judges in CAFC

Continued from previous page.

No	Judge	Number of Panel Attendance	Number of Dissent	Percentage of Dissent
<hr/>				
26	William Curtis Bryson	765	30	0.04
27	Arthur J. Gajarsa	582	27	0.05
28	Richard Linn	559	22	0.04
29	Timothy B. Dyk	633	59	0.09
30	Sharon Prost	586	29	0.05
31	Kimberly Ann Moore	301	17	0.06
32	Kathleen M. O'Malley	108	11	0.10
33	Jimmie V. Reyna	103	13	0.13
34	Evan Wallach	60	4	0.07
35	Richard G. Taranto	10	1	0.10
36	Raymond T. Chen	0	0	-
37	Todd M. Hughes	0	0	-

Table XVII
Number of Patent Lawsuit Filed In Each District Court

Source: Lex Machina Database

Court	2005	2006	2007	2008	2009	2010	2011	2012
Central District of California	240	258	320	187	267	216	308	499
Central District of Illinois	4	6	10	6	5	3	2	5
District of Alaska	0	0	1	0	0	0	0	1
District of Arizona	26	25	21	23	23	17	28	35
District of Colorado	32	45	32	33	35	37	47	65
District of Columbia	6	12	22	19	13	14	14	11
District of Connecticut	28	40	23	28	17	33	24	23
District of Delaware	113	132	157	166	228	253	484	1002
District of Guam	0	1	0	0	0	0	0	0
District of Hawaii	8	3	2	2	1	1	10	11
District of Idaho	1	2	6	3	3	5	2	8
District of Kansas	11	11	9	13	11	5	12	7
District of Maine	2	2	4	7	3	0	1	8
District of Maryland	28	20	24	24	29	19	31	42
District of Massachusetts	72	69	55	49	59	69	86	80
District of Minnesota	75	63	51	46	46	63	78	64
District of Montana	2	1	0	1	0	0	2	2
District of Nebraska	8	9	7	9	7	8	10	14
District of Nevada	28	35	20	21	15	28	30	32
District of New Hampshire	7	7	8	7	3	3	6	8
District of New Jersey	102	140	196	159	143	153	177	159
District of New Mexico	3	2	2	1	4	8	2	2
District of North Dakota	5	3	3	2	0	1	0	2
District of Oregon	35	35	22	20	22	15	29	29
District of Puerto Rico	0	0	0	1	1	0	3	7
District of Rhode Island	2	6	2	5	2	4	1	3
District of South Carolina	18	13	14	10	4	13	11	12
District of South Dakota	1	3	1	3	0	1	2	0
District of Utah	40	44	41	36	29	52	52	66
District of Vermont	2	2	1	3	2	2	11	8
District of Virgin Islands	0	0	0	0	1	0	0	0
District of Wyoming	2	1	3	2	1	5	1	0

Continued in the next page.

Continued from previous page

Court	2005	2006	2007	2008	2009	2010	2011	2012
Eastern District of Arkansas	3	4	4	2	6	2	4	6
Eastern District of California	9	11	6	6	12	8	24	18
Eastern District of Kentucky	7	2	7	5	2	1	2	4
Eastern District of Louisiana	13	6	8	4	4	7	7	3
Eastern District of Michigan	49	54	53	60	47	57	62	43
Eastern District of Missouri	21	37	34	32	30	18	17	27
Eastern District of New York	50	36	28	30	34	15	33	30
Eastern District of North Carolina	5	6	10	22	8	12	7	19
Eastern District of Oklahoma	0	0	0	1	1	0	0	0
Eastern District of Pennsylvania	44	41	46	36	32	37	30	53
Eastern District of Tennessee	5	4	6	4	8	11	5	10
Eastern District of Texas	150	262	358	289	235	283	414	1248
Eastern District of Virginia	42	28	41	61	51	62	72	87
Eastern District of Washington	1	2	3	3	1	3	5	0
Eastern District of Wisconsin	26	43	23	24	26	18	31	27
Middle District of Alabama	0	1	1	0	1	1	3	1
Middle District of Florida	49	52	62	44	43	63	78	77
Middle District of Georgia	1	4	2	5	2	5	2	2
Middle District of Louisiana	4	0	2	3	0	0	4	2
Middle District of North Carolina	18	19	14	10	15	12	17	15
Middle District of Pennsylvania	4	10	3	6	6	4	3	9
Middle District of Tennessee	5	11	6	7	3	4	9	7
Northern District of Alabama	8	4	4	5	5	5	6	6
Northern District of California	178	141	134	162	163	175	217	260
Northern District of Florida	3	3	2	0	2	5	9	13
Northern District of Georgia	57	72	56	58	39	48	48	66
Northern District of Illinois	136	124	140	144	132	172	215	236
Northern District of Indiana	6	16	9	10	17	11	4	6
Northern District of Iowa	6	3	0	3	1	6	1	3
Northern District of Mississippi	0	1	3	1	2	1	0	0
Northern District of New York	13	9	11	8	10	10	5	12
Northern District of Ohio	34	43	37	48	41	32	43	45
Northern District of Oklahoma	3	7	6	6	8	8	8	7
Northern District of Texas	54	41	42	41	36	39	46	57
Northern District of West Virginia	2	2	3	4	11	6	6	5
Southern District of Alabama	3	1	0	0	0	1	2	1
Southern District of California	60	51	59	67	71	55	79	141
Southern District of Florida	65	62	65	32	43	64	63	133

Continued from previous page

Court	2005	2006	2007	2008	2009	2010	2011	2012
<hr/>								
Southern District of Georgia	3	2	2	1	2	0	0	1
Southern District of Illinois	5	2	6	6	1	1	3	2
Southern District of Indiana	16	22	16	27	23	44	26	23
Southern District of Iowa	11	7	11	9	13	8	7	2
Southern District of Mississippi	2	1	3	0	1	2	5	4
Southern District of New York	130	107	102	105	111	104	150	141
Southern District of Ohio	23	28	20	22	30	16	23	27
Southern District of Texas	51	27	28	30	37	34	33	46
Southern District of West Virginia	0	0	1	0	0	0	1	3
Western District of Arkansas	5	2	1	3	10	4	1	1
Western District of Kentucky	1	6	6	4	3	7	4	8
Western District of Louisiana	8	5	4	6	4	3	1	4
Western District of Michigan	19	8	10	16	7	13	15	12
Western District of Missouri	13	14	13	9	5	9	9	14
Western District of New York	16	18	22	20	9	17	7	15
Western District of North Carolina	22	19	18	16	8	13	24	20
Western District of Oklahoma	5	7	5	5	6	3	7	14
Western District of Pennsylvania	18	17	18	14	16	16	11	39
Western District of Tennessee	11	8	7	7	1	4	2	31
Western District of Texas	38	17	15	13	22	34	41	55
Western District of Virginia	7	5	1	3	8	5	12	3
Western District of Washington	40	30	44	42	38	51	61	43
Western District of Wisconsin	20	26	49	40	25	38	44	31
Totals	2499	2581	2747	2527	2502	2715	3532	5423

VII. Figures

Figure 1.
US Court of Appeals & District Courts Map

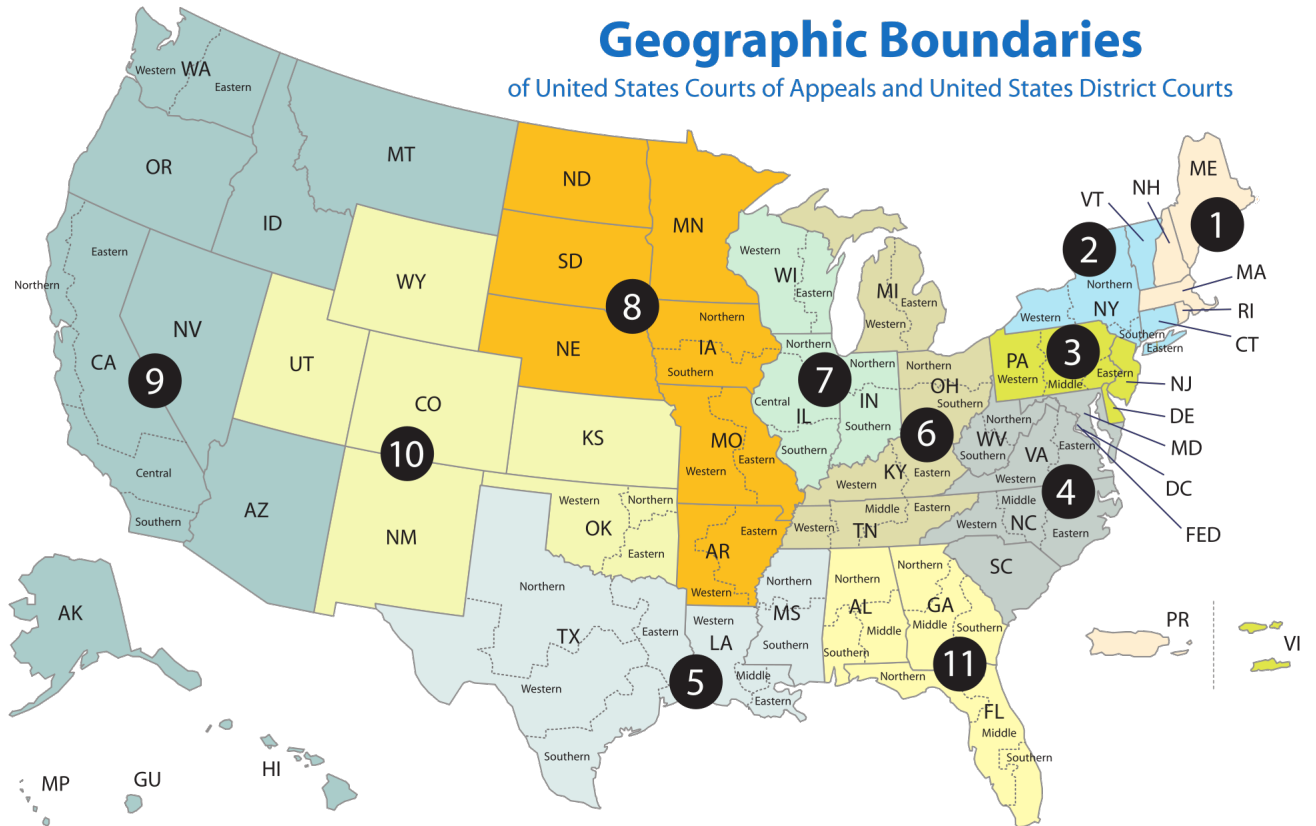


Figure 2.
Number of Patent Lawsuits

This figure shows the number of patent lawsuits filed in U.S District Courts. (Source: LexMachina Database)

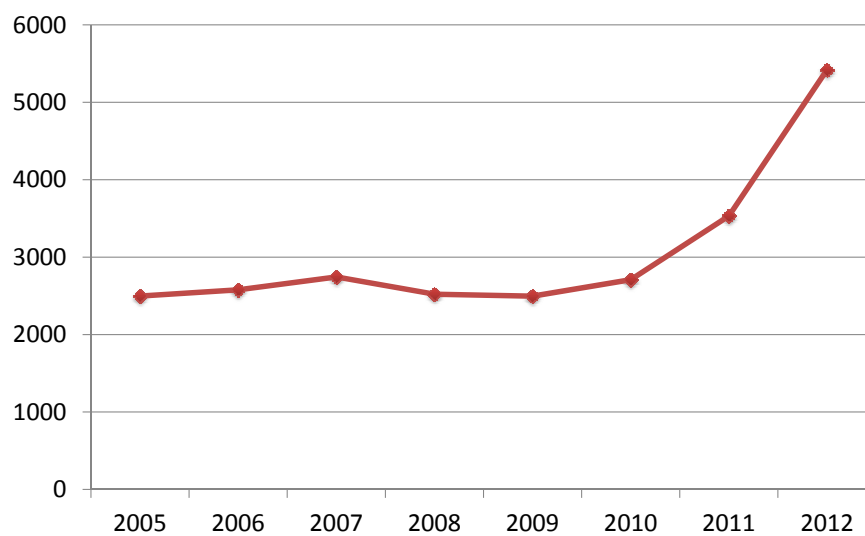
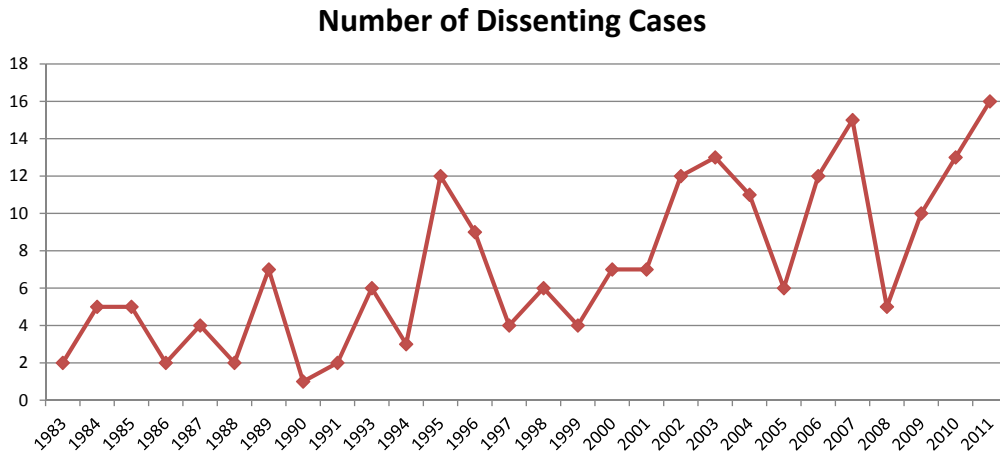


Figure 3.
Number of Dissent in CAFC Panels

This figure shows the number of dissenting dispositive court opinions by year. The sample is created as follows: first, I search all U.S. Court of Appeals for the Federal Circuit Opinions from 1/1/1983 to 31/12/2011 with the keywords “dissent! and patent”. This search returns 757 court opinions; 662 of these opinions are related with patent law and the rest is about other type of laws including civil procedure, trademark law, copyright law etc. 199 out of 658 cases are appeals raised from United States Patent and Trademark Office (USPTO) or International Trade Commission (ITC). Since my interest in this paper is only the appeals raised from U.S District Courts, I eliminate appeals from these governmental offices. This filtering leaves me with 459 court opinions. To include into my sample, I read each opinion whether it is a “dispositive” one, which means that as it leaves the Federal Circuit, at least one claim of one patent is finally adjudicated to have been infringed and not invalid or unenforceable (i.e., a win for the patent owner), or in which it has been finally determined that no claim has these characteristics (a win for the accused infringer). I include all dispositive decisions of the Federal Circuit, whether by precedential opinion, nonprecedential opinion, or per curiam affirmance without opinion under the courts Rule 36. Then, using Westlaw database, I check the history of each case to make sure that this case was not appealed to the Supreme Court or reheard in an en banc decision in a later stage. After excluding non-dissenting decisions and using these filters, I get 202 dispositive opinions, in which one of the judges have a dissenting opinion.



Winners

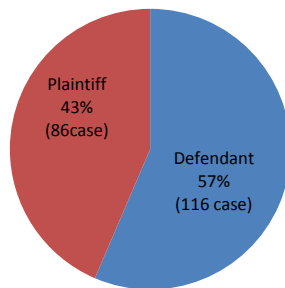
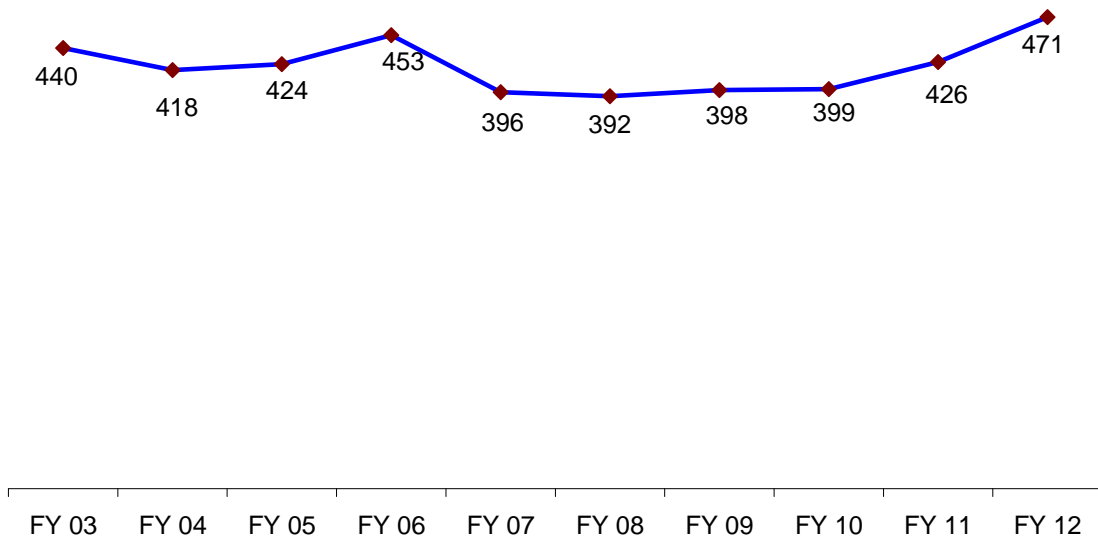


Figure 4.
Patent Caseload in CAFC

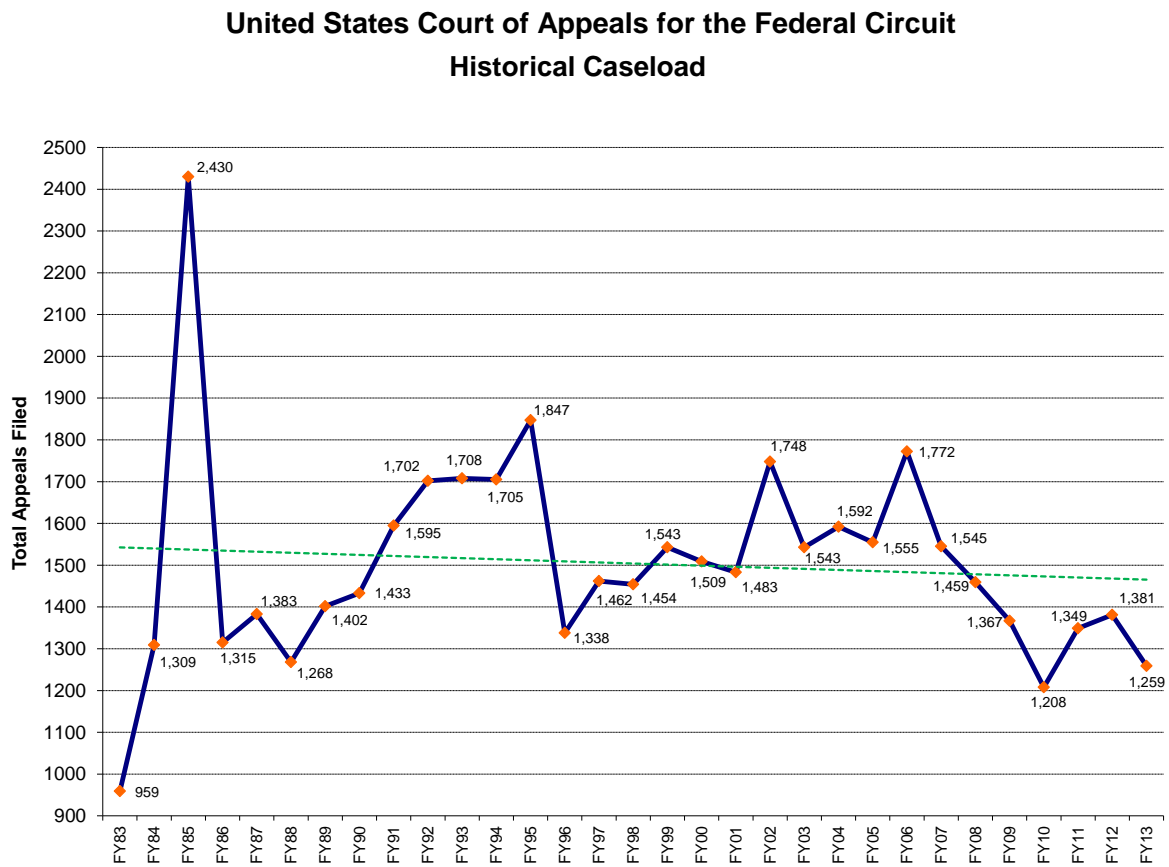
United States Court of Appeals for the Federal Circuit

**Filings of Patent Infringement Appeals
from the U.S. District Courts**



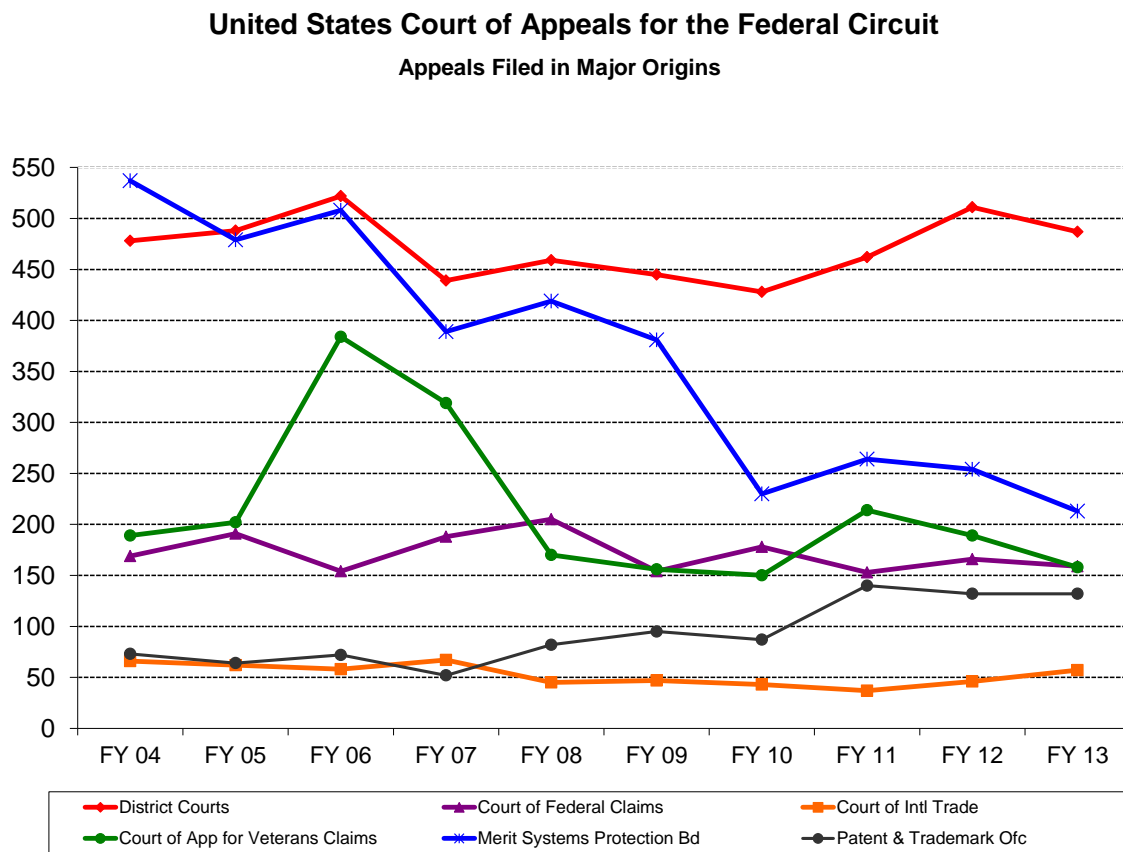
Note: Includes reinstated, cross- and consolidated appeals.

Figure 5.
All Caseload in CAFC



Notes: Includes reinstated, cross- and consolidated appeals. FY13 data is derived from the CMECF database. Prior years were derived from the court's legacy database.

Figure 6.
Caseload in CAFC by Origin



Notes: Includes reinstated, cross-, and consolidated appeals. FY13 data is derived from the CMECF database. Prior years were derived from the court's legacy database.

Figure 7.
Median Disposition in CAFC

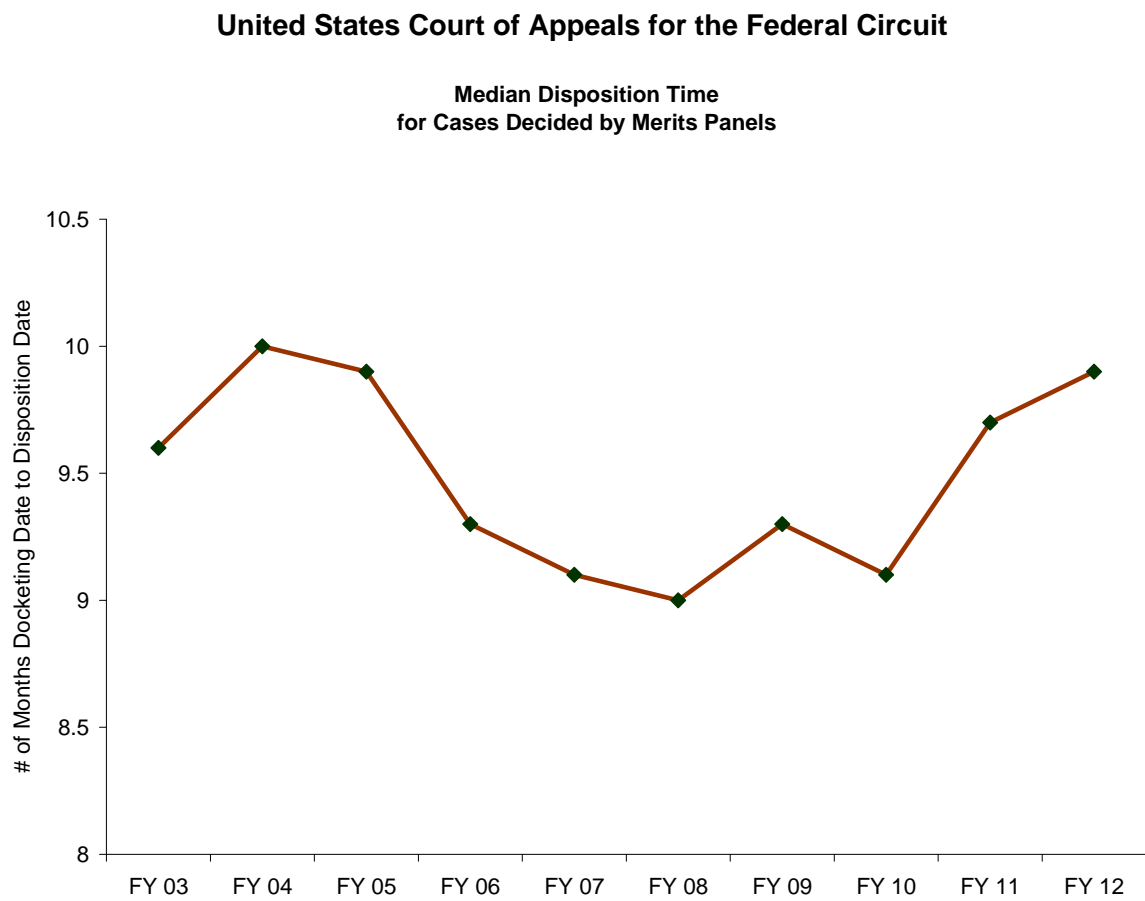


Figure 8.
Median Disposition in CAFC by Origin

United States Court of Appeals for the Federal Circuit

Median Time to Disposition in Cases Terminated After Hearing or Submission¹

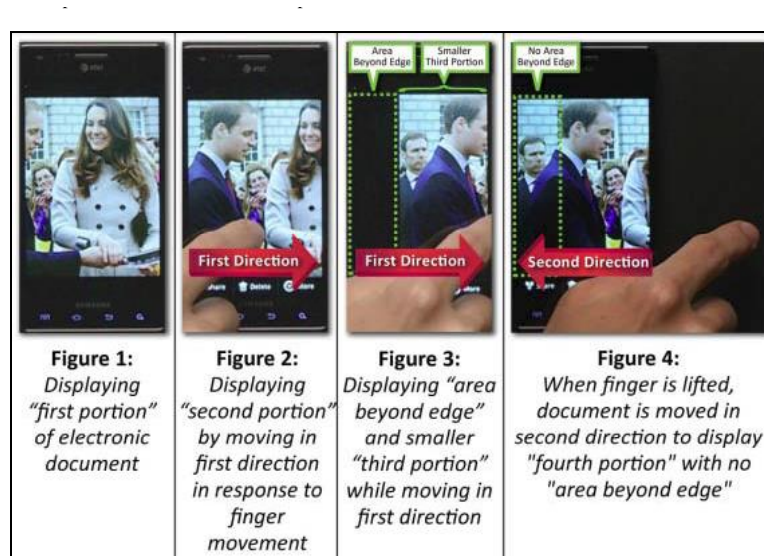
Docketing Date² to Disposition Date, in Months

	<u>FY 04</u>	<u>FY 05</u>	<u>FY 06</u>	<u>FY 07</u>	<u>FY 08</u>	<u>FY 09</u>	<u>FY 10</u>	<u>FY 11</u>	<u>FY 12</u>	<u>FY 13</u>	<u>Overall Median per Origin</u>
District Court	11.7	11.6	11.5	11.6	11.0	11.0	11.0	11.2	11.8	11.8	11.3
Court of Federal Claims	11.0	11.2	10.0	10.0	9.2	10.3	10.0	10.6	9.9	10.4	10.3
Court of International Trade	12.0	11.5	11.7	11.9	12.4	11.5	11.0	12.2	12.6	12.4	11.8
Court of Appeals Veterans Claims	10.0	9.9	8.4	8.4	8.0	9.3	9.3	6.0	8.6	11.2	9.1
Board of Contract Appeals	9.7	10.5	11.7	10.4	9.6	11.9	8.8	10.0	11.5	13.3	10.8
Department of Veterans Affairs	n/a	14.4	13.7	11.3	4.8	18.9	n/a	19.4	15.7	n/a	14.4
Department of Justice	n/a	n/a	n/a	n/a	n/a	8.9	8.9	n/a	n/a	9.7	9.7
International Trade Commission	16.0	16.4	15.6	13.6	14.4	14.4	14.8	14.6	16.1	13.7	14.4
Merit Systems Protection Board	6.9	7.5	6.5	6.4	5.8	6.5	6.1	6.1	6.4	7.4	6.5
Office of Compliance	10.1	13.3	14.0	n/a	19.0	n/a	13.0	15.0	n/a	n/a	13.6
Patent and Trademark Office	9.6	10.3	10.0	9.6	8.9	9.3	8.2	11.2	11.7	10.1	10.0
Overall Median per Fiscal Year	10.0	9.9	9.3	9.1	9.0	9.3	9.1	9.7	9.9	10.6	

¹ Excludes cross and consolidated appeals, writs, and OPM petitions

² Calculated from Date of Docketing or Date of Reinstatement, whichever is later

Figure 9. Apple's Motion for Infringement



VIII. Appendix

A. *Patent Lawsuit Defenses*

A.1. **Invalidity**

In US, a patent application is filed with United States Patent and Trademark Office (USPTO) and examined by patent examiners to assess whether the invention satisfy patenting requirements. Even though USPTO grants a patent, an alleged infringer may assert that, patent should be invalidated because the inventor failed to comply with the basic requirements for patentability. About invalidity defense, there are several doctrines that an alleged infringer may ground his arguments. These doctrines can be based in three broad categories: doctrines that ensure invention is a major contribution to the existing art; doctrines that ensure an invention is fully disclosed to the public; doctrines that ensure inventions are in the scope of patentable subjects.

First, to be a major contribution, pursuant to 35 U.S.C §101, an invention should be “new and useful” and, pursuant to §103, it should be “nonobvious”. To have “new and useful” property, an invention should have two elements: utility and novelty, as described in §102. In litigations, typically the utility requirement is not difficult to meet for the patent holders. Therefore, the issue on validity decision generally centers on the novelty and nonobviousness requirements. To be considered novel, an invention must not be wholly anticipated by the so called “prior art” or public domain materials such as publications and other patents. Nonobviousness doctrine adds to this by requiring that an invention not have been obvious to a person having ordinary skill in the art as of the time of invention.

Second, a patent should be fully disclosed to the public with a written description, best-mode and definiteness requirements. The written description and definiteness ensure that public knows the boundaries of a patent so that they would better predict whether their product falls into the domain of patent’s claims. Best-mode doctrine, however, is related for the term after a patent expired. It requires that details of the invention is fully disclosed so that someone who is skilled in the art of the invention can easily build upon the written description.

Thirdly, the invention should be in the scope of the patentable subjects. 35 USC §101 lists the patentable matters as: “Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent.” This description prevents an inventor from obtaining a patent on an overly abstract, laws of nature or physical phenomena invention that would preempt subsequent innovation. Even though patentable subjects are defined in U.S.C, with the improvement of technology, boundaries of patentable subjects induce important debates. For example, in a recent case, Myriad Genetics was sued over its claim of patents relating to two types of biological material that it identified (BRCA1 and BRCA2), whose mutations are linked to increased hereditary risk for breast and ovarian cancer. On June 2013, the Supreme Court unanimously ruled that human genes cannot be patented. They also noted, however, that a synthetic version of the gene material may be in the scope of patentable subjects²⁸.

A.2. **Noninfringement**

Patent infringement is the unauthorized manufacture, use, sale, or importation of a patented invention²⁹. To achieve a legal enforcement, patent holder ordinarily bears the burden of proving

²⁸<http://www.cnn.com/2013/06/13/politics/scotus-genes/>

²⁹The definition of “patent infringement” can be found in 35 U.S.C. §271(a) which defines direct infringement as: “makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent”. In addition, 35 U.S.C. §271(b) extends liability for

infringement³⁰. After the being alleged for infringing a patent, a defendant argues that alleged infringed product does not fall into the boundary of the described patent claims.

A patent claim generally contains three elements. First, it has a preamble setting, which describes the general description of the invention. For example, a claim to an improved monitor might have the preamble “A monitor...”. Second, patent claims have a transitional word or phrase such as “comprising, consisting of and consisting essentially of”. These phrases explain the ingredients of the invention. Finally, patent claims have the body part, which explains the details of the invention.

There can be two types of infringement: “literal infringement” and infringement under the “doctrine of equivalents”. The term “literal infringement” means that the device, system or method of another party completely embodies every element enumerated by at least one patent claim. However, even if there is no literal infringement, a claim may be infringed under the doctrine of equivalents if accused product or process contain elements identical or equivalent to each claimed element of the patented invention. The purpose of the doctrine is to prevent an infringer from stealing the benefit of a patented invention by changing only minor or insubstantial details of the claimed invention while retaining the same functionality. However, there are limits on the scope of doctrine of equivalents to which the patent owner is entitled. The scope of coverage is limited by (i) the doctrine of “prosecution history estoppel³¹” and (ii) the prior art.

In the light of these infringement types, the court process for determining whether an accused product infringes a claim can be summarized in three steps:

1. Claim construction (i.e, construe the scope of the “literal” language of the claims).
2. Compare the claims, that were construed by the court, with the accused product, to determine whether there is literal infringement.
3. If no literal infringement is found, then construe the scope of the claims under the doctrine of equivalents.

B. An Example of Infringement Case: Apple vs. Samsung

In the first of the patent wars, on April 15, 2011, Apple sued Samsung in the United States District Court for the Northern District of California alleging that several of Samsung’s Android phones and tablets, including the Nexus S, Epic 4G, Galaxy S 4G, and the Samsung Galaxy Tab, infringed Apple’s 3 utility and 4 design patents³². In this section, I will summarize the noninfringement defenses of Samsung about US Patent No: 7,469,381 (’381)³³, which was one of the most debated patents in the suit. Similar to majority of patent litigations, the dispute on the noninfringement defense was based on construe of patent claim terms.

infringement to those who “actively induces” another to infringe a patent, and 35 U.S.C. §271(c) extends liability to contributory infringers as follows: “whoever sells a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial non-infringing use, shall be liable as a contributory infringer”.

³⁰In declaratory judgment actions, the burden shifts to the plaintiff to prove non-infringement

³¹Prosecution history estoppel, also known as file-wrapper estoppel, means that a person who has filed a patent application, and then makes narrowing amendments, may be precluded from invoking the doctrine of equivalents to broaden the scope of their claims to cover subject matter ceded by the amendments.

³²Utility Patents, US Patent No: 7,469,381, 7,844,915, and 7,864,163 and four design patents. US Patent No: D504,889, D593,087, D618,677, and D604,305

³³The ’381 patent is entitled “List scrolling and document translation, scaling, and rotation on a touch-screen display”

Claim Construction Phase:

The central point of the discussion about '381 patent was about the meaning of “display” in Claim1.

CLAIM 1 of the '381 Patent:

A computer-implemented method, comprising:

at a device with a touch screen display:

displaying a first portion of an electronic document;

detecting a movement of an object on or near the touch screen display;

in response to detecting the movement, translating the electronic document displayed on the touch screen display in a first direction to display a second portion of the electronic document, wherein the second portion is different from the first portion;

in response to an edge of the electronic document being reached while translating the electronic document in the first direction while the object is still detected on or near the touch screen display:

displaying an area beyond the edge of the document, and

displaying a third portion of the electronic document, wherein the third portion is smaller than the first portion; and

in response to detecting that the object is no longer on or near the touch screen display, translating the electronic document in a second direction until the area beyond the edge of the electronic document is no longer displayed to display a fourth portion of the electronic document, wherein the fourth portion is different from the first portion.

In opposition to Apple’s preliminary injunction motion, Samsung argued that “displaying an area beyond the edge of the document in claim1 of the '381 patent requires that at least some of part of the area beyond the edge of the document emit light or be illuminated. Samsung claimed that this construction is supported by the plain claim language. For example, Claim 1 requires displaying a first portion of an electronic document and display[ing] a second portion of the electronic document. In both situations, at least some of part of the first portion or second portions must emit light. Otherwise, the first or second portions would not be visible. Likewise, displaying an area beyond the edge of the document requires the emission of light in the area beyond the edge.

According to Samsung’s claim construction, the areas beyond the edge of the documents that Apple identifies are all black so that these black areas are not displayed by the accused devices. This is because they use AMOLED screens. When an area of an AMOLED display is black, the pixels corresponding to that area are not emitting any light or being illuminated. Thus, there is a lack of any display, just as there is a lack of any display when the screen is turned off³⁴. Despite Samsung’s suggestion for claim construction, the court construed “displaying” as “showing or revealing to the viewer”³⁵. Since this definition does not include “emitting light”, Samsung was found infringing the '381 patent.

³⁴Samsung’s Opposition To Apple’s Motion For A Preliminary Injunction, Case No: 11-cv-01846-LHK

³⁵Apple Inc. v. Samsung Elecs. Co., 2011 (N.D. Cal. Dec. 2, 2011) (No. 11-CV-01846-LHK), 678 F.3d 1314 (Fed. Cir. 2012).

C. Variable Definitions

C.1. Financial Variables

Assets = ATQ

Book Leverage = Total Debt / Book Assets = (DLCQ+DLTTQ) / ATQ

Capital Expenditure Ratio= Quarterly capital expenditures (CAPXY) / lagged total assets (ATQ). CAPXY is reported on a year-to-quarter basis; thus I quarterize by subtracting lagged values.

Cash = Cash / Book Assets = CHEQ / ATQ

R&D = Research and development expenses (XRDQ) / lagged total assets(ATQ)

Return on Assets (ROA) = Operating income before depreciation (OIBDPQ) / lagged total assets (ATQ)

Return on Equity (ROE) =Income before extraordinary items/one-quarter-lagged book equity= IBQ/SEQQ

Sales growth = $\log(\text{sales}) - \log(\text{lagged sales}) = \log(\text{SALEQ}) - \log(\text{L.SALEQ})$

Sales =SALEQ

C.2. Innovation Variables

In this section, I use the variable definitions in [Bena and Li \(2013\)](#).

Self-Cite-Ratio: First, I compute the number of awarded patents to the acquirer/target firm with award years from acquisition year (ayr)-3 to ayr -1 that cite any of the acquirers/target firms other awarded patents. Second, I scale the number from the first step by the total number of awarded patents to the acquirer/target firm with award years from ayr-3 to ayr-1.

Knowledge Base Overlap : First, we determine the set of patents that received at least one citation from any of the acquirers patents with award years from ayr-3 to ayr-1 (“the acquirers knowledge base”), the set of patents that received at least one citation from any of the target firms patents awarded over the same three-year period (the target firms knowledge base), and the intersection of these two sets as the set of patents cited by both the acquirer and the target firm (“the common knowledge base”). Second, we compute the number of patents in “the common knowledge base.”

Acquirers (Targets) Base Overlap Ratio: First, I compute the number of citations from any of the acquirers (target firms) patents with award years from ayr-3 to ayr-1 made to the patents in the common knowledge base. Second, I scale the number from the first step by the number of citations from any of the acquirers (the target firms) patents with award years from ayr-3 to ayr-1 made to the patents in “the acquirers knowledge base (“the target firms knowledge base”).

Acquirers (Targets) Cross-Cites Ratio: First, I compute the number of the acquirers (target firms) awarded patents with award years from ayr-3 to ayr-1 that cite any of the target firms (acquirer’s) awarded patents. Second, I scale the number from the first step by the number of the acquirer’s (target firm’s) awarded patents with award years from ayr-3 to ayr-1.

D. Patent Law Glossary

Appellant: The party, who applies to a higher court for a reversal of the decision of a lower court.

Appellee: The party, against whom an appeal is filed in the higher court.

Concurring Opinion: is a written opinion by one or more judges of a court which agrees with the ruling of the majority of the court, but states different reasons as the basis for his or her decision.

Declaratory Judgment: a lawsuit asking a court to declare a patent invalid or not infringed.

Defendant: The party against whom an action or claim is brought in a court of law.

Doctrine of Equivalents: is an infringement type in which accused product or process contain elements identical or equivalent to each claimed element of the patented invention.

Dissenting Opinion: is an opinion in a legal case written by one or more judges expressing disagreement with the majority opinion of the court which gives rise to its judgment.

Infringement: is the unauthorized manufacture, use, sale, or importation of a patented invention.

Injunction: is a court order that requires a party to do or refrain from doing specific acts. In patent litigations, it is used as a court order that prohibits defendant to use, offer for sale, sell, and import the infringing product.

Judgment as a matter of law (JMOL): is a motion made by a party, during trial, claiming the opposing party has insufficient evidence to reasonably support its case.

Lawsuit: is a civil action brought in a court of law in which a plaintiff, a party who claims to have incurred loss as a result of a defendant's actions, demands a legal or equitable remedy.

Literal infringement: is an infringement type in which device, system or method of another party completely embodies every element enumerated by at least one patent claim.

Patent: is a grant by the government, grounded in Article I, section 8, clause 8 of the U.S. Constitution, that gives the patent owner the exclusive right to make, use, offer for sale, sell, and import the invention described in the patent for a specific term.

Plaintiff: is the party who initiates a lawsuit (also known as an action) before a court. By doing so, the plaintiff seeks a legal remedy, and if successful, the court will issue judgment in favor of the plaintiff and make the appropriate court order (e.g., an order for damages).

Safe Harbor: is a provision of a statute or a regulation that specifies that certain conduct will be deemed not to violate a given rule.

Summary Judgment: is a judgment entered by a court for one party and against another party summarily, i.e., without a full trial.

Standard Essential Patent: is a patent that claims an invention that must be used to comply with a technical standard.

Writ of mandamus: is an extraordinary court order because the case is made without the benefit of full judicial process. It is typically issued on a case that has already begun.

Writ of Certiorari: is a type of writ, by which Supreme Court decides whether to hear the case.