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Article

Unpacking Patent Assertion Entities (PAEs)

Christopher A. Cotropia[†], Jay P. Kesan^{††} & David L. Schwartz^{†††}

In the last decade, the landscape of patent litigation has radically shifted. Entities that do not manufacture products have become important players in the patent litigation system. This is a change from years ago, when patent litigation was dominated by lawsuits between competitors.¹ In this earlier period, there were complaints that the cost of patent litigation prohibited most small patent owners from enforcing their

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1. See generally Colleen V. Chien, *Of Trolls, Davids, Goliaths, and Kings: Narratives and Evidence in the Litigation of High-Tech Patents*, 87 N.C. L. REV. 1571 (2009) (describing various plaintiff-defendant matchups and their frequency of occurrence in patent litigation).

rights against large entities. Today, companies that manufacture products embodying their patents urge that patent plaintiffs that do not manufacture products are fundamentally different. The main argument is that there are asymmetric stakes.² In a patent lawsuit when both plaintiffs and defendants are manufacturers, defendants can cross-license patents or hit back at plaintiffs with their own patent infringement lawsuit, a strategy that is unavailable with a non-manufacturing plaintiff. As a result, non-manufacturing plaintiffs in the patent system are seen as opportunistic actors who sue manufacturing companies for money.

The recent entrants, often-called “patent assertion entities” (“PAEs”),³ non-practicing entities (“NPEs”), patent monetization entities (“PMEs”),⁴ or simply patent trolls, come in many shapes and sizes. They run the gamut from universities, failed start-ups, and individual inventors, to companies formed by venture capitalists seeking to exploit the inventions of others.⁵ From the perspective of a patent as an economic instrument designed to provide rewards for inventors, it is important to carefully separate these specific categories of PAEs. There is little economic support for the proposition that individual inventors and university personnel should not benefit from the patent system.⁶ Similarly, start-up companies that subsequently fail to commercialize their patented technologies also urge that they should be allowed to monetize their patents through litigation when other companies deploy the start-up’s patented technologies in their products.⁷ Other entities in the patent system who help individuals, universities, and failed start-ups monetize their patents also urge that they are important intermediaries bringing resources to inventors to help them mon-

2. See Mark A. Lemley & A. Douglas Melamed, *Missing the Forest for the Trolls*, 113 COLUM. L. REV. 2117, 2162 (2013).

3. Colleen V. Chien, *From Arms Race to Marketplace: The New Complex Patent Ecosystem and Its Implications for the Patent System*, 62 HASTINGS L.J. 297, 300 (2010).

4. Sara Jeruss, Robin Feldman & Joshua Walker, *The America Invents Act 500: Effects of Patent Monetization Entities on US Litigation*, 11 DUKE L. & TECH. REV. 357, 361 (2012).

5. Some studies have attempted to classify parties using a dozen entity status categories. See, e.g., John R. Allison, Mark A. Lemley & Joshua Walker, *Extreme Value or Trolls on Top? The Characteristics of the Most-Litigated Patents*, 158 U. PA. L. REV. 1, 10 (2009).

6. See EXEC. OFFICE OF THE PRESIDENT, PATENT ASSERTION AND U.S. INNOVATION 2 (2013) [hereinafter “EXECUTIVE OFFICE REPORT”].

7. See *id.* at 3.

etize their patents.⁸ We recognize that there are various names that people use to refer to these entities.⁹ In this Article, we refer to all of these entities as PAEs, except when referring to the studies of others who call them by a different name.

Most recently, there has been a ferocious backlash in many sectors of society against PAEs. Some academics and practitioners have argued forcefully that PAEs are bad, that their conduct is costly, and that they are socially harmful to the economy.¹⁰ The President of the United States has even joined in the fray. In response to a question about “patent trolls,” President Obama recently stated, “They don’t actually produce anything themselves They are essentially trying to leverage and hijack somebody else’s idea and see if they can extort some money out of them.”¹¹ To counter patent trolls, the President and his economic team issued an executive order, including some legislative recommendations, to make litigation more difficult for patent holders.¹² Academics have contended that PAEs cost the economy tens of billions of dollars, based upon a confidential survey of defendants.¹³ The press trumpeted an-

8. See Edith Ramirez, Chairwoman, Fed. Trade Comm’n, Opening Remarks of Chairwoman Edith Ramirez, Competition Law & Patent Assertion Entities: What Antitrust Enforcers Can Do (June 20, 2013) available at <http://ftc.gov/speeches/ramirez/130620paespeech.pdf> (“Rewarding genuine invention is good for competition and consumers. PAEs can serve that goal by reducing the enforcement hurdles facing small inventors and start-ups PAEs can make it easier for a failed start-up to monetize its patents, providing some insurance for venture capitalists.”).

9. Some refer to all or some NPEs as “trolls.” For instance, some believe troll refers to a case brought by an NPE which is meritless. Others believe troll refers to a case brought by an NPE for a nuisance value settlement. Others believe that all cases brought by an NPE are troll cases, regardless of the merits. While the terms PME and PAE are meant to exclude University patent litigation, it is less clear whether Individual Inventor lawsuits are included. For an empirical project such as ours, the definition of an NPE is key.

10. See Sannu K. Shrestha, *Trolls or Market-Makers? An Empirical Analysis of Nonpracticing Entities*, 110 COLUM. L. REV. 114, 129 (2010). See generally James Bessen & Michael Meurer, *The Direct Costs from NPE Disputes*, 99 CORNELL L. REV. 387 (2014) (discussing the costs of patent litigation).

11. Gene Sperling, *Taking on Patent Trolls To Protect American Innovation*, THE WHITE HOUSE BLOG (June 4, 2013, 1:55 PM), <http://www.whitehouse.gov/blog/2013/06/04/taking-patent-trolls-protect-american-innovation>.

12. See Edward Wyatt, *Obama Orders Regulators To Root Out “Patent Trolls,”* N.Y. TIMES (June 4, 2013), <http://www.nytimes.com/2013/06/05/business/president-moves-to-curb-patent-suits.html>; EXECUTIVE OFFICE REPORT, *supra* note 6 (discussing data findings regarding PAE litigation).

13. Bessen & Meurer, *supra* note 10, at 389. For a critique of the methods used in that study, see David L. Schwartz & Jay P. Kesan, *Analyzing the Role*

other study that found patent trolls filed 62% of patent lawsuits in 2012, a huge increase from the 29% filed in 2010.¹⁴ RPX Corporation (RPX) and Patent Freedom, two companies whose business includes providing subscriptions for businesses facing PAE assertions of patent infringement, have each reported summaries of their proprietary data on PAEs.¹⁵

While the rhetoric in these studies is often sharp and clear, the same cannot also be said for the disclosures of the underlying data. The studies merely provide summary data to the public and often do not differentiate between the various types of PAEs. Instead, the studies broadly classify companies as either PAEs or non-PAEs (or sometimes, trolls or non-trolls). Importantly, nearly all of the data upon which these studies are premised is confidential and thus is not available for peer review or for use in other studies.¹⁶ This includes the data used in the Executive Office Report. In late August 2013, the Government Accountability Office (“GAO”) released its long-awaited report on NPEs.¹⁷ That report, while appearing quite balanced

of *Non-Practicing Entities in the Patent System*, 99 CORNELL L. REV. 425 (2014).

14. See Steven Musil, *Patent Trolls Now Behind Most Patent Infringement Lawsuits*, CNET (Dec. 10, 2012, 9:10 PM), http://news.cnet.com/8301-1023_3-57558384-93/patent-trolls-now-behind-most-patent-infringement-lawsuits (“About 62 percent of all patent lawsuits filed this year up to December 1 were brought by patent assertion entities (PAEs), which are created to extract licensing fees from other companies rather than make products based on the patents.”); Colleen Chien, *Patent Trolls by the Numbers*, PATENTLY-O (Mar. 14, 2013), <http://www.patentlyo.com/patent/2013/03/chien-patent-trolls.html>.

15. See, e.g., RPX CORP., 2012 NPE ACTIVITY REPORT (2013), available at <http://patentlyo.com/media/docs/2013/07/0BF995E82CFF591EE80EFE8AC69259E7.pdf>. Patent Freedom’s publicly available website contains summary data on NPE assertions. See, e.g., *Litigations Over Time*, PATENT FREEDOM, <https://www.patentfreedom.com/about-npes/litigations/> (last visited Nov. 5, 2014). Moreover, Steven J. Moore, a legal practitioner at the Kelley Drye law firm, wrote a five-part series on the popular blog IPWatchdog about NPEs. In the posts, he reported summary data on a variety of NPE related issues that appear to contradict the anti-patent troll narrative. See, e.g., Steve Moore, *Probing 10 Patent Troll Myths—A Fractured Fairytale Part 2*, IPWATCHDOG (July 30, 2013, 11:35 AM), <http://www.ipwatchdog.com/2013/07/30/probing-10-patent-troll-myths-a-fractured-fairytale-part-2/id=43754>.

16. We understand that Stanford Law School is in the early staging of organizing a publicly available database of litigated patent owner information, including classification of entities that own the underlying patents. We have agreed to contribute our data to this worthwhile effort. We understand that some or all of the data from the Feldman et al. article will also be contributed to the public database.

17. U.S. GOV’T ACCOUNTABILITY OFFICE, INTELLECTUAL PROPERTY: ASSESSING FACTORS THAT AFFECT PATENT INFRINGEMENT LITIGATION COULD

and thoughtful, has several shortcomings. The GAO analyzed data from patent lawsuits initiated between 2007 and 2011, which means that it lacked meaningful data after the effective date, in late 2011, of the America Invents Act.¹⁸ The GAO report also did not disclose its underlying data. Because the underlying data is never released in any of the prior studies, other researchers cannot often determine which entities were classified as PAEs or NPEs, what revenue numbers were associated with these entities, and other information necessary to fully evaluate the claims. This information is critical to verify, as a policy matter, whether PAEs are engaging in strategic and opportunistic behavior that does not benefit anyone except them.¹⁹

Defenders of PAEs have offered several purported benefits. They claim that PAEs provide liquidity in the marketplace for patents.²⁰ They permit inventors who are otherwise excluded from the marketplace—because, for instance, they are individuals who cannot manufacture products, or they are companies that tried yet failed to manufacture—to obtain some return on their investment.²¹ Even when these entities sell their patents to another to enforce, they are receiving something for their efforts. According to this argument, without the market for patents, these inventors would remain uncompensated for their contributions. Furthermore, PAEs are claimed to be specialists in patent enforcement who are skilled in evaluating allegations of infringement and hiring and supervising law firms to keep costs down. PAEs also have resources to cover litigation expenses.²² Under this theory, PAEs assert lawsuits that have a reasonable likelihood of succeeding and which are expected to yield recoveries above out-of-pocket litigation expenses.

HELP IMPROVE PATENT QUALITY (2013) [hereinafter GAO REPORT], available at <http://www.gao.gov/assets/660/657103.pdf>.

18. *Id.* at 4. The GAO Report hypothesizes without data that the increase in litigation in the end of 2011 was because patent owners anticipated the passage of the AIA, which restricted the number of accused infringers who could be joined in a single lawsuit. *Id.* at 15.

19. We also note that lawsuits do not represent the complete story of patent disputes. Some disputes are clearly raised and either settled or dropped without court intervention. We have no means to evaluate the quantity or effect of cease and desist letters sent by patent holders, despite their potential importance. This correspondence between private parties is confidential and not available to research in all but the rarest of circumstances.

20. Michael Risch, *Patent Troll Myths*, 42 SETON HALL L. REV. 457, 459 (2012); Shrestha, *supra* note 10, at 126–28.

21. *See* sources cited *supra* note 20.

22. Risch, *supra* note 20, at 494.

To us, the fundamental barrier to thoroughly understanding these competing narratives is the lack of granular and transparent data that attempts to properly account for the various types of PAEs. In addition, no other PAE study, to our knowledge, has publicly released the underlying data. Other studies maintain their datasets as confidential or otherwise have not yet released the data.²³ This present study overcomes this barrier.

We have classified all patent holder litigants from calendar years 2010 and 2012, and we are releasing this data to the public. We have attempted to drill down and finely classify the nature of the litigants, beyond the simple PAE or non-PAE definitions. Broad definitions of trolls or PAEs surely cause higher numbers. We believe that providing data to the public that unpacks the definition of PAE can provide better illumination to policy makers, researchers, and others interested in the patent litigation system. It will enable researchers to properly tailor investigations to the specific question they are considering. And if one believes that all PAEs, however defined, are bad, then one can aggregate our classifications to analyze data.

Our dataset, which took months to gather and code, includes 2,520 lawsuits from 2010 and 5,185 lawsuits from 2012. We classified each patent holder as an Operating Company, University, Individual Inventor, Patent Aggregator, Technology Development Company, Failed Start-up, IP Holding Subsidiary of an Operating Company, or Patent Holding Company.²⁴ In addition, we obtained information about the underlying patents and technologies involved in the lawsuits.

Our data provides a rich account of changes in patent litigation in the last few years, considering both the increase in the number of patent lawsuits and their interaction with the new laws that have come into effect under the America Invents Act (AIA). Our most basic descriptive findings are inconsistent with, and call into serious question, the summary data provided by RPX, Patent Freedom, and other academics. Our data reveals a much lower percentage of litigation brought by Patent

23. Some of the data is owned by RPX and Patent Freedom. These are for-profit businesses that earn money, in part, because of the data that they have compiled. We understand their legitimate business desire to maintain the data as secret. However, if a business elects to maintain its data as secret, then we believe the data should be severely discounted in debates about public policy. As academics, we do not have these financial incentives with respect to data.

24. A full description of each of these types of patent holders is found in Part II.

Holding Companies than other studies. In fact, for the most part, we find that there has not been any explosion of PAE litigation between 2010 and 2012, as others have reported. We find, instead, that most of the differences between the years are likely explained by, and attributable to, a change in the joinder rules adopted in 2011 as part of the America Invents Act. To be sure, the data is slightly complicated, and we do find a modest increase in PAE litigation, especially if one uses a narrow definition of PAEs (including only non-original inventors—Patent Holding Companies and Patent Aggregators). But overall, the often-repeated “explosion” of PAE litigation from 2010 to 2012 is almost completely a myth.

Our data reveals a modest increase in the number of Patent Holding Companies and in the number of Individual Inventor suits. We also find that when we repackage all PAEs into a single category, they are responsible for a majority of accused infringers sued for patent infringement in 2012. We note that many of the patent law changes currently proposed will negatively impact Individual Inventors. Individual Inventors are rarely explicitly described as trolls but are often included in the counts of ‘bad’ lawsuits. If one believes that the focus should be on speculators who purchase patents from others for the purposes of enforcement, then the data on such individuals should be studied.

The remainder of this Article proceeds in three parts. In Part I, we explain several theories on why PAEs are beneficial or detrimental to the patent system. These theories outline distinct categories of patent holders who enforce their patents. Transforming the distinct categories into a coding scheme, we detail in Part II the methodology we used to generate the dataset. Part III provides descriptive statistics of 2010 and 2012 patent litigation. We discuss implications of the data, including points of disagreement between our data and the data of others, in Part IV. We also describe some areas of future study, many of which we are presently undertaking. Finally, we provide a brief conclusion.

I. THEORIES RELATING TO PAES

There are numerous theories on the role of PAEs in the patent system. As mentioned in the introduction, many people (including President Obama’s economic team) contend that PAEs “significantly retard innovation in the United States and result in economic ‘dead weight loss’ in the form of reduced in-

novation, income, and jobs for the American economy.”²⁵ They assert that PAEs hold up legitimate innovators by demanding undeserved rents. Opponents of PAEs point to other “unfair” aspects of PAE litigation that stem from the fact that PAEs do not manufacture any products. For instance, PAEs are immune from a potential weapon used by accused infringers—counterclaims of patent infringement—because they make no products that may potentially infringe a patent.²⁶ Furthermore, because PAEs do not manufacture products, they have fewer relevant documents.²⁷ In litigation, the discovery obligations are asymmetric, with it costing more to defend a PAE lawsuit than to prosecute one.²⁸ Supporters of PAEs allege that these entities serve a useful role as intermediaries with skills at monetizing patents, something that many original patent owners lack.²⁹ But sometimes, the arguments are more nuanced. To untangle these conflicting economic rationales and dueling narratives, the definition of PAE needs to be unpacked and the specific categories of actors within the PAE category and each actor’s behavior in litigation needs to be analyzed separately.

An initial question is whether Universities should be included within a definition of PAE. University faculty and graduate students are often viewed as important contributors to innovation and scientific research. However, Universities are undeniably “non-practicing”; they do not directly commercialize their inventions. A technical definition of PAE or NPE would include Universities, although many scholars believe Universities should not be included.³⁰

Moving beyond Universities, should Individual Inventors enforcing their own patents be considered PAEs? Again, these individuals are non-practicing in that they are not manufacturing products. Some consider them bad actors and “patent trolls.”³¹ But the story of the garage inventor, “working against

25. EXECUTIVE OFFICE REPORT, *supra* note 6, at 12.

26. *See id.* at 4.

27. *See* Lemley & Melamed, *supra* note 2, at 2162.

28. *See id.*

29. Risch, *supra* note 20, at 459.

30. *See, e.g.,* Mark A. Lemley, *Are Universities Patent Trolls?*, 18 *FORDHAM INTELL. PROP. MEDIA & ENT. L.J.* 611, 630 (2008) (arguing that universities should not be deemed trolls); Risch, *supra* note 20, at 468.

31. *See, e.g.,* Andrew Beckerman-Rodau, *The Supreme Court Engages in Judicial Activism in Interpreting the Patent Law in eBay, Inc. v. MercExchange, L.L.C.*, 10 *TUL. J. TECH. & INTELL. PROP.* 165, 173 (2007) (“In

all odds to provide society with amazing technological breakthroughs" is part of the American dream.³² And if an important benefit of PAEs is their roles as intermediaries skilled at monetizing patents, it is strange to include the original individual patent inventors, who are by definition not intermediaries.

Failed companies, including Failed Start-ups and Failed Operating Companies, also are a distinct type of PAE. At one point, these companies either manufactured products or seriously attempted to break into the market. For some reason, these entities failed at selling or developing products or services. They retained their original patents, and later seek to enforce them. To proponents of PAEs and entrepreneurship in general, Failed Start-ups that enforce their patents are a positive.³³ The revenue from patent monetization permits some return to the original corporate backers and investors, who otherwise would receive no money.³⁴ By providing an alternative method of returning money to investors, patent enforcement helps the investment ecosystem.³⁵ Critics of PAEs argue that very few start-ups plan or ever make money from enforcing their patents.³⁶ They argue that start-ups are more likely to be on the receiving, rather than asserting, end of a PAE dispute.³⁷

Another category includes companies that develop technology largely for the purposes of licensing to others. These companies are like idea labs, which rely upon patents to protect the inventions. They are separate from Individual Inventors because they use a corporate structure to bring together numerous employee inventors. But they are original owners of the technology, and for the most part they do not practice the technology by making products and/or offering services based on

contrast, the so-called patent trolls are often individual inventors or small startups.").

32. Christopher A. Cotropia, *The Individual Inventor Motif in the Age of the Patent Troll*, 12 YALE J.L. & TECH. 52, 54 (2009).

33. Risch, *supra* note 20, at 491.

34. *Id.*

35. See generally Stuart J.H. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 BERKELEY TECH. L.J. 1255 (2009) (analyzing a survey of early-stage technology companies regarding why they patent).

36. See generally COLLEEN V. CHIEN, NEW AM. FOUND., PATENT ASSERTION AND STARTUP INNOVATION (2013), available at http://newamerica.net/sites/newamerica.net/files/policydocs/Patent%20Assertion%20and%20Startup%20Innovation_updated.pdf (discussing benefits and costs of patent assertion litigation to start-up companies and venture capitalists).

37. *Id.*

their patented technologies. These Technology Development Companies fit as PAEs in some definitions, but not others.

Some definitions of PAEs exclude the original owner of the patents. The argument is that financial speculators are purchasing patents not with the goal of enhancing knowledge or encouraging commercialization, but rather merely to obtain financial returns (i.e., rent-seeking). Others counter that these speculators are creating a market for patents to enable Individual Inventors to receive some compensation, when none was previously available.³⁸ These financial speculators, presumably financed by Wall Street, take two potential forms. First, they may purchase a single patent or small portfolio of patents. These speculators form essentially a shell corporation—a Patent Holding Company—to hold title to the patents without other substantial assets. Then, the Patent Holding Company aggressively asserts the patents against an industry. The Patent Holding Company's legal fees are relatively low in patent litigation because it has essentially no documents to produce.³⁹ Consequently, its discovery costs are low. Moreover, the Patent Holding Company litigates overly aggressively because it has no reputational concerns that an Operating Company may have when asserting its patents.⁴⁰

A second type of speculator is the Mass or Large Patent Aggregator. The Mass Patent Aggregator acquires a large portfolio of patents, sometimes alleged to be as large as 80,000 patents.⁴¹ Aggregators then assert the entire portfolio against established industry participants. Critics of these entities claim that they are a tax on production, unnecessarily raise rivals' costs, and engage in potential anticompetitive conduct.⁴² Others tepidly defend Mass Aggregators by arguing that Aggregators reduce transaction costs for companies needing to clear a significant number of patent rights.⁴³ According to this narrative,

38. See Beckerman-Rodau, *supra* note 31, at 172–73.

39. See Lemley & Melamed, *supra* note 2, at 2162.

40. See EXECUTIVE OFFICE REPORT, *supra* note 6, at 5.

41. Dennis Crouch, *Intellectual Ventures and its 80,000 Patents*, PATENTLY-O (Oct. 7, 2013), <http://www.patentlyo.com/patent/2013/10/intellectual-ventures-and-its-80000-patents.html>.

42. Tom Ewing & Robin Feldman, *The Giants Among Us*, 2012 STAN. TECH. L. REV. 1, 25–28 (2012).

43. Lemley & Melamed, *supra* note 2, at 2157. “Royalty stacking” refers to situations in which a single product potentially infringes many patents and thus may require multiple royalty payments. The term “royalty stacking” reflects the fact that, from the perspective of the company making the product in question, all of the different claims for royalties must be added or “stacked”

Mass Aggregators reduce the number of negotiations, which in turn reduces “royalty stacking.”⁴⁴ Thus, according to theory, the total payment by those needing licenses would be lower when negotiating with a Mass Aggregator than when negotiating with numerous smaller Patent Holders.⁴⁵

The Federal Trade Commission (“FTC”) opened an investigation into certain PAEs, presumably ones that acquire patents from others.⁴⁶ One concern of the FTC is that an insufficient portion of the recoveries from patent assertions is provided to the inventors and innovators. Instead, the argument is that the middlemen—contingent lawyers, venture capitalists, and others—siphon off almost all of the money. Almost none of the money purportedly returns to the deserving party, the original inventor. However, the financial arrangements between the original owner, subsequent owners, their managers, and attorneys are typically confidential and not available for review. As a result, it is difficult to determine the percentage of the royalty income that is returned to the original inventors. Nevertheless, the FTC, through its 6(b) subpoena power, can theoretically obtain this sort of information from the parties that are involved in these transactions.

The FTC’s concern highlights an important issue in the study of PAEs: not all of the criticisms in the press apply to all categories of PAEs. The FTC’s concern pertains only to a subset of PAEs. It does not apply to Individual Inventors and Failed Start-ups enforcing their own patents. Those groups obtain all, or substantially all, of the recoveries from the lawsuits. Other entities, such as Patent Holding Companies that purchase patents in order to monetize them, fall within the desired criticism that the FTC hopes to investigate. Furthermore, Large Patent Aggregators fall within the FTC’s concern.

In sum, there are numerous distinct types of patent holders who may assert their rights. These include Universities, Individual Inventors, Failed Start-ups, Technology Develop-

together to determine the total royalty burden that is borne by the product if the firm is to sell that product without engaging in patent infringement. *Id.* at 2148.

44. *Id.* at 2157.

45. *Id.*

46. See Edward Wyatt, *Inventive, at Least in Court*, N.Y. TIMES, July 17, 2013, at B1 (noting that the FTC “is expected to begin a sweeping investigation” of patent assertion entities that use shell companies when they sue); see also Ramirez, *supra* note 8 (“I believe that the Commission should use its 6(b) authority to study the costs and benefits of PAE activity.”).

ment Companies, Patent Holding Companies, Mass Patent Aggregators, as well as Operating Companies. The argument about the costs and benefits of PAEs vary for the different types of patent holders, with some arguments only being applicable to a subset of all patent holders. In this empirical work, as we elaborate in the next section, we have kept careful track of the various types of patent holders and their involvement in patent litigation in the recent past.

II. STUDY DESIGN AND METHODOLOGY

In this Part, we convert the distinct categories of patent holders we set forth in Part I into a usable taxonomy of PAEs for our empirical study. Because the definitions we used are essential to our study, this part explains in detail the techniques used to collect and classify the data. It then reports some basic parameters of the data set. We also report various statistical measures of reliability. To permit others to evaluate our coding and to use the data for other studies, we have made the data set available at <http://www.npdata.com>.⁴⁷

A. THE CODERS

Because the data is both central to the article and difficult to code, the authors personally coded all of the lawsuits.⁴⁸ We did not delegate the task to our student RAs. We did not outsource the job to foreigners unfamiliar with patents and the U.S. litigation system.⁴⁹ Instead, each of the three authors spent a significant amount of time coding the identities of the patent holders.

We believe that our previous experience relating to data, patents, and litigation was an important advantage in coding the lawsuits. Each of the authors practiced as a patent attorney before becoming a full time academic. Together, we have over twenty years' experience in practicing patent litigation, representing both practicing and non-practicing entities, and over

47. We have released the raw data we obtained from PACER that permits identification of the case, along with our categorization of the type of entity. PACER is a federal government-operated service providing access to electronic court records.

48. As used in this article, we use the term "case" and "lawsuit" interchangeably. Both terms refer to a dispute that was assigned a particular civil action number by the courts.

49. We do not know who RPX and Patent Freedom rely upon to classify parties in their database, but we suspect experienced patent litigators are not personally performing the coding.

thirty years academic experience in studying patent litigation. In addition, our collective experience includes serving as legal and technical experts in patent litigation and presiding over patent litigation as a special master. We have each separately conducted empirical studies of patent litigation and previously engaged in large scale coding projects.⁵⁰ We believe that our prior experience adds important validity to our study. Many of the coding decisions require detailed knowledge of patent litigation and civil procedure, two topics on which student coders and inexpensive foreign labor would be particularly deficient. Other coding decisions inherently require some subjective judgment.⁵¹ We believe that our collective experience provides us substantial value in coding. Furthermore, we have benefited from reviewing the coding schema used by other academics. These provide us both with a roadmap of potential coding

50. See, e.g., Christopher A. Cotropia & Mark A. Lemley, *Copying in Patent Law*, 87 N.C. L. REV. 1421 (2009); Christopher A. Cotropia, *Determining Uniformity Within the Federal Circuit by Measuring Dissent and En Banc Review*, 43 LOY. L.A. L. REV. 801 (2010); Christopher A. Cotropia, Mark A. Lemley & Bhaven Sampat, *Do Applicant Patent Citations Matter?*, 42 RES. POL'Y 844 (2013); Christopher A. Cotropia, *Nonobviousness and the Federal Circuit: An Empirical Analysis of Recent Case Law*, 82 NOTRE DAME L. REV. 911 (2007); Christopher A. Cotropia, Cecil D. Quillen, Jr. & Ogden H. Webster, *Patent Applications and the Performance of the U.S. Patent and Trademark Office*, 23 FED. CIR. B.J. 179 (2013); Christopher A. Cotropia, *Strength of the International Trade Commission As a Patent Venue*, 20 TEX. INTELL. PROP. L.J. 1 (2011); Jay P. Kesan & Gwendolyn G. Ball, *How Are Patent Cases Resolved? An Empirical Examination of the Adjudication and Settlement of Patent Disputes*, 84 WASH. U. L. REV. 237 (2006); Jay P. Kesan & Gwendolyn G. Ball, *Judicial Experience and the Efficiency and Accuracy of Patent Adjudication: An Empirical Analysis of the Case for a Specialized Patent Trial Court*, 24 HARV. J.L. & TECH. 393-467 (2011); Jay P. Kesan & Andres A. Gallo, *The Political Economy of the Patent System*, 87 N.C. L. REV. 1341 (2009); Jay P. Kesan, *Transferring Innovation*, 77 FORDHAM L. REV. 2169 (2009); David L. Schwartz, *Courting Specialization: An Empirical Study of Claim Construction Comparing Patent Litigation Before Federal District Courts and the International Trade Commission*, 50 WM. & MARY L. REV. 1699 (2009); David L. Schwartz, *Explaining the Demise of the Doctrine of Equivalents*, 26 BERKELEY TECH. L.J. 1157 (2011); David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223 (2008); David L. Schwartz, *Pre-Markman Reversal Rates*, 43 LOY. L.A. L. REV. 1073 (2010); Christopher A. Cotropia, *Is Patent Claim Interpretation Review Deference or Correction Driven?* (Feb. 7, 2014) (unpublished manuscript) (on file with the *Minnesota Law Review*).

51. We note that the government disagreed with 29 out of 500 classifications made by Lex Machina. See GAO REPORT, *supra* note 17, at 52 ("We found 29 cases where we differed with Lex Machina's original classification. They adjusted their classifications in all but five of the cases.").

schema and choices, as well as aspects we thought could be improved.⁵²

B. IDENTIFYING RELEVANT LAWSUITS

The data set assembled for the present study includes information from all patent infringement lawsuits filed in two complete calendar years: 2010 and 2012. The raw data from these years includes 3,553 and 5,600 lawsuits, respectively. We wanted two separate years so we could compare them. The year 2010 was well-suited for study because a majority of the lawsuits filed then have since been resolved, thus permitting us to investigate outcomes, settlements, and other information relating to the litigation. The year 2012 provides a more recent snapshot.

The year 2011 was poorly suited for empirical study, in our opinion, because the America Invents Act (“AIA”) was adopted in September of that year.⁵³ The AIA included a revision to the joinder rules for patent litigation, which requires lawsuits filed against multiple unrelated parties to be filed separately.⁵⁴ For example, in 2010, while you could sue three defendants in one patent lawsuit in some venues, after the passage of the AIA, you may have to sue each defendant separately, resulting in three patent lawsuits. After the negotiated language of the AIA was released to the public and before the President signed it into law, there appeared to be a rush to the courthouse to file before the new rules were effective.⁵⁵ Indeed, in those few days in September, over 800 defendants were sued for patent infringement.⁵⁶ Because of both the change of law that occurred during the year and the uncommon spike in filings before the adoption of the AIA, we chose to exclude 2011. We suspect that many of the cases filed in September 2011 would have otherwise been brought later in 2011, and that some of them may have been filed in 2012 (or not filed at all). We do not believe that the Sep-

52. See, e.g., Jeruss et al., *supra* note 4, at 364–72; Robin Feldman, Tom Ewing & Sara Jeruss, *The AIA 500 Expanded: The Effects of Patent Monetization Entities*, UCLA J.L. & TECH., Fall 2013, at 1, 16–37, available at <http://www.lawtechjournal.com/articles/2013/041024-Feldman.pdf>.

53. Act of Sept. 16, 2011, Pub. L. No. 112-29, 125 Stat. 284.

54. See *id.* § 299 (codified at 35 U.S.C. § 299 (2012)).

55. Dennis Crouch, *Rush to Judgment: New Dis-Joinder Rules and Non-Practicing Entities*, PATENTLY-O (Sept. 20, 2011), <http://www.patentlyo.com/patent/2011/09/rush-to-judgment-new-dis-joinder-rules-and-non-practicing-entities.html>.

56. *Id.*

tember 2011 spike substantially affects our results from 2012 and some data supports our belief,⁵⁷ but at this point, we cannot rule it out.⁵⁸

We do not believe that parties in 2010 anticipated the passage of the AIA, particularly the joinder provision. Patent reform bills had been introduced in Congress every year since 2005, becoming progressively more watered down each year.⁵⁹ There was no indication or expectation that a bill would ever pass.⁶⁰ Furthermore, the joinder provision of the AIA was not present in the patent reform bills under debate in 2010 or earlier.⁶¹ In fact, the joinder provision was added to the bill that became the AIA in a final mark-up before passage, with little notice or debate.⁶²

We used Bloomberg Law's Federal Docket Database to identify the patent lawsuits filed in these years.⁶³ We understand that Bloomberg Law obtains its data from PACER.⁶⁴ As a check on Bloomberg's comprehensiveness, we manually compared the results of a search of patent infringement lawsuits

57. We have analyzed the monthly lawsuit filings in January, February, and March in 2010 and 2012 by entity type. The pattern of filings appears to be the same, with March being the highest month in both years. We also considered whether January 2012 appeared to be artificially low, at least compared to January 2010, for filings involving patent holding companies. If January 2012 was low, it would be consistent with cases that would be filed in early 2012 having been accelerated and filed just before the passage of the AIA in September 2011. After investigating, January 2012 did not appear to be artificially low.

58. To fully consider the spike, one would need to gather and classify the patent litigation data from 2011 using our coding.

59. See Dan L. Burk, *Patent Reform in the United States: Lessons Learned*, REGULATION, Winter 2012–13, at 20, 20.

60. See *id.*

61. For a summary of the key provisions in the proposed Patent Reform Act of 2010, see Dennis Crouch, *Patent Reform Act of 2010: An Overview*, PATENTLY-O (Mar. 8, 2010), <http://patentlyo.com/patent/2010/03/patent-reform-act-of-2010-an-overview.html>. Even the patent reform bills introduced earlier in 2011 did not contain the provision on joinder. See S. 23, 112th Cong. (2011), available at <http://patentlyo.com/media/docs/2011/02/patentreformactof2011asreported.pdf>.

62. David O. Taylor, *Patent Misjoinder*, 88 N.Y.U. L. REV. 652, 655–56 (2013).

63. We limited the docket search on Bloomberg Law to lawsuits from between January 1 and December 31 of the given year. We used the Nature of Suit field to isolate “830 – Patent” cases.

64. *Ask a Librarian: Court Documents and PACER Access*, HARV. L. SCH. LIBR., <http://asklib.law.harvard.edu/a.php?qid=39345> (last visited Nov. 5, 2014).

from Bloomberg with an analogous search from PACER.⁶⁵ We found that the Bloomberg results were over 99% accurate in the sample we reviewed and, in fact, appeared to capture consolidated matters slightly more accurately than PACER's raw data.⁶⁶ Consequently, we felt comfortable using Bloomberg's dataset of patent infringement cases.

For every lawsuit, we reviewed the docket report and a copy of the complaint. The docket report is a list of the papers filed with, or generated by, the court in the case.⁶⁷ It includes the title and associated date of each entry from the initial complaint until the lawsuit is terminated.⁶⁸ The complaint is the legal document that initiates a lawsuit.⁶⁹ While the complaint is frequently light on facts, it sometimes has information about the parties, including the patent holder.⁷⁰

After reviewing these documents, we eliminated several types of cases from the data set. First, we excluded all cases in which the sole cause of action was patent false marking.⁷¹

65. We limited our search in PACER to Nature of Suit "830 - Patent" as we did in Bloomberg Law.

66. We reviewed patent lawsuits initiated between January 1, 2012 and March 1, 2012 in both databases. There were only 7 inconsistencies in 778 records. These 7 inconsistencies all were from two groups of lawsuits. In the first, involving Brandeis University, there were a set of cases filed in the Western District of Wisconsin and Northern District of Illinois between the same parties. Bloomberg Law merges these into a single lawsuit, specifically the one that was pursued. In the second, PACER has two lawsuits with sequential docket numbers (9:12-CV-80037 and 9:12-CV-80038) between the same parties in the same district. Bloomberg Law only includes one of these lawsuits. For all of these inconsistencies, we believe that Bloomberg Law's data is better suited for our purposes than the original PACER data. As discussed in more detail below, we believe that consolidated cases should not be double counted.

67. See generally *Dockets*, BLOOMBERG L., <http://www.bna.com/bloomberglaw/dockets/> (last visited Nov. 5, 2014).

68. *Id.*

69. *Complaint*, LEGAL INFO. INST., <http://www.law.cornell.edu/wex/complaint/> (last visited Nov. 5, 2014).

70. *Id.*; see generally FED. R. CIV. P. 8-10.

71. False marking disputes are cases in which someone, often a member of the general public, complains that a company labeled its product as "patented," when in fact, no unexpired patent covered the product. See 35 U.S.C. § 292 (2012). The issues in Patent false marking cases are quite different from disputes about whether a party infringes a patent. For instance, the validity of the patent is not at issue in patent false marking cases. See R. Mark McCareins & Peter Slawniak, *Current State of Patent False Marking Litigation*, INTELL. PROP. & TECH. L.J., May 2011, at 3, 3. Many of the cases involved companies that, without bad intent, continued to mark their products with a patent number even though the patent had expired. See *id.* In these cases, infringement was not at issue either. See *id.* Furthermore, none of the

There were 666 patent false marking cases, which we manually excluded in 2010. The AIA effectively eliminated nearly all false marking cases.⁷² We did not find any false marking disputes in the 2012 data.

Second, we excluded all cases in which the only patents asserted were design patents. The current debate about PAEs is about utility patents, not design patents.⁷³ If a lawsuit involved allegations of both utility and design patent infringement, we retained the lawsuit in the data set. Excluding design-patent-only lawsuits resulted in 184 lawsuits being dropped in 2010 and 176 lawsuits being dropped in 2012.

Third, we excluded other cases that did not involve an allegation of infringement of a utility patent. This included allegations of legal malpractice, inventorship disputes (including requests for correction of inventorship), demands for patent term adjustments, interferences, motions to quash subpoenas, other actions against the Patent Office, and mislabeled trademark and copyright infringement actions.⁷⁴ We excluded 139 lawsuits on this basis from 2010 and 147 lawsuits from 2012.

Finally, we excluded duplicate cases. Whenever possible, when cases were consolidated or transferred, we eliminated the duplicate lawsuit. Although we removed duplicative suits, we did not automatically remove declaratory judgment actions. If there were reciprocal declaratory judgment and patent infringement actions involving the same parties and the same patents, we would exclude one of the lawsuits. Unless there was a

current debate about PAEs involves claims about false marking. Consequently, we thought it best to remove these cases from the data set.

72. The America Invents Act eliminated the ability of any member of the public to initiate a lawsuit alleging false marking. *See* 35 U.S.C. § 292 (2012). Instead, only the U.S. government and companies that have been competitively injured can initiate false marking lawsuits. *Id.* Almost none of the false marking cases brought in 2010 were brought by a company that had been competitively injured.

73. Design patents are becoming more important in the business context, but they still are fundamentally different from utility patents. Design patents contain essentially no text; nearly all of the patent specification and claims comprise figures of a design. They cover ornamental and decorative aspects of a design, as opposed to functional aspects. Litigation involving design patents is much cheaper than utility patent litigation. For instance, the American Intellectual Property Law Association estimates that the cost of design patent litigation is substantially below utility patent litigation. But again, the current debate about PAEs is about utility patents, not design patents.

74. These cases are quite distinct from patent infringement lawsuits. More importantly, they are not part of the debate about PAEs. Thus, we believe that exclusion of these cases is necessary.

reciprocal lawsuit brought by the patent holder, we retained declaratory judgment actions in our data set. We understand that other researchers have systematically eliminated all declaratory judgment actions from their data set.⁷⁵ We see no reason to exclude declaratory judgment actions, provided that such lawsuits involved allegations of utility patent infringement and do not result in a double counting of a dispute between the patentee and the alleged infringer.

After removing the categories of lawsuits identified above, our dataset contained 2,520 patent infringement lawsuits in 2010 and 5,185 patent infringement lawsuits in 2012. As we explain in Part III, the difference is largely explained by the AIA change in joinder rules.

For every lawsuit, we obtained certain specific information from Bloomberg Law. We obtained the judicial district in which the lawsuit was brought, the judge assigned to the case, the civil action number, the filing date of the lawsuit, the utility patent numbers asserted in the lawsuit, and a list of all of the parties to the lawsuit (including all plaintiffs and defendants). From there, we determined the type of patent holder involved in the lawsuit.

C. CLASSIFYING PATENT HOLDERS

For each of the patent infringement lawsuits in 2010 and 2012, we classified the patent holder by type of entity. Each of the authors coded approximately one third of the cases. We intentionally coded overlapping cases so we could gauge the reliability of the coding. When coding, we considered all of the parties involved in asserting patent infringement. When there was only a single party who owned the patent, it was easy. In these cases, we focused on the sole patent holder.

However, when there were two or three plaintiffs (or defendants in declaratory judgment actions), our focus was on who *controlled* the litigation and litigation strategy. This occurred somewhat infrequently. The most common time it occurred was when a patent owned by an Individual was asserted in a lawsuit along with an exclusive licensee Operating Company. In these cases, we identified the patent holder as an Operating Company because the Operating Company was likely financing the litigation, taking a large percentage of the win-

75. Jeruss et al., *supra* note 4, at 365 (“Given our focus on patent holders who file infringement cases, we chose to exclude declaratory judgment cases”).

nings (if any), and controlling litigation strategy. Even less common was a lawsuit involving two plaintiffs, one of which was a University patent holder and the other was an exclusive licensee Operating Company.⁷⁶ In this case, we would assume that the Operating Company was financing and controlling the litigation. Consequently, we classified that sort of case as an Operating Company case. Therefore, we believe that our count of Individual Inventors and Universities is rather conservative because we coded some cases in which these entity types are the patent holder as Operating Company cases.

We classified all patent holders into one and only one of the following groups: (1) University; (2) Individual Inventor; (3) Large Patent Aggregator; (4) Failed Operating or Start-up Company; (5) Patent Holding Company; (6) Operating Company; (7) IP Holding Company Owned by Operating Company; and (8) Technology Development Company. These categories seemed to capture the essential features of the policy debate. For instance, we separated Individual Inventors from Patent Holding Companies because some argue that a key shortcoming of “trolls” is that they do not return sufficient money to the original inventor.⁷⁷ Individual Inventors likely received a substantial percentage of the proceeds from suits in which they were named as the plaintiff; whereas it is less clear that the original inventor received a substantial percentage of cases brought by Patent Holding Companies.⁷⁸

For a small number of companies, we could not determine in which group to classify them and therefore labeled them as undetermined. If any coder was unsure of the classification of a patentee, then the coder would code the classification as “unsure” or “undermined.” We then had a second author review the coding on these entities.⁷⁹ Almost no companies remained classified as undetermined after the second review.

To determine the proper classification for a plaintiff we looked at several sources. First, we reviewed the complaint filed in the lawsuit. Sometimes, the complaint mentioned whether products were being manufactured by the patent hold-

76. To provide some context on how frequently this arose, we found thirteen patent lawsuits filed in 2010 involving University and Operating Company co-plaintiffs. Our core results remain unchanged, even if one were to classify these as University patent holders.

77. *See, e.g.,* Lemley & Melamed, *supra* note 2, at 2151 n.148.

78. *See id.*

79. As an additional layer of reliability, we had student coders verify the cases we were unsure of, as well as other cases.

er and whether those products were covered by the patents at issue. If the complaint made that sort of statement, then we coded the patent holder as an Operating Company. It was not feasible for us to investigate the quantity of products being manufactured or the timing of the manufacture. When the complaint was silent (as it was in the majority of cases), we used web searches to obtain information about the patent holder. If the patent holder had a website indicating that it manufactured products, then we classified it as an Operating Company.

Below is a brief description of each category.

(1) University: A public or private institution of higher learning. It includes foreign and domestic institutions.⁸⁰ An example is Cornell University.

(2) Individual Inventor: One or more inventors who own(s) a patent (i.e., it is unassigned to a company). Often the party to the litigation would be an individual litigating in their individual capacity. We also included family trusts in this category. Additionally, if it appeared that an individual had formed a corporate vehicle that she completely controlled for the primary purposes of litigation, then we coded this as an individual, and we also created a separate subcategory of individuals litigating in a corporate capacity. This arose when the name of the corporate vehicle included the name of the Individual Inventor and no products were being sold. For instance, Ronald A. Katz Technology Licensing, L.P. (RAKTL) asserts patents invented by Ronald A. Katz.⁸¹ While Ronald Katz does not technically hold these patents in his individual capacity, we believe that RAKTL is best understood as an Individual Inventor. Sometimes our review of corporate records revealed that the Individual Inventor owned all of the shares of the corporation. Unfortunately, such corporate records were not available for all companies, especially for companies we identified as Patent Holding Companies. Consequently, we suspect we may undercount the number of individuals litigating in a corporate capac-

80. We do not believe that any of the entities we categorized as universities were instead patent holding companies that were named to sound like universities. We reviewed the complaints for all cases and the complaints contained recitations of each party in the case. The recitation of universities typically indicated something along the lines that they were not-for-profit educational institutions.

81. See *Company Overview of Ronald A. Katz Technology Licensing, L.P.*, BLOOMBERG BUSINESSWEEK, <http://investing.businessweek.com/research/stocks/private/snapshot.asp?privcapId=7672486> (last visited Nov. 5, 2014).

ity, and similarly overcount Patent Holding Companies. Finally, we note that one of these coding decisions, in a patent owned by an entity named GeoTag, is important to our results, as the patent is asserted in numerous litigations, which could skew our results.⁸²

(3) Large Patent Aggregator: A company with a large patent portfolio whose primary business is enforcing patents of numerous other individuals and entities.⁸³ This includes Acacia companies⁸⁴ and Intellectual Ventures.

(4) Failed Operating or Start-up Company: A company that originally invented the patent-in-suit and attempted to com-

82. GeoTag is a company frequently in the news. *See, e.g.*, Peter Bright, *Google and Microsoft Team Up to Battle Geotagging Patent Troll*, ARS TECHNICA (Mar. 3, 2011), <http://arstechnica.com/information-technology/2011/03/google-and-microsoft-team-up-to-battle-geotagging-patent-troll/> (stating that GeoTag sued at least 397 different companies); Ameet Sachdev, *Obama Tries To Curb Some Patent-Holding Firms*, CHI. TRIB. (June 5, 2013), <http://www.chicagotribune.com/business/ct-biz-0605-patent-trolls-20130605-story.html> (“Hundreds of retailers, for example, were sued in 2010 by a patent-holding company called GeoTag Inc. for having websites that used store locator functions.”). We coded GeoTag as an Individual Inventor since we understand that one of the original co-inventors owns 100% of GeoTag. GeoTag is a difficult coding decision, as the patent was originally owned by a start-up company that employed the inventor. According to a declaratory judgment complaint lodged against GeoTag, the patent has changed ownership five times, and the original inventor was involved in all of the transfers. Complaint at 2, *Microsoft Corp. v. GeoTag, Inc.*, 847 F. Supp. 2d 675 (D. Del. 2011) (No. 11CV00175), available at <http://docs.justia.com/cases/federal/district-courts/delaware/dedce/1:2011cv00175/45847/1/0.pdf?1299179190>. We believe that this scenario fits more closely to an Individual Inventor. Alternatively, some may classify it as a Failed Start-up. It seems, to us, quite different from a patent holding company which purchases a patent and has no preexisting relationship with the original inventors.

83. The line between Patent Holding Company and Aggregator is not completely clean. We generally used the Aggregator category sparingly, limiting it to companies that had assembled via acquisition of portfolios with hundreds of patents or more.

84. We identified Acacia companies by several mechanisms. Acacia sometimes litigates in its own name. *See* Rachael King, *Acacia: The Company Tech Loves to Hate*, BLOOMBERG BUSINESSWEEK (Feb. 1, 2010), <http://www.businessweek.com/stories/2010-02-01/acacia-the-company-tech-loves-to-hatebusinessweek-business-news-stock-market-and-financial-advice>. Other times, an Acacia subsidiary or other company with an agreement with Acacia is the patent holder and does not contain “Acacia” in its corporate name. *See id.* We located what we believe are most of these companies by analyzing Acacia press releases of settlements, which identified the Acacia company. Furthermore, we checked the corporate ownership information for most of the patent holders. Acacia’s name often was visible in a corporate ownership check. If the company was an Acacia company, we coded it as a Large Aggregator, regardless of the underlying company’s entity type.

mercialize the technology. At present, the company sells no products and its primary business appears to be patent litigation. An example of the Failed Operating or Start-up Company is Broadband Graphics LLC.

(5) Patent Holding Company: Companies, usually limited liability companies, that appear to have been formed solely to hold and enforce a patent or small portfolio of patents. As far as we can tell, these companies are not owned by the original inventor. Frequently, these companies were formed shortly before litigation was commenced.

(6) Operating Company: Companies that manufacture products or deliver services (other than licensing patents). An example of an Operating Company is Hewlett Packard. We have not analyzed whether the Operating Company is making use of the patent-in-suit.⁸⁵

(7) IP Holding Company Owned by Operating Company: Companies that were wholly-owned by Operating Companies. For instance, AT&T Intellectual Property I, L.P. is an IP Holding Company for AT&T Inc.

(8) Technology Development Company: A company which invested in the development of technology, perhaps with the intention of licensing rather than commercialization. A Technology Development Company is the original owner of the patents but does not manufacture products covered by the patents. Examples of Technology Development companies are Walker Digital LLC and Tessera Technologies.

As previously mentioned, we coded a subset of each other's coding. From a mathematical calculation, the reliability of our coding appears quite high.⁸⁶ That said, one should be aware

85. We know that some operating companies assert patents that they do not utilize in their business operations. See Ted M. Sichelman, *The Vonage Trilogy: A Case Study in "Patent Bullying,"* 90 NOTRE DAME L. REV. (forthcoming 2014), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1856703.

86. We chose Cohen's kappa as the measure of inter-coder agreement. See Mark A. Hall & Ronald F. Wright, *Systematic Content Analysis of Judicial Opinions*, 96 CALIF. L. REV. 63, 113–14 (2008) (stating that the best practice for relaying reliability information is to report a coefficient such as "Cohen's kappa"). Cohen's kappa ranges from 0 to 1, with numbers near 1 indicating a higher degree of reliability. *Id.* For our 2010 unique parties, Cohen's kappa is 0.653, which equates to "[s]ubstantial agreement." Anthony J. Viera & Joanne M. Garrett, *Understanding Interobserver Agreement: The Kappa Statistic*, 37 FAM. MED. 360, 362 (2005). For our 2012 unique parties, Cohen's kappa is 0.836, which equates to "[a]lmost perfect agreement." *Id.* By calculating kappas on unique parties instead of all parties, we likely overstate the amount

that our coding is based upon publicly available information. It is quite possible that some of the companies have confidential transactions relating to the patents that would affect our coding. For instance, some of the Patent Holding Companies may be affiliated with the original inventor, although we cannot tell that from the available public information. Furthermore, it is often difficult to identify Failed Start-ups.

D. OTHER DATA

We counted the number of accused infringers in each lawsuit. We hand counted the defendants after an earlier version of this article used an estimation procedure.⁸⁷ To hand count, we pulled the complaint, and any amended complaints, for each coded lawsuit and counted the number of defendants listed. We included in the defendant count any party identified by the plaintiff(s) as a defendant in the complaint.⁸⁸ For declaratory judgment cases, we counted plaintiffs as “defendants,” and if Does were listed as defendants, we counted them as a single “defendant” regardless of the number of individual Does identified. A defendant was still counted as a “defendant” even if they were dismissed from a lawsuit. However, if a party became a defendant in a suit via consolidation from another suit, we did not count them as a “defendant” to prevent double-counting. We did all of this to ensure accuracy in our defendant count numbers. Although we report the information relying upon the

of disagreement in our respective coding. For instance, the kappa for 2012 duplicate parties is .956, indicating that we almost always agree on the patent holders who appear multiple times in the dataset. We did not code an overlapping set of duplicate parties in 2010 so we cannot report a similar kappa. The difference between the 2010 and 2012 kappas likely reflects an incremental improvement in our coding methodology which we refined as we went along, and the numbers do not likely reflect any underlying issue related to the parties or that there is significant subjectivity in our individual coding approaches.

87. In an earlier draft of this article, we estimated the number of defendants from the raw information provided by Bloomberg Law. More specifically, we counted the number of parties to the lawsuit, as identified by Bloomberg Law, and subtracted one to attempt to remove the plaintiff from the total. After we received feedback from Professor Robin Feldman that our estimated number appeared too low, we hand counted the number of defendants for each utility patent infringement suit.

88. Unfortunately, it was unfeasible for us to exclude “related” defendants. Thus, if two distinct yet apparently related corporate entities (i.e., LG Electronics Inc. and LG Electronics USA Inc.) appeared as separate defendants, we counted those as two defendants. In follow-on research, we are manually identifying such related parties to permit them to be removed, when appropriate.

hand counted numbers below, the differences between the hand counts and estimated counts have no material effect on the main findings of the Article.⁸⁹ More specifically, the joinder rule changes appear to be responsible for nearly all of the change in patent litigation defendants between 2010 and 2012.

Docket Navigator also graciously provided us data about claim construction, the process of determining the scope of patent protection accorded to a patent claim.⁹⁰ More specifically, Docket Navigator told us which patent lawsuits in 2010 had resulted in a claim construction and which had not. The data captured whether the claims had been construed and which claims were construed during summary judgment motions, in a separate claim construction hearing or proceeding, or at another time during the litigation. We tested a random sample of 2% of the data provided by Docket Navigator and found the data to be highly reliable.⁹¹

Finally, we obtained a list of the patent numbers asserted in each case in 2010. We recorded the information that Bloomberg Law generated for each case. It appears that Bloomberg Law used an automated means to scrape the complaints and capture the patent numbers affiliated with each case. After re-

89. The hand count resulted in a total of 9,894 and 9,419 defendants in 2010 and 2012, respectively. Our original estimation was 11,671 defendants in 2010 and 11,603 defendants in 2012. There are several reasons for the difference. First, some cases had multiple plaintiffs. Second, some parties that appear as "parties" in Bloomberg Law's data are not defendants. For instance, Bloomberg Law identifies special masters or members of the media seeking access to documents as parties. Finally, Bloomberg Law had an occasional error when cases were consolidated. The original lawsuits with the correct number of defendants were present in most of the cases. However, in one case, Bloomberg Law provided a list of all of the defendants. This resulted in double counting using the original method. Our hand counting method properly recognized that these consolidated defendants were not part of the complaint in the case, and consequently these defendants were excluded.

90. See generally Jeffrey A. Lefstin, *Claim Construction, Appeal, and the Predictability of Interpretive Regimes*, 61 U. MIAMI L. REV. 1033, 1033-34 (2007) (discussing how courts interpret patent claims).

91. More specifically, we randomly selected 50 cases from 2010. For those cases, we studied the docket report for the litigation, reviewing all relevant documents, to determine if the claims had been construed. We then compared our results with the data provided by Docket Navigator on claim construction. For 49 of the 50 cases, we agreed with Docket Navigator. In one case, we identified claim constructions that were not reported by Docket Navigator. Upon investigation, Docket Navigator informed us that the order construing claims was not immediately available from PACER when filed, so Docket Navigator was unable to record the construed terms when it initially processed the document. Docket Navigator was able to obtain the document at a later date and back-fill the missing claim constructions.

viewing the Bloomberg Law patent number information, we had concerns about its accuracy.⁹² We attempted to manually correct the Bloomberg Law results when they appeared likely to be inaccurate. Because we used the patent numbers merely to roughly categorize by technology, we believe that the inaccuracies may be less important.⁹³

III. RESULTS

As previously discussed, we initially collected 3,553 cases filed in 2010 and 5,600 cases filed in 2012 identified as “830—Patent” cases in PACER, through Bloomberg Law.⁹⁴ We manually removed false marking cases; cases involving only design patents; cases that did not include an allegation of patent infringement; and “duplicate” filings, such as corresponding declaratory judgment actions to already filed infringement actions and consolidations of already filed cases. This left 2,520 utility patent infringement cases filed in 2010 and 5,185 filed in 2012. These constituted the universe of cases that we analyzed further.

The distribution of the raw number of utility patent infringement cases filed by each patentee category is set forth below in Figure 1 for 2010 and 2012.⁹⁵

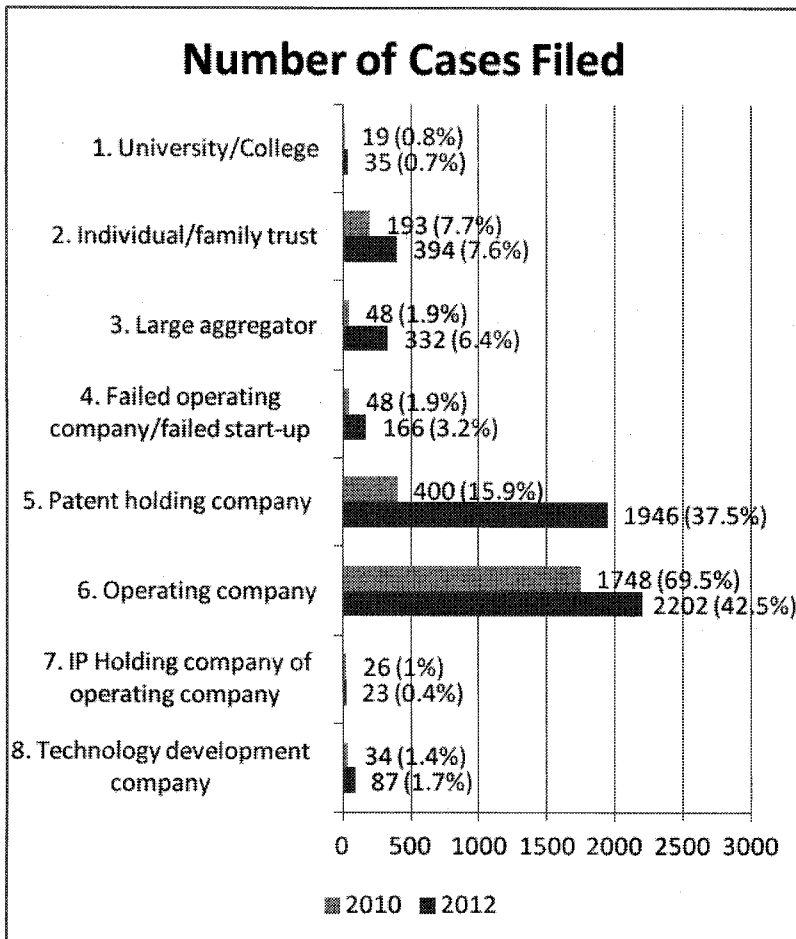
92. We reviewed a random sample of Bloomberg Law’s coding and found 10–20% of the cases had errors in the patent numbers. The errors appeared especially likely in declaratory judgment complaints in which the plaintiff alleged inequitable conduct. These allegations often mentioned patent numbers of allegedly undisclosed prior art, and Bloomberg Law mistakenly included these patent numbers as being asserted in the case.

93. Take, for example, a case with detailed allegations of inequitable conduct including a recitation of patents that allegedly were withheld from the Patent Office. In this case, Bloomberg Law’s automated manner of identifying the litigated patents would wrongly determine that the patents in the inequitable conduct allegations were patents-in-suit. However, it is likely that all of the patents in the inequitable conduct allegation are in the same technological field as the actual patents-in-suit, as they must be “material” in order to complete the allegation for inequitable conduct. *See, e.g.*, *Therasense, Inc. v. Becton, Dickinson & Co.*, 649 F.3d 1276, 1290 (Fed. Cir. 2011). Since we only used patents at the level of technological field, these errors would not affect our analysis.

94. *See supra* Part II.B.

95. There were only four patentees we could not categorize, all in the patent lawsuits filed in 2010. These patentees included Conectflex Technologies LLC, Locked and Loaded Products, Inc., Noah Systems, Inc., and One-to-One Integrated Technologies.

FIGURE 1: Cases Filed by Patent Holder Category, 2010 and 2012



The total number of utility patent infringement cases increased from 2010 to 2012 from 2,520 to 5,185 cases.⁹⁶ The number of cases for each category of patentee, except IP Holding Companies, increased from 2010 to 2012. The greatest increase occurred in the Patent Holding Company category, with the number of cases rising from 400 to 1,946. The number of

96. The difference in the distribution between 2010 and 2012 is statistically significant, with a Pearson's chi-squared test reporting 591.2737 and a p-value < 0.0001.

lawsuits filed by Individual Inventors increased, but, interestingly, the percentage of those cases filed by a true individual (as opposed to a corporate entity formed and owned by the Individual Inventor) dropped substantially. More specifically, true Individual Inventors brought 68.4% of the Individual Inventor cases in 2010, but only 39.3% of the Individual Inventor cases in 2012.⁹⁷ The number of cases filed by Operating Companies increased from 1,748 cases to 2,202 cases. Operating Companies still made up the largest percentage of cases filed in both 2010 and 2012. In terms of percentages, Operating Companies patent holders made up a little under 50% of patent infringement lawsuits in 2012.

These numbers are insightful for studying the behavior of different types of patent holders, but the change in the number of filings could have been driven, at least in part, by the AIA's change to the joinder rules.⁹⁸ To test whether the increase in the number of cases filed is driven, at least in part, by the new joinder rules, the data collected was examined to determine the number of unique patentees that filed suit for each year—2010 and 2012.⁹⁹ For 2010, we observed 1588 unique patentees. For 2012, there were 1667 unique patentees that filed suit.

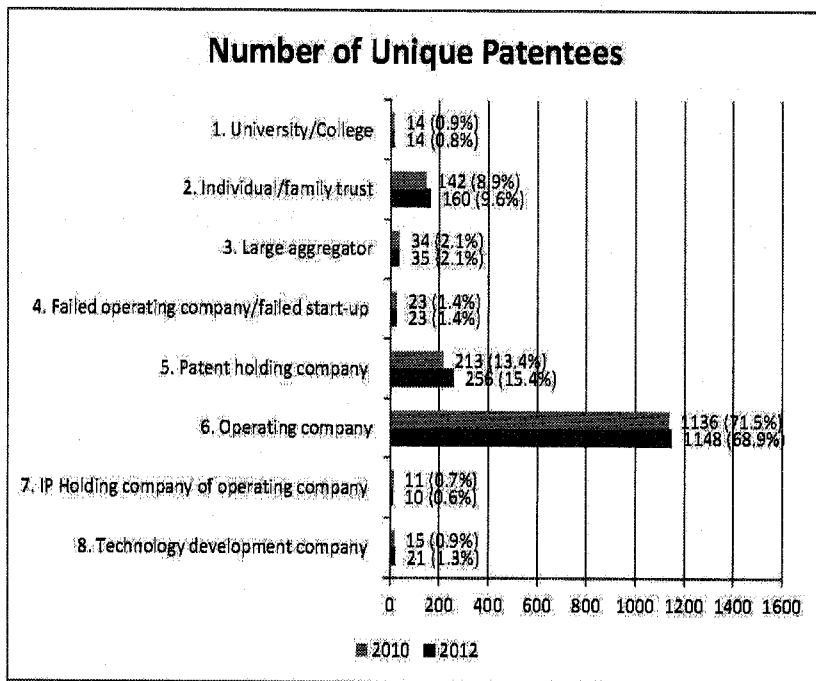
Figure 2 sets forth the numbers and percentages of unique patentees that filed for each patentee category in 2010 and 2012.

97. True individuals brought 132 of 193 cases in 2010 and 155 of 394 cases in 2012. If GeoTag is excluded, then true individuals brought 132 of 184 cases in 2010 (71.7%) and 157 of 299 cases in 2012 (52.5%), still a substantial drop.

98. See 35 U.S.C. § 299 (2012); Crouch, *supra* note 55.

99. We recognize that the joinder rules may have decreased the total number of patent lawsuits because they required an additional filing fee for each company selling a separate allegedly infringing product. According to this theory, the cases should have decreased between 2010 and 2012, and if the data indicates a constant number of cases, then that may represent an increase. In the future, we plan to investigate whether the total number of patents asserted have changed and also study how many patentees filed lawsuits in diverse district involving the same patent. We note, however, that the district courts used a variety of approaches to reduce their workload when confronted with separate lawsuits relating to the same patent. These included the use of multi-district litigation (MDL) and consolidation of matters for pre-trial proceedings. See, e.g., *In re: Bear Creek Tech., Inc.*, (722) Patent Litig., 858 F.Supp.2d 1375 (J.P.M.L. 2012) (centralizing 14 patent infringement actions involving the same telecommunications patent). Consolidation and MDL made the separate cases proceed similar to a single case naming multiple defendants. Thus, there may not have been a substantial increase in patent-side litigation costs caused by the joinder provision.

FIGURE 2: Number of Unique Patentees, 2010 and 2012



The total number of unique patentees for each year studied, 2010 and 2012, was very similar (1,588 compared to 1,667 patentees). The similarity in terms of number of unique patentees is in sharp contrast to the data on the raw number of filings, which showed a large increase in litigation. And, as can be seen above in Figure 2, the distribution among the various patentee types is nearly identical for each year.¹⁰⁰ Thus, while there was nearly double the number of lawsuits filed in 2012 than 2010, the number of patent holders involved in the patent litigation system seemed essentially unchanged. Importantly, the number of Patent Holding Companies, the category of patent holder that had the largest increase in the number of raw

100. The difference in the distribution of types of patents between 2010 and 2012 is not statistically significant, with a Pearson's chi-squared test reporting 4.2256 and a p-value of 0.753.

filings, had a much smaller increase when measured by unique patentees.

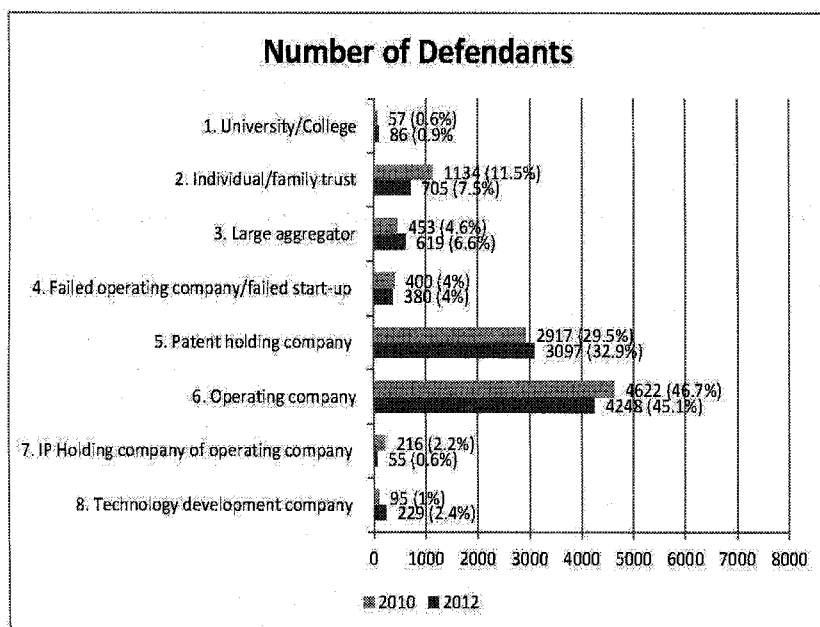
However, these figures only account for the number of unique patentees. Another, perhaps more important, perspective on the data is the number of defendants being sued by patentees in the various categories. As noted above, we hand counted the number of defendants in each case using the complaint, and any amended complaints, filed.¹⁰¹ Using this data, we calculated the number of parties for each patentee category.¹⁰²

Figure 3 sets forth the total number of defendants for each patentee category in 2010 and 2012.

101. Every listed defendant in a given case is counted as a “defendant” for the purposes of this analysis. The only exceptions are (a) those defendants that are added to a case via consolidation (these are excluded to prevent double-counting) and (b) multiple “Does” (which are counted as a singular defendant regardless of how many does are listed). Even if a defendant is dismissed from a suit, they are still counted as a “defendant.”

102. We acknowledge that this method treats all assertions by the same patentee together, even if the assertions involved different patents. When we obtain all of the patent numbers, we will investigate if this matters. We also recognize that related companies are identified as separate defendants. In other words, if Sony North America, Inc. and Sony Japan were separately sued in a single case, they are counted as two defendants. In reality, they may be represented by the same attorney and raise the same litigation arguments. It was not feasible for us to manually adjust the count of defendants to collapse these related defendants. We will investigate in a future paper whether collapsing related defendants matters.

FIGURE 3: Total Number of Defendants by Type of Patentee, 2010 and 2012¹⁰³



The number of defendants stayed relatively constant between 2010 and 2012 for most patentee categories. The total number of defendants was 9,894 in 2010 and 9,419 in 2012. Specifically relevant to the PAE debate, the number of Patent Holding Companies increased from 2,907 to 3,097—a relatively small change. The two notable changes, although not dramatic, were in the number of defendants in Individual Inventor and Large Aggregator patentee cases.¹⁰⁴ The number of parties in Individual Inventor cases decreased from 1,134 in 2010 to 705 in 2012. And the number of parties increased for Large Aggregators from 453 in 2010 to 619 in 2012.

103. As discussed in a previous draft of this article, we used Bloomberg's total number of parties as the basis for computing the number of defendants. We ultimately counted all defendants ourselves. Notably, while the absolute numbers changed, the relationships between the two years for each category do not vary much, at all, between hand counting defendants and using Bloomberg's total number of parties metric.

104. A Pearson's chi-squared test reported a 292.8967 and a p-value < 0.0001.

One benefit of our granular data is that it can be used to construct counts of PAEs based upon various definitions of PAEs. In other words, depending upon one's view of which entities are properly labeled PAEs, one can construct relevant statistics. Some believe that PAEs are all non-operating companies including Individual Inventors, Failed Start-ups, Universities, Technology Development Companies, along with Patent Holding Companies and Patent Aggregators. Using such a broad definition, the percentage of unique patentees increased from 2010 to 2012 by 2.7 percentage points (28.5% in 2010; 31.1% in 2012) and the percentage of defendants sued by PAEs increased from 2010 to 2012 by 1.6 percentage points (53.3% in 2010; 54.9% in 2012). For those who exclude Individual Inventors from their definition of PAEs, the percentage of unique patentees increased by 2.0 percentage points (19.5% in 2010; 21.5% in 2012) and 5.6 percentage points for the percentage of defendants (41.8% in 2010; 47.4% in 2012). For those who include only non-original owners as PAEs—only Patent Holding Companies and Patent Aggregators—the percentage of unique patentees increased from 2010 to 2012 by 1.8 percentage points (14.9% in 2010; 16.7% in 2012) and the percentage of defendants accounted for by these PAEs increased 5.4 percentage points (34.1% in 2010; 39.5% in 2012). All of these changes are well below the magnitude set forth in the Executive Office Report,¹⁰⁵ but the actual differences depend upon the precise definition of PAE used. Because the Executive Office Report relied upon proprietary industry data, we cannot directly compare the coding.

The number of defendants for 2010 can also be separately analyzed by the technology at issue. Table I below illustrates that the patent cases are dispersed across all technology fields, but that Computers and Communications has substantially more cases than the other technology fields. It has nearly double the number of cases and over triple the number of parties than the other technology fields.

105. See EXECUTIVE OFFICE REPORT, *supra* note 6, at 5–6.

TABLE I: Distribution of Patent Litigation by National Bureau of Economic Research (NBER) Technology Class, 2010

NBER Technology	# of Cases	# of Defendants
1. Chemical (excluding Drugs)	162	333
2. Computers and Communications	864	5,456
3. Drugs and Medical	465	1,198
4. Electrical and Electronics	253	1,055
5. Mechanical	287	662
6. Others	484	1,167

We do not presently have the patent numbers affiliated with the 2012 lawsuits; consequently, we cannot provide analogous information about 2012. To understand better the Computers and Communications National Bureau of Economic Research (NBER) category in 2010, in Tables II and III below we provide further information about that category as well as the Drugs and Medical NBER category. We note stark differences in the distribution of Individual Inventor and Patent Holding Companies in the Computer and Communication and Drug and Medical technology categories.

FIGURE 4: Distribution of Patent Cases by Technology

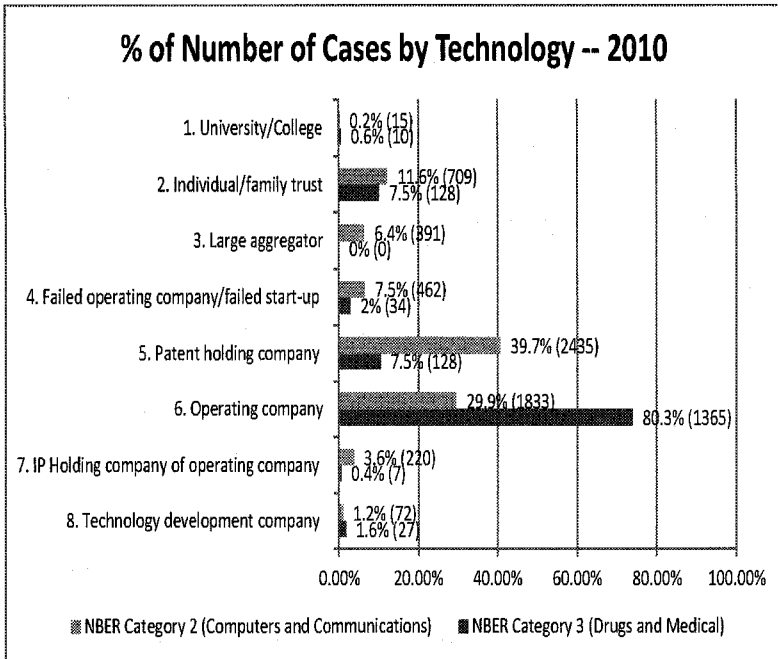
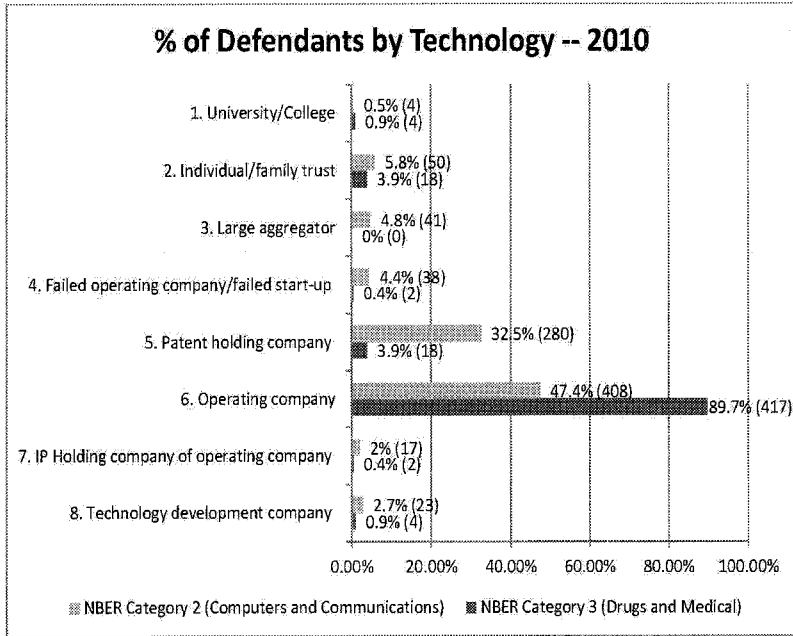


FIGURE 5: Distribution of Number of Defendants by Technology



Notably, for 2010, the number of cases (864) and number of defendants (5,456) in cases involving Computers and Communications was almost double the comparable numbers for the next closest categories—Drugs and Medical (465 cases with 1,198 defendants) and Other (484 cases with 1,167 defendants). For cases involving Computers and Communications, the highest number of cases was brought by Operating Companies (408 cases) and the highest number of defendants involved in patent lawsuits was brought by plaintiffs who were Patent Holding Companies (2,217 parties). Thus, in the Computers and Communications industry, most defendants were sued by non-Operating Companies. Operating Companies dominated cases involving Drugs and Medicine, with 417 cases brought comprising 885 parties, excluding the patentee.

IV. IMPLICATIONS

A. EXPLORING THE LACK OF MATERIAL CHANGE BETWEEN 2010 AND 2012

Based on our data, there is no major difference between both the number of unique patentees and the number of alleged infringers from 2010 to 2012. Although the number of cases increased, the totals for the main players—patentees and defendants—stayed essentially constant. One way to consider this is that the AIA has added substantial cost to the system, by increasing the number of lawsuits, without decreasing the number of patentees or defendants.¹⁰⁶ This observation is confirmed by a two-sample T test with unequal variances reporting a statistically significant variation in the distribution of the number of parties excluding patentees for Individual Inventor,¹⁰⁷ Patent Holding Company,¹⁰⁸ and Large Aggregator Patentee cases between 2010 and 2012.¹⁰⁹

The question, then, is how the distribution is different within the various patentee categories. What are the changes in behavior at a more granular level? In other words, what are the changes between 2010 and 2012 that are not evident from merely looking at the aggregate numbers of plaintiffs, defendants, and lawsuits? To explore this question further, we looked at the number of patentees in a given category that make up the four quartiles of the number of parties for each unique patentee¹¹⁰ in a given year. We ordered the defendants, beginning with the unique patentees who sued the most parties. We then divided the number of defendants in four equal groups, which we label as quartiles. Figure 6 below shows the breakdown of defendants by unique patentee.

106. These costs may not be that significant when one considers how the courts have handled multiple lawsuits involving the same patent post-AIA. Many districts try to hold costs down by consolidating cases for specific purposes such as claim construction and discovery. And multidistrict litigation is also being used when the cases are dispersed across courts in multiple venues. But, of course, there is no consolidation of trials.

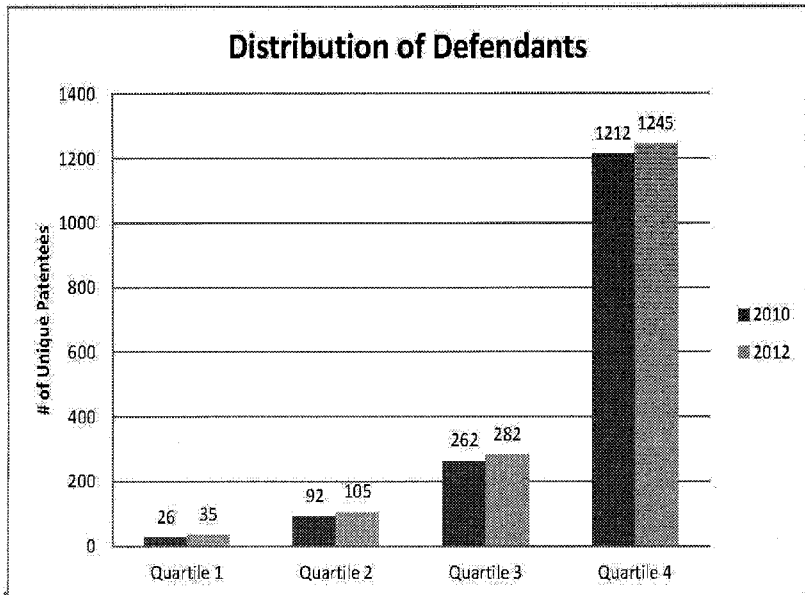
107. T of 10.2173 with a p-value < 0.0001 for patent holding company cases.

108. T of 4.8446 with a p-value < 0.0001 for individual cases.

109. T of 4.7586 with a p-value < 0.0001 for large aggregator cases.

110. By unique patentee, we simply mean a particular patentee without double counting.

FIGURE 6: Distribution of Defendants by Unique Patentee, 2010 and 2012



As shown above in Figure 6, suits initiated by a small number of unique patentees constitute a majority of the alleged infringers for a given year. Thus, a very few patent holders are responsible for a great number of patent lawsuits. For 2010, 26 patentees were responsible for the top quartile of parties, while 35 patentees were responsible for the top quartile in 2012. And this distribution by the number of patentees making up each quartile is very similar for both 2010 and 2012 (92 to 105 patentees for the second quartile, 262 to 282 for the third quartile, and 1,212 to 1,245 patentees for the bottom quartile). These results are not surprising. A small group of aggressive patentees were targeting the most alleged infringers while about 75% of the patentees fall into the last quartile, most of whom simply sue only one alleged infringer. Consequently, most patent holders are not significant in terms of the rate of overall patent litigation.

To understand how the categories of patentees relate to the distribution, set forth below is this quartile information, showing the number of parties, divided into quartiles, involved for

each patentee category. This information is presented for both 2010 and 2012 in Figures 7 and 8 below.

FIGURE 7: Quartiles by Number Defendants per Unique Patentee, 2010

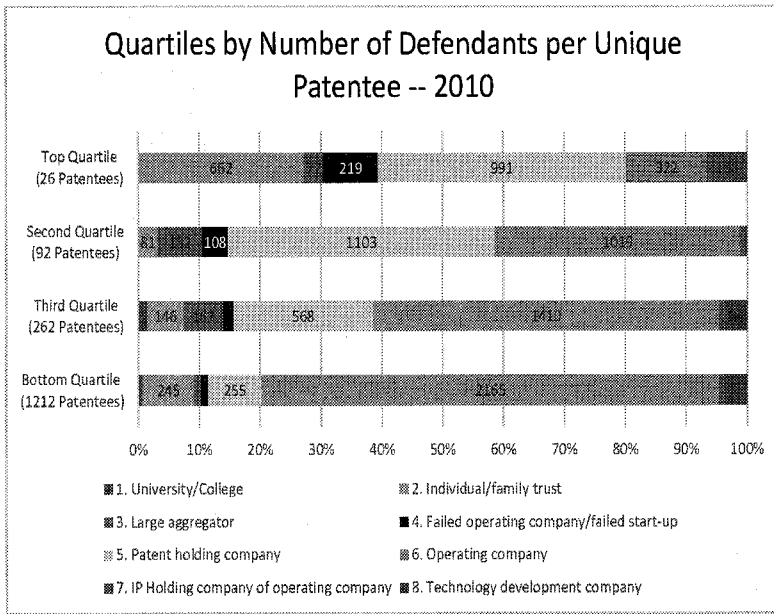
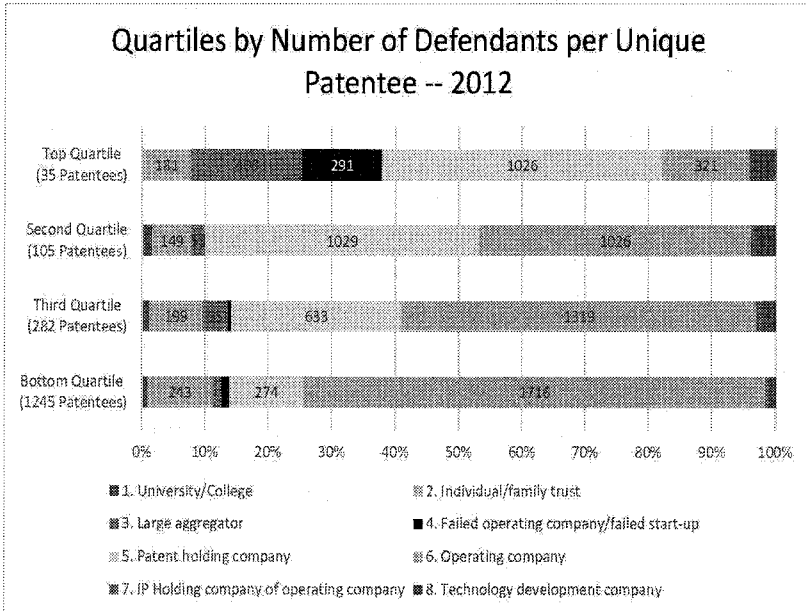


FIGURE 8: Quartiles by Number of Defendants per Unique Patentee, 2012



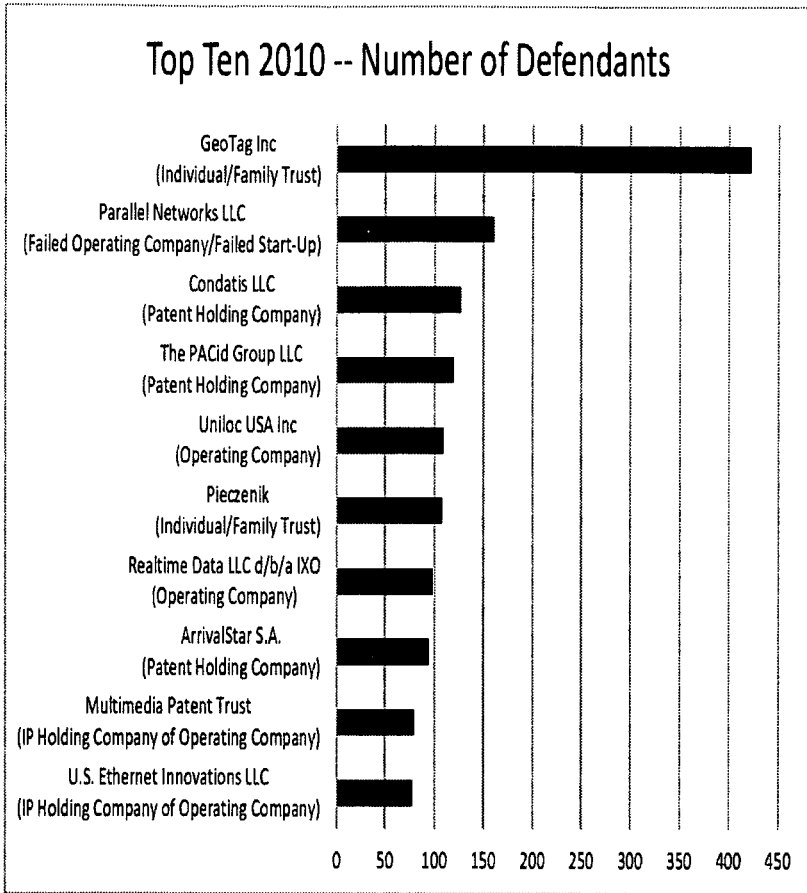
As shown in Figure 7 and Figure 8, there are some differences in distribution between the two years worth noting. The number of accused infringers in each quartile did differ, particularly for the first and second quartiles. In 2010, the top quartile included unique patentees alleging infringement against between 52 and 422 accused infringers. In 2012, the top quartile included unique patentees alleging infringement against fewer accused infringers (between 37 and 134). The second quartile ranged from 17 to 51 in 2010, and 15 to 36 in 2012. The third quartile included from 6 to 17 in 2010, and 5 to 15 in 2012. The bottom quartile ranged from 1 to 6 in 2010, and 1 to 5 in 2012.

The other difference is the distribution for Individual/Family Trust patentees and Large Aggregators between the two years. In 2010, mainly due to the activity of one patentee, GeoTag, Individual/Family Trust patentees made up a much greater percentage of the top quartile as compared to 2012. Patent Aggregators also grew in the top quartile from 2010 until 2012. The presence of a major IP Holding Company of an Operating Company, U.S. Ethernet Innovations LLC, in the top

quartile in 2010 also created a difference in distribution for the top tier between the two years.

Accordingly, only about 25% of the unique patentees alleged infringement against 75% of the defendants for each year. And the only material changes between the make-up of the quartiles between the two years is the number of defendants per patentee for the upper quartiles. In 2010, fewer unique patentees sued the first quartile (25%) of the defendants than in 2012. This may have been because it was cheaper to sue numerous defendants in 2010—because the defendants could be sued in a single lawsuit—than in 2012, after the AIA joinder rules went into effect. However, it is difficult to fully analyze these differences with only two years of data. In the Appendix, we provide further analysis of the distribution of different types of patentees in 2010 and 2012.

The data can also be analyzed focusing on the small number of patentees that are suing large swathes of alleged infringers. To see if this is the case, we calculated the top ten patentees, by number of parties involved in the lawsuits, for each of the observed years. These “top ten” lists are set forth below.

FIGURE 9: Top Ten Most Litigious Patent Holders, 2010

Uniloc USA Inc. provides a good example of how our coding may differ from others. Some people anecdotally refer to Uniloc as a “troll.”¹¹¹ When we performed our original coding (summer 2013), our investigation indicated that Uniloc sells products that are related to their patents. More specifically, a Google search for Uniloc USA Inc. returned a link for <http://www.uniloc.com>. That website included a link to “NetAuthority.” When that link was activated, the user was redirected to the website for <http://netauthority.com>, and products related to the patents in suit were clearly being sold by

111. See, e.g., Jon Brodtkin, *You Can't Patent Simple Math, Judge Tells Patent Troll Uniloc*, ARS TECHNICA (Mar. 28, 2013), <http://arstechnica.com/tech-policy/2013/03/you-cant-patent-simple-math-judge-tells-patent-troll-uniloc>.

Uniloc USA Inc. We used the Wayback Machine to confirm that Uniloc, through NetAuthority, was selling products back in 2010.¹¹² Accordingly, Uniloc USA Inc. was coded as an Operating Company.¹¹³

ArrivalStar is another company that was somewhat difficult to classify. ArrivalStar does not appear to be the original owner of the patents in suit. However, the original inventor appears to have some affiliation with the company.¹¹⁴ We limited the Individual Inventor category to true individuals and to corporate entities which were controlled entirely by the original, individual inventor. We did not feel that there was sufficiently clear information to classify ArrivalStar as an Individual Inventor company, and instead classified it as a Patent Holding Company.

Finally, although some have called Realtime Data LLC d/b/a IXO an "NPE,"¹¹⁵ we classified it as an Operating Company. Its website (http://ixorealtime.com/About_Us.html) and the complaints in the lawsuits indicate that it makes products.¹¹⁶ Furthermore, *Business Week* notes it was founded in 1998 and sells software.¹¹⁷ We note that several of the most litigious patent holders were close calls on categorization. We believe that these entities were some of the more difficult to classify. Our

112. See WAYBACK MACHINE, <https://web.archive.org/web/20100105213003/http://uniloc.com/> (last visited Nov. 5, 2014).

113. During the editing process for this article (fall 2014), the Uniloc website no longer contained a link to NetAuthority, and the NetAuthority website was also defunct. This is largely not relevant to our coding since we strive to identify whether Uniloc sold products in 2010, when it brought the lawsuits. Separately, a patent litigator who represented a defendant charged with infringement by Uniloc told us that he had been unable to obtain any commercial products made by Uniloc in discovery. Investigation into such statements is beyond the scope of this Article. We believe that Uniloc is a close call on whether it is an Operating Company, a Failed Start-up, or Patent Holding Company.

114. See Tom De Poto, *New Jersey Firm Stands Up to Patent Trolls*, NJ.COM (Sept. 6, 2013, 7:30 AM), http://www.nj.com/business/index.ssf/2013/09/jersey_firm_stands_up_to_patent.html.

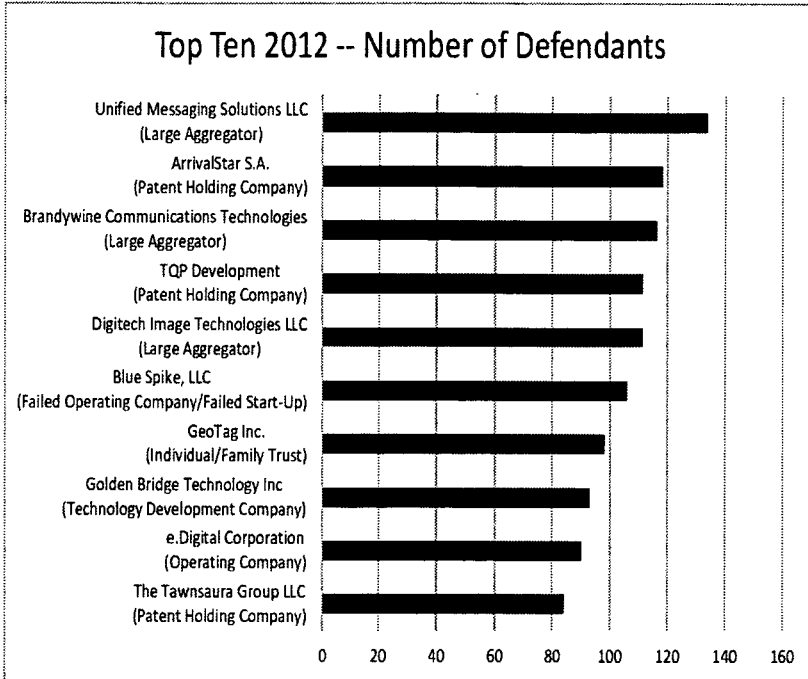
115. Ahmed J. Davis & Karolina Jesien, *The Balance of Power in Patent Law: Moving Toward Effectiveness in Addressing Patent Troll Concerns*, 22 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 835, 844 (2012).

116. See, e.g., First Amended Complaint for Patent Infringement ¶ 1, *Realtime Data, LLC v. Thompson Reuters*, 897 F. Supp. 2d 146 (S.D.N.Y. 2012) (No. 11-cv-06703), 2011 WL 4576896.

117. Company Overview of Realtime Data LLC, BUSINESS WEEK, <http://investing.businessweek.com/research/stocks/private/snapshot.asp?privcapId=142803119> (last visited Nov. 5, 2014).

discussion here of these entities should not be read to imply that all of the classifications involved similar difficulties.

FIGURE 10: Top Ten Most Litigious Patent Holders, 2012



In a prior draft of this article, we discussed the coding of Brandywine Communications Technologies LLC. After reporting that Brandywine appeared to be a subsidiary of Acacia,¹¹⁸ we noted that Brandywine's website indicated that it sold products.¹¹⁹ Based upon this information, we believed that Brandywine was best categorized as an Operating Company. We have investigated further, and now believe that Brandywine is best categorized as an Aggregator due to its relationship with Acacia. Our further investigation included a phone call to the number listed on Brandywine's website. Representatives for the company indicated that it was unaffiliated with

118. See *Acacia Subsidiary Enters into License and Settlement Agreement with Mitel Networks Corporation*, DAILY FIN. (May 17, 2013, 6:22 AM), <http://www.dailyfinance.com/2013/05/17/acacia-subsi-dary-enters-into-license-and-settleme.>

119. See BRANDYWINE COMM., <http://www.brandywinecomm.com> (last visited Nov. 5, 2014).

the patent holder in the lawsuits. Accordingly, we revised our classification of this entity.

We also revised the coding of another “Top Ten” patent holder, Blue Spike LLC. Originally, we coded Blue Spike as an Operating Company because Blue Spike’s website (<http://blue-spike.myshopify.com/collections/frontpage>) indicates that it sells products, and Blue Spike recently applied for a federal trademark on its products, indicating under oath that it was using the mark in commerce.¹²⁰ We noted that the coding was a close call because Blue Spike’s website also prominently mentions its patents and the company has an office in Tyler, Texas, which may have been formed to establish closer ties to the Eastern District of Texas. Upon further investigation, including discussions with an attorney who represented the company, we understand that Blue Spike does not currently sell products. It appears that the individual inventor who formed Blue Spike and serves as its President and CEO was involved in the early development of the technology-at-issue, digital watermarking. Because the company failed in the marketplace, we coded it as a Failed Operating Company/Start-up.

Coding issues aside, a couple of observations are relevant. For 2010, the top ten patentees accounted for 1,396 (14.11%) of the total parties involved in patent infringement suits, while in 2012, the top ten accounted for 1,061 (11.26%) of the total parties involved. In 2010, one patentee, GeoTag, dominated the top ten list, whereas the distribution in 2012 was more even. Notably, two patentees make both lists—GeoTag and ArrivalStar S.A.. And these top ten lists are made up of a smattering of patentees from numerous patentee categories. Interestingly, three large Aggregators, Unified Messaging Solutions LLC, Brandywine Communications Technologies LLC, and Digitech Image Technologies LLC—all affiliated with Acacia Technologies—made the list in 2012.

Therefore, based on the data we gathered, things have not changed much from 2010 to 2012. While more lawsuits were filed, the number of unique patentees and defendants remained constant, and the distribution of these numbers among patentee categories stayed roughly the same as well. Furthermore, most patent litigation, that involving at least 75% of the patentees, has remained nearly the same between these two years.

120. TRADEMARKS411, <http://trademarks411.com/marks/86096173-blue-spike> (last visited Nov. 5, 2014).

B. COMPARING OUR DATA TO PREVIOUS STUDIES

Our results can also be compared to previous studies regarding litigation characteristics of different type of patentees. Two specific studies that we looked at are those by Feldman et al.¹²¹ and RPX Corporation.¹²² A summary of the comparison of the data between the studies and ours is set forth below in Table II.

Table II: Comparison of Descriptive Findings from Various Studies

Type of Patentee-Plaintiff in Various Studies	% Cases Filed in 2010 by PAEs	% Cases Filed in 2012 by PAEs	% Parties/Alleged Infringers Involved in PAE suits in 2010	% Parties/Alleged Infringers Involved in PAE suits in 2012
Feldman et al. ¹²³	N/A ¹²⁴	58.7% (2,750 cases)	N/A ¹²⁵	49.90% (4,606 defendants)
Feldman et al. (Individual Inventors)	N/A	4.1% (206 cases) ¹²⁶	N/A	6.27% (579 defendants)
Feldman et al. (Failed Start-ups only)	N/A ¹²⁷	N/A	N/A	N/A

121. Feldman et al., *supra* note 52.

122. RPX CORP., *supra* note 15.

123. The data in this table from Feldman et al. focuses on what they coded as a "patent monetization entity" or "monetizer," which, based on their article, excludes "Individual or Trust" and "University." Feldman et al., *supra* note 52, at 16, 24–26.

124. Feldman et al. did not report data from 2010. *See id.* at 15.

125. Again, Feldman et al. did not report 2010 data. *See id.*

126. While RPX does not disaggregate its data, it reported that "94% of 2012 suits brought by entities that do not practice were brought by corporate PAEs." Chien, *supra* note 3. We suspect that RPX may be classifying individual inventors who form a wholly-owned corporate vehicle to enforce their patents as "corporate PAEs."

127. Feldman et al. did not classify Failed Start-ups or Failed Operating Companies separately. *See* Feldman et al., *supra* note 52, at 40.

Feldman et al. (Technology Development Cos. only)	N/A ¹²⁸	N/A	N/A	N/A
RPX ¹²⁹	30% (765 cases)	65% (3,054 cases)	55% (4,170 defendants)	61% (4,351 defendants)
RPX (Failed start-ups only)	N/A ¹³⁰	N/A	N/A	N/A
RPX (Technology Development Companies)	N/A ¹³¹	N/A	N/A	N/A
Cotropia, Kesan, Schwartz ¹³² (Large Aggregators + Patent Holding Companies)	17.80% ¹³³ (448 cases)	43.93% (2,278 cases)	34.06% (3,370 defendants)	39.45% (3,716 defendants)
Cotropia, Kesan, Schwartz ¹³⁴ (Large Aggregators + Patent Holding Companies + Individuals)	25.48% (641 cases)	51.53% (2,672 cases)	45.52% (4,504 defendants)	46.94% (4,421 defendants)

128. Feldman et al. did not classify Technology Development Companies separately. *Cf. id.* at 18–27 (discussing the study design and company classifications).

129. RPX's data represented in this table identified "non-practicing entities" or "NPEs." RPX CORP., *supra* note 15, at 3.

130. RPX did not report data on Failed Start-ups or Failed Operating Companies separately. *Cf. id.* at 7–8 (discussing the study's methodology and definitions).

131. RPX did not report data on Technology Development Companies separately. *Cf. id.*

132. Our data in this column combines patentees in the Large Aggregator and Patent Holding Company categories.

133. Ideally, we would report the same number of significant digits for each study. Unfortunately, we do not have access to the raw data for the other studies, and consequently report it here exactly as it is available to us.

134. Our data in this row combines patentees in the Large Aggregator, Patent Holding Company, and Individuals categories.

Cotropia, Kesan, Schwartz (Failed Operat- ing Compa- nies/Failed Start-ups)	1.9% (48)	6.4% (382)	4% (400)	4% (380)
Cotropia, Kesan, Schwartz (Technology Development Companies)	1.4% (34)	1.7% (87)	1% (95)	2.4% (229)
Cotropia, Kesan, Schwartz (in- dividual/family trust)	7.7% (193)	7.6% (394)	11.5% (1135)	7.5% (705)

As detailed below, there are differences, and these differences are driven, at least in part, by the patentee categories used in the various studies and the level of detail used when reporting the data.

1. Cases Filed

Regarding the distribution of cases among the various categories, Feldman et al. found, in the one year overlapping with our study, that 58.7% of the patentees were “Monetizers” in 2012.¹³⁵ And RPX found that “Non-Practicing Entities” (“NPEs”) filed 3,054 cases in 2012 (65% of all patent infringement cases) and 765 cases in 2010 (30% of all patent infringement cases).¹³⁶

In comparison, adding our Large Aggregator and Patent Holding Company category results together to facilitate a proper comparison, our findings show these two categories comprising 448 cases (17.80%) in 2010 and 2,278 cases (43.93%) in 2012. If the Individual/Family Trust results are added to Large Aggregator and Patent Holding Company results, the findings

135. Feldman et al., *supra* note 52, at 37 (“Most significantly, monetizers crossed into the majority in 2012, having filed 58.7% of patent infringement lawsuits.”). We do not compare to Professor Chien’s data as she relies upon RPX data for her studies.

136. RPX CORP., *supra* note 15, at 11 (Chart 4).

show 641 cases (25.48%) in 2010 and 2,672 cases (51.53%) in 2012.

Accordingly, even if Individual/Family Trust cases are added to categories that more closely fit the other studies' definitions of Monetizers and PAEs, our data reports significantly lower percentages as compared to those of Feldman et al. and RPX. These differences could be driven by the different categorical definitions used in the studies. We also believe that the differences are driven by how the data is coded, analyzed, and reported in these studies, and that a comparison of the actual raw data may demonstrate smaller differences between the studies' results.

One final point: while we are comparing the data regarding the number of cases filed, this metric, particularly after the change to the joinder rules, loses much of its significance. As we demonstrate above, the real change between 2010 and 2012 is only in the number of lawsuits being filed, not in the number of accused infringers or in the number of patentees behind those cases.

2. Number of Parties/Defendants

Thus, the more important point of comparison pertains to the number of parties/defendants in the observed lawsuits. Feldman et al. found that in 2012 Monetizers sued 4,606 defendants as compared to 3,832 defendants sued by Operating Companies and 579 defendants by Individuals or Trusts.¹³⁷ Breaking Feldman's results into percentages, Monetizer defendants comprised 49.90% of the total, Operating Companies 41.51%, and Individuals 6.27%. RPX found that NPEs sued 4,170 defendants in 2010 and 4,351 defendants in 2012.¹³⁸ RPX concluded that NPE suits made up 55% of defendants sued in 2010 and 61% in 2012.¹³⁹

In comparison, our data shows that Large Aggregators and Patent Holding Companies comprise, together, 34.06% (3,370) of the total number of parties in suits excluding the patentee in 2010 and 39.45% (3,716) in 2012. Adding Individual/Family Trust cases increases the total number of parties in suits excluding the patentee to 4,504 (45.52%) in 2010 and 4,421 (46.94%) in 2012. This is in contrast to Operating Company

137. Feldman et al., *supra* note 52, at 44.

138. RPX CORP., *supra* note 15, at 11 (Chart 5).

139. *Id.* at 12 (Chart 8).

cases, which involved 46.72% (4,622) of the parties in 2010 and 45.10% (4,248) in 2012.

The proper comparison between the studies is the percentages since Feldman et al. and RPX report the number of defendants among the various patentee categories, while we report the total number of parties for our categories.¹⁴⁰ And under this comparison, just as with the comparison of the number of cases filed, our data indicates that Patent Holding Companies and Large Aggregators make up a smaller percentage of defendants than reported by Feldman et al. and RPX. Again, these differences could be driven by the different categorical definitions used in these studies. We also believe that the differences are driven by how the data is coded, analyzed, and reported in these studies, and that comparison of the actual raw data could demonstrate smaller differences between these studies.

C. CONSIDERING POTENTIAL INCREASES IN PATENT ASSERTIONS OUTSIDE THE SCOPE OF OUR STUDY

Our study carefully examines patent lawsuits filed in 2010 and 2012. In this Section, we discuss theories that there was an increase in patent assertions that our study does not capture.

First, our study is limited to 2010 and 2012. We chose those years because of the growing literature claiming that there was an explosion of PAE activity between 2010 and 2012. After we made a draft of our article public, opponents of PAEs acknowledged that the recent uptick was caused by the AIA joinder rules.¹⁴¹ After backing off the claim of a recent explosion, some claim that there was a large increase in PAE activity earlier, namely from 2003 until 2010.¹⁴²

We offer several reactions. Initially, we note that all of the data purporting to show the increase from 2003 until 2010 is proprietary data gathered by private companies. We strongly believe that data relating to PAEs should be made publicly available for other researchers, including ourselves, to in-

140. Again, given the small number of suits with more than one plaintiff and the even distribution of multiple plaintiff suits between the categories, we believe the total number of parties data adequately represents changes in the number alleged infringers in a given case, for a given category of patentee.

141. See James Bessen, *ALL the Facts: PAEs Are Suing Many More Companies*, PATENTLY-O (Jan. 28, 2014), <http://patentlyo.com/patent/2014/01/facts-suing-companies.html> (noting a "minor error . . . affecting the period 2010 to 2012.>").

142. See *id.*

spect.¹⁴³ Putting aside the issue of publicly available data, we note that we suspect that these opponents of PAEs are correct. We believe, without having studied it empirically, there was a large increase in PAE activity in the earlier time period. In other words, our *hypothesis* is that more PAEs—especially Patent Holding Companies and Individual Inventors—participated in the patent litigation system and sued more parties in 2010 than in 2003. To confirm (or refute) this hypothesis, one should empirically study litigation data from these years. A consistent definition must be used when comparing litigation across the longer time period. We believe that a more granular definition, like the one used in the present study, which separates Universities, Individual Inventors, Failed Start-ups, Technology Development Companies, Patent Holding Companies, Operating Companies, etc., is important. Thus, while we suspect that there was an uptick in PAE litigation in the last ten years, we believe that more transparent and better data is needed to evaluate that hypothesis. But beyond PAEs, there has been a large increase in the total number of patent lawsuits filed each year from the early 1990s until the present.¹⁴⁴ Detailed, granular data about patent litigation across a long period of time would be beneficial to understanding changes to the patent litigation ecosystem.

Separate from patent litigation in the courts, there are anecdotal stories of an increase in patent demand letters.¹⁴⁵ Our study is limited to litigation in the federal courts, and does not capture patent demand letter activity. These private letters are notoriously difficult to accurately measure.

D. FUTURE AREAS FOR RESEARCH

The granular data we have provided can be supplemented to shed more light on patent litigation. Below we list several research questions that we believe are ripe for investigation. We also note that we are presently gathering or acquiring in-

143. Christopher A. Cotropia, Jay P. Kesan, & David L. Schwartz, *The Value of Open Data for Patent Policy*, PATENTLY-O (Feb. 20, 2014), <http://patentlyo.com/patent/2014/02/value-patent-policy.html>.

144. See Ron Katznelson, *The America Invents Act at Work—The Major Cause for the Recent Rise in Patent Litigation*, IP WATCHDOG (Apr. 15, 2013, 12:59 PM), <http://www.ipwatchdog.com/2013/04/15/aia-the-major-cause-for-rise-in-patent-litigation/id=39118>.

145. See Joe Mullen, *Patent Trolls Want \$1,000 – For Using Scanners*, ARS TECHNICA (Jan. 2, 2013), <http://arstechnica.com/tech-policy/2013/01/patent-trolls-want-1000-for-using-scanners>.

formation to enable us to answer each of these questions. We take no position on the optimal number of patent lawsuits or the optimal number of lawsuits by Patent Holding Companies. We note, however, that Patent Holding Companies filed far more than a trace number of lawsuits. By sheer numbers of lawsuits, Patent Holding Companies are consequential to the patent litigation system.

A critical question relates to the patents asserted by Patent Holding Companies. By definition, these entities were not involved in the original inventive activity. Instead, they purchased the patent from the inventors or another entity. Research into the previous owners and chains of title of these patents is sorely needed. We are unsure at this point whether the patterns in previous patent ownership have changed between 2010 and 2012. Are these Patent Holding Company patents primarily from Individual Inventors, from Universities, from Operating Companies? Has the proportion changed over time? And there is another difficult to answer yet interesting question: How many of the Patent Holding Company cases involve deals with Operating Companies to split the proceeds? These “privateering” arrangements are not typically publicly available, which makes them quite hard to study.¹⁴⁶

We also found that there were a small number of patent holders in both 2010 and 2012 who were responsible for suing a large number of defendants. Specifically, we found that 25% of the patent holders in 2010 and 2012 sued 75% of the defendants. Even more pointedly, we found that 28 patent holders in 2010 and 30 patent holders in 2012 sued 25% of all the defendants. This asymmetric distribution in patent holders, with a small number of them suing a large number of defendants, raises numerous interesting questions about the nature of these patent holders and the characteristics of the patents which were asserted against many defendants. We will leave this topic for further exploration in the future.

We also believe that more information regarding the outcomes of patent suits is desirable. This will permit us to compare how often type categories of patent holders are successful. And rather than just considering the overall success rate, we can consider the success rate of various parties in the distribution of cases.

146. See generally Tom Ewing, *Indirect Exploitation of Intellectual Property Rights by Corporations and Investors*, 4 HASTINGS SCI. & TECH. L.J. 1 (2012) (analyzing the phenomenon of IP privateering).

Additionally, we believe that information about the duration of case pendency is salient. The longer a case pends, the higher the legal expenses in general. We suspect that the median Patent Holding Company case pends for shorter than the median Operating Company case. Information about pendency can inform the debate about the costs of PAE disputes and perhaps provide insight into the merits of the disputes.

Finally, we recognize that even our granular coding of patent holders has its limitations. Obviously, even the most granular categories are not homogeneous. There must be good and bad Patent Holding Company lawsuits, just as there are good and bad Operating Company lawsuits. To determine whether NPEs, PAEs, or Individual Inventors (or whatever group one is interested in) are good or bad (or a net cost or a net benefit to the system), one must first understand the make-up of the group and how it compares to other patent litigants. We welcome further refinements to our coding and other ideas on how one can tease out important heterogeneities within our groups.

V. CONCLUSION

Profound changes appear to be occurring in the patent system. There is a vigorous debate about which entities ought to be the rightful beneficiaries in a well-designed patent system and which entities are currently, in fact, reaping monetary rewards by asserting patents. Granular data on the identities of patent holder litigants is necessary to consider the arguments being advanced and to understand the implications of the changes to the patent system that we are experiencing. The present study provides such granular data, classifying patent holders into numerous categories including Failed Start-ups, Individual Inventors, Patent Holding Companies, Operating Companies, and Aggregators. It shows that the changes themselves are much more complex than previously understood. In order to promote free and open discussion of these important patent policy matters, we have also publicly released all our data and analysis at <http://www.npedata.com>.

It appears that much of the recent increase in patent lawsuit filings resulted from the joinder rule changes in the AIA. Surprisingly, various litigation characteristics relating to Patent Holding Companies, such as the number of unique patent holders, total number of accused infringers, and the distribution of their litigation, appear nearly unchanged from 2010. Finally, Individual Inventor lawsuits still play a role in the pa-

tent litigation system. This may be considered as a positive and previously unnoticed sign of the health of the patent system, depending upon one's views of the patent system. Further study of the underlying patents in the disputes, including the origination of patents asserted by Patent Holding Companies, will be useful.

APPENDIX

To further analysis of PAEs, we report in the Appendix the distribution of any of the particular different types of patentees changed between 2010 and 2012. We were particularly interested in Patent Holding Companies, Individual Inventors, and Operating Companies. To move even more granularly than quartiles, we separated each of these types of patent holders and then tabulated the cumulative distribution of defendants in each category. Figures 11, 12, and 13 below report our results.

FIGURE 11: Cumulative Distribution of Unique Individual Patentees

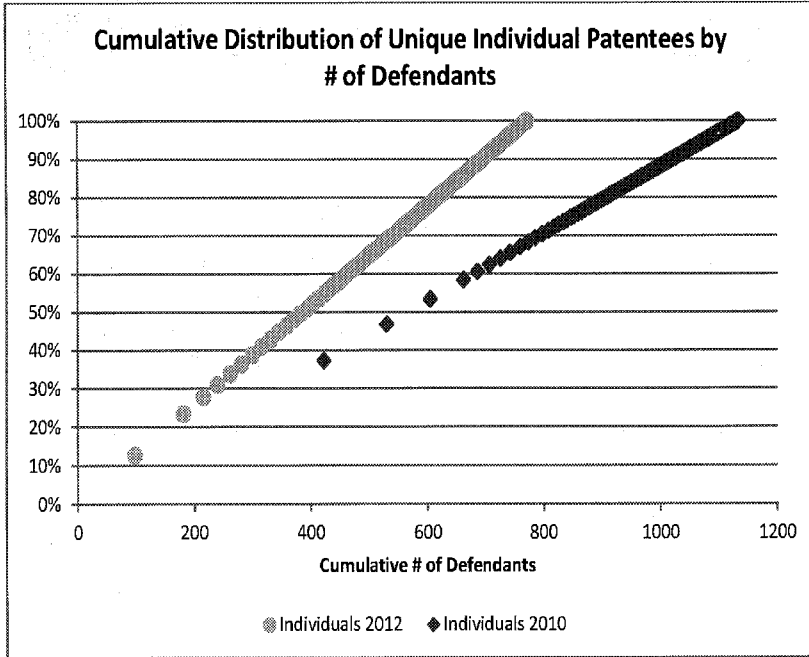


FIGURE 12: Cumulative Distribution of Unique Patent Holding Company Patentees

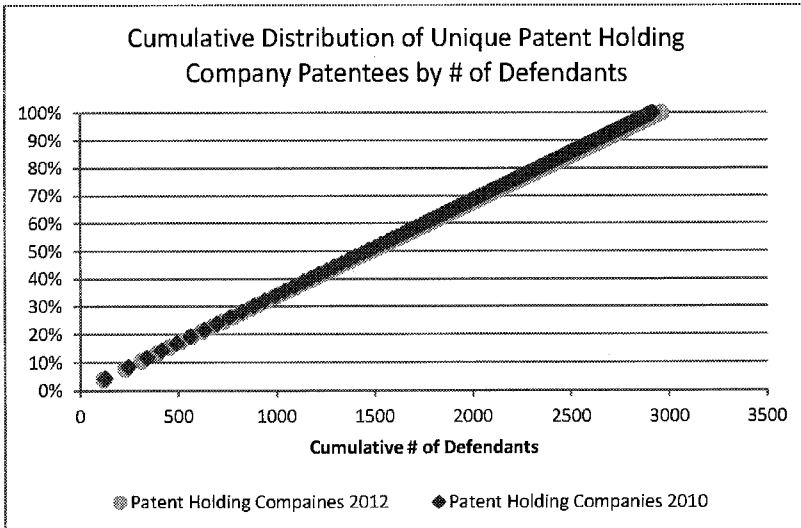


FIGURE 13: Cumulative Distribution of Unique Operating Company Patentees

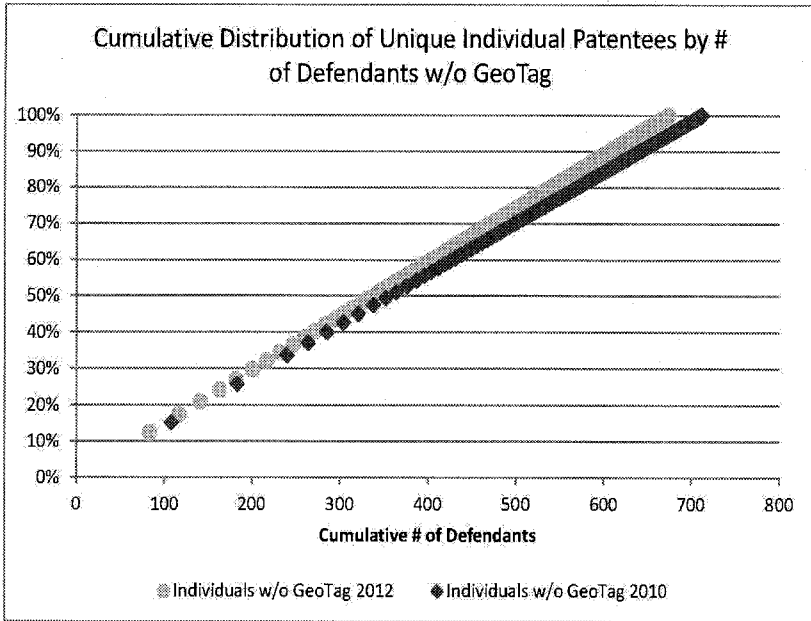


Figure 10 illustrates the distribution for unique Individual Inventor patentees in 2010 and 2012. It appears the distribution has changed slightly between those years. In 2012, there are fewer total defendants, but the slope of the distribution is similar. Figure 11 shows the distribution of Patent Holding Companies in 2010 and 2012. There are slightly more defendants in 2012, but the slope of the distribution is quite similar. However, the spacing between the points tells a slightly different story. For both Patent Holding Companies and Individual Inventor patentees (with and without GeoTag included), patentees make up for more space between data points. These spaces are made up for in the bottom end in 2012, causing both years to be near equivalents overall. Put another way, the distribution is more even in 2012 than in 2010.

Figure 12 contains the distribution of Operating Companies in 2010 and 2012. The lines overlap nearly completely, indicating almost no change in the distribution between those two years. We wonder whether the similarities between all of these figures shows that what dominates behavior is not the

category of plaintiff, but rather something about patent law or litigation in general.

Turning back to the unique Individual Inventor patentees, one company, GeoTag, was responsible for almost one third of all accused infringers in 2010. To investigate whether we were observing a “GeoTag effect,” in Figure 13 below we show the cumulative distribution after excluding GeoTag. Basically, GeoTag alone does not appear responsible for the different slopes and configurations of the distributions. Further investigation is warranted.

FIGURE 14: Cumulative Distribution of Unique Individual Patentees (Excluding GeoTag)

