PATENTS AT ISSUE: THE DATA BEHIND THE PATENT TROLL DEBATE

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INTRODUCTION

The debate over "patent trolls"[1] is raging at full tilt and its fury is stoked by fundamental questions about patent assertion. Both sides are struggling to understand which patent assertion practices are consistent with the purpose of patent rights and which are abusive and result in net social costs. This Article addresses patent assertion concretely through empirical analysis of actual infringement awards. In particular, this Article studies all

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[1] This Article uses the term "patent trolls" in order to speak directly to participants in the debate who label various patent assertion entities "trolls" without qualification. The Authors, however, have reservations about the pejorative nature of this term and retain the quotation marks to preserve a degree of impartiality. As discussed in Part II, there is no clear definition of "patent troll," and many academics and policymakers use the term loosely to describe any patent holder thought to be abusing his or her patent rights. This subjective approach suggests potential bias in empirical analysis and policy discussion. In particular, given that this study attempts to understand precisely what patent assertion practices result in net social costs and can be said to abuse the rights intended to be afforded by patents, it cannot start with the tautology of labeling the abuse before it is found. And as stressed throughout this Article, patent assertion and patent value are intrinsically related, and there is too great a risk of inadvertently undermining socially beneficial patent value through uninformed reform efforts. Particularly when new patent value may be derived from novel patent assertion and monetization techniques and fundamental evolution of the patent marketplace, it is best to be careful to not forestall patent innovation in the name of technological progress.

awards granted for findings of patent infringement in U.S. district courts between 1995 and 2011, and, with targeted analyses, focuses on cases involving patent assertion entities ("PAEs"). This Article specifically investigates certain principal assumptions about patent assertion which have been raised in the debate and further tests some of the leading policy proposals that are currently being considered. In so doing, this Article seeks to inform the "patent troll" debate and helps answer some of the key questions driving it.

Part I below discusses the background for this study, addressing the current "patent troll" debate and some of the leading reform proposals that have been advanced. Part II describes the dataset used. Part III explains the empirical methodology used and highlights principal findings from previous work analyzing PAE and other nonpracticing entity ("NPE") litigations. Part IV investigates PAE assertion practices directly and analyzes key questions that have been raised in the "patent troll" debate. Part V provides a summary of results and concluding remarks.

The principal findings are as follows:

A. *PAE Patent Quality*: This Article analyzes PAE success rates and quality-related characteristics of the patents asserted to investigate fears that PAEs typically assert low-quality patents and bring frivolous cases.

1. *PAE Success Rates*: Approximately equal success rates exist for PAEs as for other patent claimants in the cases studied. Specifically, PAEs won 28 percent (45 out of 160) of the cases they brought, and all other plaintiffs won 32 percent (509 out of 1,591) of their cases. The 4 percent difference is not statistically significant here.

2. *Characteristics of PAE Patents*: This Article studies certain intrinsic characteristics that have widely been associated with patent quality in cases where the PAE or non-PAE claimant, respectively, was granted an award for infringement.

i. *Number of Claims*: PAE patents had a *higher* number of claims than patents asserted by other patent holders in the cases studied. On average, PAE patents had 33.39 claims and non-PAE patents had 21.24 claims.

ii. *Number of Forward Citations*: PAE patents had a *higher* number of forward citations than patents asserted by other patent holders in the cases studied. Specifically, PAEs asserted patents with 22.35 forward citations on average, and non-PAEs asserted patents with 19.27 forward citations on average.

iii. *Number of Patents*: PAEs asserted a *higher* number of patents per case on average than other patent holders in the cases studied. PAEs assert 3.85 patents per case on average, while non-PAE plaintiffs assert 2.22 patents per case.

B. *PAE Litigation Strategy*: This Article studies PAE litigation strategy along the following parameters: (1) PAE decision rates, which provide information relevant to settlement rates; (2) venue of PAE cases; and (3) length of PAE litigations relative to non-PAE litigations in cases finding infringement.

1. *PAE Decision Rates*: PAE cases account for only 9 percent of all cases studied in which there was a final decision on the merits. This low proportion is despite the fact that PAEs are reportedly initiating more infringement lawsuits than non-PAEs. Taken together, these findings could indicate that PAEs are more likely to settle their cases than other patent plaintiffs.

2. *PAE Venue*: Approximately 50 percent of PAE cases are concentrated in five U.S. district courts: the Eastern District of Texas, the Northern District of Illinois, the District of Delaware, the Northern District of California, and the Central District of California. The Eastern District of Texas also provided PAEs the highest win rate of any other district court that decided at least five PAE cases. These results were not driven by one PAE litigating many times in a single venue.

3. *Length of PAE Litigations*: There is no statistically significant difference between the length of fully litigated cases brought by PAEs relative to other patent holders. In all cases where the patent holder was successful from 1995 to 2011, PAE cases lasted 1,014 days (2.78 years) and non-PAE cases lasted 1,040 days (2.85 years) on average. This difference is not statistically significant.

C. *PAE Patent Acquisitions and Opponents*: Finally, this Article delves deeper into the patents asserted and types of defendants sued by PAEs, looking for differences in: (1) the age and assignment history of PAE patents versus non-PAE patents, which speak to concerns that PAEs principally extract after-market value from patents they have acquired from inventors or technology companies; and (2) the entity size of defendants sued by PAEs and non-PAEs in cases finding infringement.

1. *Age and Assignment History of PAE Patents*:

i. *Patent Age*: There is no statistically significant difference in patent age at the time of trial between PAE and non-PAE plaintiffs who were awarded damages in the cases studied. The average patent age at trial is 2,149 days (5.89 years) for PAEs and 2,318 days (6.35 years) for non-PAEs in these cases.

ii. *Number of Assignments*: PAE patents had a slightly higher number of assignments prior to trial than patents asserted by other claimants. PAE patents had 1.481 assignees on average while non-PAE patents had 1.317 assignees in the cases studied, and this difference is significant at the 5 percent level.

2. *Size of Defendants*: PAEs tend to litigate against large companies more often than non-PAEs, although the difference is not significant.

PAEs sued Fortune 500 defendants in 22 percent of cases and non-PAEs sued Fortune 500 defendants in 13 percent of cases, based on data of infringement awards in cases decided between 1995 and 2008.

I. BACKGROUND

The core questions in the "patent troll" debate include issues of whether and to what extent patent assertion practices take a toll on innovation,[2] whether PAEs are asserting low-quality patents and seeking quick settlement payoffs,[3] whether start-ups suffer more harm through patent assertions than the benefits they gain from patent market liquidity,[4] and whether high litigation costs are shifting the economics of patent assertion to favor PAEs.[5] These questions implicate the underlying tension between "patent monetization" and "patent assertion." Which types of patent monetization practices are legitimate and which types exceed the intended scope of the patent grant? Does "after-market" patent value extracted by PAEs deserve the same status as the patent value derived by practicing entities? More generally, should PAEs be entitled to property rule protection for their patent rights—i.e., should they have the right to exclude infringers—or should liability rules apply? This Article seeks to inform the policy debate about "patent trolls" and modern patent assertion practices by studying some of the key questions concretely, through empirical analysis of patent infringement award data.

These questions are of central importance and urgency, as public attention has been captivated by the "patent troll" debate and calls for reform measures are rapidly rising. The White House recently issued a report condemning "patent trolls" and calling for investigation and remediation of

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[2] *See, e.g.*, Richard Finger, *Voicing Both Sides of the Patent Troll Debate*, FORBES (Sept. 10, 2013, 5:25 PM), http://www.forbes.com/sites/richardfinger/2013/09/10/voicing-both-sides-of-the-patent-troll-debate/ (discussing costs and benefits of PAE practices).

[3] *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-13-465, INTELLECTUAL PROPERTY: ASSESSING FACTORS THAT AFFECT PATENT INFRINGEMENT LITIGATION COULD HELP IMPROVE PATENT QUALITY 28 (2013) [hereinafter GAO PATENT ASSERTION STUDY], *available at* http://www.gao.gov/assets/660/657103.pdf ("Several of the stakeholders we spoke with, including representatives from PMEs, operating companies, and legal commentators, said that many recent patent infringement lawsuits are related to the prevalence of low-quality patents; that is, patents with unclear property rights, overly broad claims, or both.").

[4] *See, e.g.*, Colleen V. Chien, *Patent Assertion and Startup Innovation*, NEW AM. FOUND. OPEN TECH. INST., 18-22 (Sept. 2013), http://newamerica.net/sites/newamerica.net/files/policydocs/Patent%20Assertion%20and%20Startup%20Innovation.pdf.

[5] *See, e.g.*, EXEC. OFFICE OF THE PRESIDENT, PATENT ASSERTION AND U.S. INNOVATION 9 (2013) [hereinafter WHITE HOUSE REPORT], *available at* http://www.whitehouse.gov/sites/default/files/docs/patent_report.pdf ("[T]he harassing litigation tactics of some PAEs, combined with substantial litigation costs . . . have added significant costs to the innovation ecosystem . . . .").

many of their assertion practices.[6] However, this report refers to PAEs and "patent trolls" interchangeably,[7] and it gives little guidance as to which practices are harmful on balance or what remedial measures are likely to be effective. Similarly, President Barack Obama expressly supports legislative measures against certain patent assertion practices, stating that "our efforts at patent reform only went about halfway to where we need to go . . . [toward] smarter patent laws."[8] However, the executive branch offers no road map for identifying true threats and remediating them.

Academic scholarship and policy papers are further engaging in the "patent troll" debate from a variety of angles. A recent study by Professors James Bessen and Michael Meurer seeks to measure the costs of NPEs on practicing firms, estimating $29 billion of direct costs in 2011.[9] Professor Colleen V. Chien studies the costs and benefits of patent assertion on technology start-ups, based on surveys of venture capitalists and technology firms.[10] This study concludes that the costs to small firms exceed the benefits of increased liquidity in patent markets. Among the reform proposals, Professor Chien recommends specific legislative measures including: (1) requiring patent plaintiffs to identify in their initial demand letters the specific basis for infringement claims and disclose licenses they have previously granted under the asserted patents;[11] and (2) imposing statutory limits on the liability of start-ups and their customers for patent infringement.[12]

Additionally, the Government Accountability Office ("GAO") recently issued a study of PAE activity, based on interviews of 44 stakeholders knowledgeable about patent assertion and analysis of a random sample of 500 lawsuits from 2007 to 2011 reported in Lex Machina, RPX, and other sources.[13] The GAO sought to study four objectives, namely:

> (1) what is known about the volume and characteristics of recent patent litigation activity; (2) the views of stakeholders knowledgeable in patent litigation on what is known about the key

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6 *Id.* at 12-13.

7 *Id.* at 2 ("This report looks particularly at firms who do not practice the patents they own and instead engage in aggressive litigation to collect license and other fees from alleged infringers. A review of the evidence suggests that on balance, such *patent assertion entities (PAEs) (also known as "patent trolls")* have had a negative impact on innovation and economic growth." (emphasis added)).

8 The White House, *President Obama on Patents in a Google+ Hangout*, YOUTUBE (Feb. 21, 2013), http://www.youtube.com/watch?v=VQ4Zo0XyNsw#t=1m20s.

9 James Bessen & Michael J. Meurer, *The Direct Costs from NPE Disputes* 3 (Boston Univ. Sch. of Law, Working Paper No. 12-34, 2012), *available at* http://www.bu.edu/law/faculty/scholarship/workingpapers/documents/BessenJ-MeurerM062512revised7-2013.pdf.

10 Chien, *supra* note 4.

11 *Id.* at 5 ("Make patent risks more manageable for startups by requiring demand letters and complaints to disclose the real-party in interest, claim charts, related litigations and reviews, and licenses that could cover the target.").

12 *Id.* ("Make startups less attractive targets by limiting the liability of downstream users and the precedential value of the settlements signed by small companies.").

13 GAO PATENT ASSERTION STUDY, *supra* note 3, at 4-7 (describing data and methodology).

> factors that have contributed to recent patent litigation; (3) what developments in the judicial system may affect patent litigation; and (4) what actions, if any, has [the U.S. Patent and Trademark Office] recently taken that may affect patent litigation in the future.[14]

Among their findings, the GAO reported that the number of infringement suits increased significantly in 2011,[15] and PAEs (termed "Patent Monetization Entities" or "PMEs" in the report) brought approximately 19 percent of all suits in the four years studied.[16] The GAO study also reported evidence of practicing entities partnering with PAEs in order to enforce their patents, such as by suing their competitors while avoiding the risk of countersuit.[17] The GAO also found a high incidence of software patents being asserted, with approximately 46 percent of all suits and 84 percent of PAE suits during this time period involving software patents.[18] The GAO also reported data on venue and outcomes of recent PAE lawsuits,[19] among other characteristics.

Most recently, the Federal Trade Commission ("FTC") has launched an investigation of PAEs, their patent holdings, and the assertion and licensing practices they conduct. On September 27, 2013, the FTC commenced the public comment period for a "proposal to gather information from approximately 25 companies that are in the business of buying and asserting patents, known as [PAEs]."[20] The FTC proposed a formal Section 6(b) study intended to "provide a better understanding of PAE activity and its costs and benefits."[21] The proposed information requests seek extensive information regarding each PAE's corporate structure, patent holdings, patent portfolio valuation and organization (i.e., the PAE's rationale for organizing its patent assets into specific portfolios and methods for valuing these portfolios), details of all patent acquisitions, transfers and licenses in/out, details of all patent assertion activity (including demands as well as formal litigation), and financial information regarding costs and revenues associated with their patent holdings.[22] Information requests will also be sent to fifteen other entities that assert patents in the wireless communications field.[23]

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14 *Id.* at 4.

15 *Id.* at 14.

16 *Id.* at 17.

17 *Id.* at 19.

18 *Id.* at 21-22.

19 GAO PATENT ASSERTION STUDY, *supra* note 3, at 23-26.

20 Press Release, Fed. Trade Comm'n, FTC Seeks to Examine Patent Assertion Entities and Their Impact on Innovation, Competition (Sept. 27, 2013), *available at* http://www.ftc.gov/news-events/press-releases/2013/09/ftc-seeks-examine-patent-assertion-entities-their-impact.

21 *Id.*

22 *Id.*

23 *Id.*

It is important to note that the FTC investigation was motivated by an earlier FTC finding that there is "a lack of empirical data" regarding PAE practices and their effects.[24] This is somewhat at odds with the rising calls for substantive legislative reforms being voiced by academics and policymakers. Particularly given the symbiotic relationship of patent assertion and patent value, the stakes are high to ensure that efforts intended to prevent abusive practices do not accidentally also undermine patent value. To walk this tightrope, it is crucial to develop an empirical understanding of patent assertion practices and their true costs and benefits.

This delicate balance is reminiscent of the patent reform debates leading up to passage of the America Invents Act ("AIA"). At the time, many were concerned that patent infringement awards were "excessive" and "unpredictable," and legislative measures were proposed to increase the burdens of proof on patent holders and substantively limit their remedies.[25] The potential side effects of these prescriptions were unknown, but support for them continued to grow among academics and policymakers alike. Against this backdrop, an empirical study called into serious question whether damage awards were indeed "excessive."[26] That study found that the awards distribution of decided cases is highly skewed by a very small number of very large and noticeable "blockbuster" verdicts. Furthermore, award value is highly deterministic and predictable from observed factors.[27] This analysis strongly suggested that the risk of devaluing U.S. patent assets by curtailing infringement remedies significantly outweighed any specific idiosyncratic issues affecting award value. In the end, the AIA did not enact changes to the law of infringement remedies, and the reforms that had been proposed to Section 284 on damages were left on the Senate floor.

Today, there exists a similar set of questions, and a similar lack of data analysis, about the empirical costs and benefits of patent assertion practices. It is crucial to determine which patent assertion practices are harmful and which are legitimate—that is, which patent plaintiffs are "trolls" and which are properly enforcing their rights. In the Parts that follow, this Article aims to inform the debate with direct analysis of PAE practices based on litigated infringement cases.

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24 *Id.*

25 *See, e.g.*, S. REP. NO. 111-18, at 8 (2009) ("[D]amage awards . . . are too often excessive and untethered from the harm that compensatory damages are intended to measure.").

26 Michael J. Mazzeo, Jonathan Hillel & Samantha Zyontz, *Explaining the "Unpredictable": An Empirical Analysis of U.S. Patent Infringement Awards*, 35 INT'L REV. L. & ECON. 58, 58-60 (2013).

27 *Id.* at 66.

II. DATASET

This analysis of PAEs and their assertion practices focuses on cases litigated in U.S. district courts which have resulted in a final decision on validity, infringement, and liability. As such, this Article offers a specific perspective of patent assertion by PAEs—it is not dealing with demand letters or filed complaints, but instead focuses on cases that have reached a final decision on infringement liability.

One might question this approach, particularly given that many of the concerns regarding PAE practices relate to the costs and other potential harms of pending and threatened litigation, and not simply the final liability of an infringement award. In fact, the information available from decided cases offers important insight into assertion practices and also provides a road map for further areas of inquiry. For example:

1. Decided cases are the end result of patent assertions. There is no way to assess the risk and magnitude of infringement liability ex ante without knowing the data on awards and patent-holder success rates. And, although the vast majority of patent cases settle, settlements are negotiated in the shadow of litigation. Both parties must evaluate litigation expectations in order to determine their settlement strategy.

2. Decided PAE cases also provide some insight into PAE litigation practices. Decided cases offer detailed data for a number of important assertion parameters, such as: (i) where PAEs file their cases; (ii) the types of defendants they sue; (iii) the industries in which they operate; and (iv) the characteristics of the patents they assert. Understanding the "who," "what," and "where" of PAE assertions is critical to assessing the actual costs and comparative benefits of these practices.

3. Decided cases provide a unique perspective on PAE litigation strategy and success rates, insights that cannot be gleaned from case filings or survey data alone. Examining decided cases allows for an evaluation of PAE success rates in court (which informs ex ante risk assessment), a measurement of how long PAE proceedings last relative to other patent cases (which relates to litigation expenses), and inferences about the settlement rates of PAEs relative to other types of patent-holder plaintiffs (which provides evidence of PAE incentives).

4. Perhaps most relevant to the central question raised in the "patent troll" debate, analysis of PAE decided cases relative to non-PAE decided cases provides a means to assess whether PAEs on average are "abusing" their patent rights, and whether proposed reforms can effectively prevent such abuse. If there are significant differences between PAE decided cases and non-PAE decided cases, these variations could reflect abusive practices and give clues as to how to prevent them. Conversely, if PAE cases are indistinguishable from similar non-PAE cases, this undermines arguments of PAE "abuse" and moreover raises the specter that efforts to curtail PAE assertions might also undermine the rights of practicing entities, their abil-

ity to enforce these rights, and the overall value they can realize from their patent holdings.

5. Yet, there are important limitations to data on decided cases which must be kept in mind when interpreting these results. Particularly when examining litigation practices of PAEs—such as the types of entities they sue, the venues they select, the full extent of litigation costs attributable to their assertions, and their settlement behavior—decided cases are only one piece of the puzzle. Cases filed that do not result in a final decision, and assertions that do not even involve a filed case, may be different than decided cases. Similarly, if patent-holder wins and losses are significantly different, results drawn from cases awarding damages for infringement may be limited. As mentioned above, data on decided cases can be invaluable to several lines of inquiry, and as with all data they must be properly interpreted so that accurate conclusions can be drawn.

This dataset of decided patent cases and damage awards is based upon a database licensed to us by PricewaterhouseCoopers ("PwC"), which regularly publishes annual and periodically updated Patent Litigation Studies analyzing its data (the "PwC Studies").[28] The PwC Studies are regularly cited by policymakers (including the FTC in its reports) and academics. The version of the PwC database used here contains all decided patent cases reported in Westlaw from 1995 through 2011. This Article supplements the PwC data with several additional variables regarding the cases, parties, and patents at issue, and performs various statistical analyses to reach the conclusions reported herein (see Part III below for a discussion of methodology).

The PwC dataset contains 1,751 patent cases reported in Westlaw which were decided between 1995 and 2011 and reached a decision on patent validity and infringement at summary judgment or trial. Five hundred and fifty-four of such cases included a finding of validity and infringement for at least one of the patents asserted, and of those cases 421 had publicly reported award amounts or were cases related to abbreviated new drug application ("ANDA") litigation—of these, forty-five were ANDA cases with $0 awards (since damages are not available in ANDA cases). In total, 376 cases resulted in awards greater than $0.

PwC also tracks whether the patent holder in each case is an NPE or a practicing entity, and the PwC database further codes three subtypes of NPE: NPE-university, NPE-individual, and NPE-company. PAEs fall into the third category, and accordingly the analysis is concentrated here. PwC defines an NPE as "an entity that does not have the capability to design,

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[28] *See, e.g.*, PRICEWATERHOUSECOOPERS LLP, 2013 PATENT LITIGATION STUDY [hereinafter 2013 PWC STUDY], *available at* http://www.pwc.com/en_US/us/forensic-services/publications/assets/2013-patent-litigation-study.pdf.

manufacture, or distribute products with features protected by the patent,"[29] and this definition is employed here.

The definition of "PAE" varies widely across empirical studies, other scholarship, and policy papers. As one notable example, the White House report considers all PAEs to be "patent trolls" and vice versa, and by implication (but without an identifiable distinction) excludes from this definition any NPEs that "play an important role in U.S. innovation ecosystem, for example by connecting manufacturers with inventors."[30] By contrast, the FTC in its recent proposed inquiry defines PAEs as "firms with a business model based primarily on purchasing patents and then attempting to generate revenue by asserting the intellectual property against persons who are already practicing the patented technologies."[31] Also, Professor Chien defines an NPE as "an entity that asserts patents as a business, not including universities or startups," and uses the terms PAE and NPE interchangeably.[32] This variety of definitions causes confusion and complicates the task of identifying the specific assertion practices associated with PAEs and studying their likely effects. The PwC definition, which is rooted in objective characteristics of the patent holder, provides a more objective basis for initial study. An important task for future research would be to determine a common set of definitions that the field could agree upon and work from.

III. METHODOLOGY AND RELEVANT PRIOR RESULTS

The empirical methodology utilized in this Article is summarized as follows. The PwC dataset is supplemented by coding additional variables relating to the parties, cases, and patents at issue, generating a comprehensive dataset comprising more than 120 variables for each case record. There are several unique features of the dataset relevant to the present study. In particular, the variables include the size of the defendant (measured in terms of Fortune ranking), the time to trial (measured in days between the initial case filing and actual trial), and characteristics of the asserted patents, such as number of claims, forward citations, and patent age, which respectively speak to the breadth of the patent right, prominence relative to the prior art, and currency in technology markets at the time asserted.

Using this dataset, this Article first conducts a series of distributional analyses to measure statistics relating to case rates, patent-holder successes, imbalance in award amounts, and related time trends. Next, this Article conducts large-scale regression analyses to determine overall predictability of award value based on observed variables, and further to identify the key

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29 *Id.* at 34.

30 WHITE HOUSE REPORT, *supra* note 5, at 1.

31 Press Release, Fed. Trade Comm'n, *supra* note 20.

32 Chien, *supra* note 4, at 35 nn.2 & 5 (internal quotation marks omitted).

determinants of award value. Then, this Article focuses on a small number of specific variables to analyze their particular effects on award size. Drawing from academic literature and the policy debates, this Article targets factors that have been the basis of concern, such as whether the patent holder is an NPE and whether the underlying "economic value" of the asserted patents correlates with the final award amount.[33] Finally, this Article addresses key points of the policy debates directly, conducting specialized analyses to investigate the assumptions made and main issues raised.[34]

Two previous studies using this dataset have been published in peer-reviewed law and economics journals. The first, *Explaining the Unpredictable*, analyzes whether patent infringement awards are "excessive" or "unpredictable," questions that were central to the patent reform debates preceding passage of the AIA.[35] This study conducted large-scale distribution and regression analyses and found infringement awards to be highly skewed, with the top eight awards accounting for nearly 50 percent of the cumulative award amount for the 306 cases through 2008. Awards were also found to be highly predictable, with identified factors explaining over 75 percent of the variation in award value.[36]

The second study, *Do NPEs Matter?*, focused on NPE cases and analyzed whether significant variations could be observed in damages awarded to NPEs relative to practicing entities (controlling for other case-related factors).[37] It principally found that there is no statistically significant difference between NPE cases and practicing entity cases in terms of the distribution of award amounts.[38] However, it also observed lower win rates[39] and slightly lower award amounts[40] for NPEs relative to practicing entities.

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33 Several studies have found correlations between these intrinsic patent characteristics and the likelihood of patents being asserted in litigation. These studies typically use assertion as a proxy for "patent value." *See, e.g.*, Jean O. Lanjouw & Mark Schankerman, *Characteristics of Patent Litigation: A Window on Competition*, 32 RAND J. ECON. 129 (2001); Jean O. Lanjouw & Mark Schankerman, *Patent Quality and Research Productivity: Measuring Innovation with Multiple Indicators*, 114 ECON. J. 441 (2004); Jean O. Lanjouw & Mark Schankerman, *Protecting Intellectual Property Rights: Are Small Firms Handicapped?*, 47 J.L. & ECON. 45 (2004); *see also* John R. Allison et al., *Extreme Value or Trolls on Top? The Characteristics of the Most Litigated Patents*, 158 U. PA. L. REV. 1 (2009) (studying litigation rates of patents in specific industries); John R. Allison et al., *Valuable Patents*, 92 GEO. L.J. 435 (2004); Shawn P. Miller, *What's the Connection Between Repeat Litigation and Patent Quality? A (Partial) Defense of the Most Litigated Patents*, 16 STAN. TECH. L. REV. 313 (2013).

34 Where noted, certain of these analyses utilize data on cases decided between 1995 and 2008, and other analyses address cases decided between 1995 and 2011. The dataset is currently being updated to include all variables for recent cases.

35 Mazzeo, Hillel & Zyontz, *supra* note 26.

36 *Id.* at 63.

37 *See generally* Michael J. Mazzeo, Jonathan H. Ashtor & Samantha Zyontz, *Do NPEs Matter? Non-Practicing Entities and Patent Litigation Outcomes*, 9 J. COMPETITION L. & ECON. 879 (2013).

38 *Id.* at 903.

39 *Id.* at 889-90.

40 *Id.* at 894-96.

Importantly, this study also found that PAE awards are noticeably different than other NPE awards. Relative to individuals, PAEs have higher success rates (although universities tend to be more successful than other NPEs—universities also have higher success rates than the average for all patent litigants).[41] Additionally, PAEs generally are awarded larger amounts of damages than either individuals or universities in the cases in which they are successful. Regression analyses also found a positive coefficient for the PAE variable, indicating that PAEs generally receive equivalent or slightly higher awards than other types of patent holders.[42] The 2013 PwC Study shows consistent results, finding higher median awards for NPEs relative to practicing entities.[43]

The following summarizes the key findings of these previous studies which are most relevant to the "patent troll" debate addressed herein:[44]

1. The proportion of decided NPE cases relative to all cases has remained relatively stable over time. Notably, many studies, including the 2013 PwC Study, have observed a significant increase in case filings by PAEs,[45] and coupled with the results of this Article, this could reflect to some extent a greater willingness of PAEs to settle their claims rather than litigate to a final decision.[46]

2. There is a noticeable shift from individuals to PAEs in cases decided in the most recent years studied. Several policy papers and academics have questioned whether PAEs provide valuable remuneration to inventors by acquiring or licensing their patents, and the data offer support for such transfers, showing that patents are now being asserted more frequently by PAEs than by individuals.

3. PAEs are more successful than individuals in case outcomes, which is consistent with the hypothesis that they have greater expertise at determining which patents to assert and at litigating their claims. Coupled with evidence of upstream patent transfers, this suggests that PAEs may provide a specialized function in the patent marketplace, efficiently separating technology development from patent enforcement and monetization. These efficiency gains could flow back to inventors and practicing entities that license and use patent rights in the form of more accurate market valuations of patent assets and greater liquidity in patent transactions. However, PAEs may also be commanding high profits from their assertion practices,

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41 *Id.* at 902.

42 *Id.* at 899-900.

43 2013 PWC STUDY, *supra* note 28, at 7.

44 Mazzeo, Ashtor & Zyontz, *supra* note 37, at 880.

45 2013 PWC STUDY, *supra* note 28, at 3.

46 Of course, since settlements are mutual agreements, the defendant's willingness to settle is also relevant here. Furthermore, since there are other forms of case disposition than only settlements or final decisions—including dismissal on motion or voluntarily, consolidations, stays, etc.—and since there is a significant time lag between case filing and final disposition, this study cannot determine the extent to which the data correspond to actual settlements.

which may appropriate some of the efficiency benefits for their private gain.

4. The distribution of NPE awards is not statistically different from that of other awards. That is, NPE cases are distributed heavily toward low-value cases with only very few high-value outcomes, and the distribution is indistinguishable from that of practicing entity cases. This suggests that despite their specialized expertise, NPEs on the whole face similar litigation risks and factors affecting final award value as do practicing entities.

5. Importantly, NPEs overall are somewhat less successful in the case outcomes than practicing entities, both in terms of findings of validity and infringement and in terms of damage award levels in successful cases. As mentioned, PAEs are more successful than individuals, although universities are more successful than PAEs.

IV. ANALYSIS OF PAE ASSERTION PRACTICES

This Article's analysis of PAE assertion practices focuses on three principal categories of questions and policy recommendations raised in the "patent troll" debates, namely: (A) PAE patent quality; (B) PAE litigation practices; and (C) PAE patent markets and opponents. The following identifies the specific questions posed, describes the analyses to evaluate them, and reports the results.

A. *PAE Patent Quality*

A major basis for concern in the "patent troll" debate is the fear that PAEs often assert patents of poor quality and ambiguous claim scope. It is feared that PAEs do this in order to extract settlements from a broad range of accused infringers who, despite the weakness of the claims, prefer to pay off the PAE than engage in costly litigation. For example, the White House report states that PAEs extract settlement fees by "acquiring and asserting broad patents, some of questionable validity."[47] The report continues to describe how PAEs "acquire patents whose claim boundaries are unclear, and then (with little specific evidence of infringement) ask many companies at once for moderate license fees, assuming that some will settle instead of risking a costly and uncertain trial."[48] To address these concerns, the report, along with several academics, recommended enacting higher standards of patentability, limiting software and business method patents, and enhancing procedures to challenge patents and scrutinize patent quality.[49] This Article

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47 WHITE HOUSE REPORT, *supra* note 5, at 4.

48 *Id.*

49 *Id.* at 13; *see also* Chien, *supra* note 4, at 4.

studies these concerns by evaluating PAE success rates, and analyzing specific quality-related characteristics of patents they assert.

1. PAE Success Rates

This Article conducts targeted analyses of decided PAE cases and the patents asserted by PAEs in these cases to test the assumption that PAEs typically assert lower-quality patents than other plaintiffs. Specifically, this Article first studies the success rates of PAEs relative to other types of NPEs and practicing entities, on the theory that if PAEs generally assert lower-quality patents this should be reflected in lower success rates in cases that are fully litigated. If PAE patents are generally of lower quality, they are more likely to be held invalid or non-infringed in decided cases.

PAEs had approximately the same success rate as all other plaintiffs in cases with decisions between 1995 and 2011. PAEs won 28 percent (45 out of 160) of the cases they brought, and all other plaintiffs won 32 percent (509 out of 1,591) of their cases. The 4 percent difference here is not statistically significant.[50] This could suggest that the cases brought by PAEs which reach final decision are not in fact weaker on their merits than any other case, and the patents asserted by PAEs in decided cases are not of lower quality than other plaintiffs' patents.

2. Quality-Related Characteristics of PAE Patents

Next, this Article studies several intrinsic quality-related characteristics of the patents asserted by PAEs in cases where they were successful, to look for differences between PAE patents and practicing entity patents. This Article specifically analyzes the following factors of PAE patents relative to practicing entity patents in cases finding infringement: (1) number of claims; (2) number of forward citations; and (3) number of patents asserted. These factors have been found to correlate with higher likelihood of a patent being asserted in the first instance,[51] as well as higher resulting award amounts in successful suits.[52]

With respect to the number of claims, PAE patents have more claims than those asserted in non-PAE cases with an infringement award. On average, PAE patents have 33.39 claims and the patents in other cases have 21.24 claims. This result is not strongly significant, but it could indicate

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50 A chi-squared test resulted in a test statistic of 1.005 and a p-value of 0.316.

51 *See supra* note 33.

52 *See* Mazzeo, Hillel & Zyontz, *supra* note 26, at 69.

patents of somewhat greater complexity being brought by PAEs.[53] Furthermore, this appears to be at odds with the popular fear of PAEs asserting very broad and vague patents of uncertain claim scope. A higher number of patent claims suggests possibly greater specificity of claim scope, as dependent claims add limitations that further refine the metes and bounds of the protected invention. Although there is considerable anecdotal evidence of PAEs asserting broad and ambiguous patents,[54] case data suggest that these individual examples might not reflect the general rule.[55]

With respect to the number of forward citations, there are significant but small differences in the average number of forward citations for PAE patents in cases finding infringement. On average, PAE patents had 22.35 forward citations and non-PAE patents had 19.27 forward citations.[56] Forward citations have been widely recognized to correlate with patent value and quality, indicating a greater recognition and importance of the claimed invention in follow-on patented technologies. The higher number of forward citations therefore also suggests, contrary to popular belief, that PAEs on average assert higher-quality patents than non-PAEs in cases finding infringement.

With respect to the number of patents asserted, the average number of patents asserted by PAEs in cases awarding damages is higher than the average number of patents asserted in successful non-PAE cases.[57] On average, PAEs assert 3.85 patents per case, while other plaintiffs assert 2.22 patents per case. The difference is statistically significant at the 15 percent level at least.[58] A higher number of patents in successful cases could sug-

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53 This analysis included 339 cases, 27 of which involve PAEs. A t-test for equal means with unequal variances provides a t-statistic of -1.363 and a p-value of 0.184. An additional non-parametric two-sample Wilcoxon rank-sum test was also run since the data do not follow a normal distribution particularly well. The test statistic is z = -2.153 with a p-value of 0.031, which again suggests the differences are more significant than given by the standard t-test.

54 *See, e.g.*, Chien, *supra* note 4, at 25 ("[M]any survey respondents don't find [NPE suits] to be socially productive assertions—but rather involving frivolous or overbroad patents, and frustrating rather than furthering competition.").

55 A similar dynamic took place around fears of the "excessiveness" of infringement awards. Although there were a few very large awards that garnered substantial media attention and aggravated popular concern, these were substantially larger than the vast majority of awards and resulted in a highly skewed distribution. Mazzeo, Hillel & Zyontz, *supra* note 26, at 63.

56 This analysis included 339 cases, 27 of which involve PAEs. A t-test for equal means with unequal variances provides a t-statistic of -0.725 and a p-value of 0.473. An additional non-parametric two-sample Wilcoxon rank-sum test was also run since the data do not follow a normal distribution particularly well. The test statistic is z = -1.683 with a p-value of 0.092.

57 These analyses use awards granted from 1995 to 2008 in the dataset.

58 Total cases for this analysis equal 339, 27 of which are PAE cases. A t-test for equal means with unequal variances provides a t-statistic of -1.505 and a p-value of 0.144. An additional non-parametric two-sample Wilcoxon rank-sum test was also run since the data do not follow a normal distribution particularly well. The test statistic is z = -2.313 with a p-value of 0.021, which suggests the differences are more significant than given by the standard t-test.

gest more robust and meritorious claims of infringement, although it also suggests greater complexity in these cases, which could increase litigation costs on both sides.

Taken together, to the extent these characteristics are robust indicators of patent quality, PAEs appear to assert patents of at least equal, if not *greater*, quality as compared to those asserted by other plaintiffs in cases awarding damages for infringement.

B. *PAE Litigation Practices*

Certain patent assertion practices often associated with PAEs have been cited as abusive and opportunistic in the "patent troll" debate. This Article investigates the prevalence of these practices and compares them to litigation activity by other patent plaintiffs. Specifically, this Article studies: (1) PAE decision rates; (2) the length of PAE litigations; and (3) typical venues of PAE cases.

1. PAE Decision Rates

It has widely been complained that "PAEs often threaten to sue with the intention of extracting license fees or settlement payments."[59] Indeed, this approach to patent assertion is consistent with the incentives involved in litigation by PAEs—injunctions are generally not available to PAEs under *eBay Inc. v. MercExchange, L.L.C.*,[60] and given that they do not compete in the relevant markets PAEs cannot prove lost profits and therefore are predominantly entitled to reasonable royalties as their measure of damages.[61] PAEs also do not derive indirect benefits from tying up defendants in costly litigation—unlike practicing entities, they do not stand to gain market share or tarnish their opponents' reputations. Accordingly, it may often be preferable for a PAE to settle its lawsuit for some amount equal to or greater than the expected reasonable royalty award, less litigation fees and expenses avoided (and discounted for time value and uncertainty).

PAE decision rates are consistent with this incentive structure. For instance, a recent GAO report found that PAEs filed 59 percent of all patent lawsuits filed in the United States in 2012, and data from previous years show increasing proportions toward this high mark.[62] However, the propor-

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59 WHITE HOUSE REPORT, *supra* note 5, at 6.

60 547 U.S. 388 (2006). It would also be useful to investigate whether PAE incentives to settle have changed after the *eBay* decision.

61 *See* Panduit Corp. v. Stahlin Bros. Fibre Works, Inc., 575 F.2d 1152, 1157 (6th Cir. 1978).

62 Sara Jeruss et al., *The America Invents Act 500: Effects of Patent Monetization Entities on US Litigation*, 11 DUKE L. & TECH. REV. 357, 357 (2012).

tion of NPEs in decided cases—wins and losses combined—has remained relatively constant through 2011 (although the proportion of PAE cases has increased to some extent). On average, PAE cases account for only 9 percent of all cases in which there was a final decision on the merits.[63] This difference between filings and decisions provides some support for the hypothesis that PAEs often have greater incentives to settle their suits than practicing entities.[64]

2. Length of PAE Litigations

It has recently been posited that PAEs are more likely to prolong their lawsuits with the intent of driving up their opponents' litigation expenses and potential settlement value. The White House report states that "PAEs have an incentive to drag out litigation, to increase pressure on defendants to settle the case."[65] The report cites studies suggesting that the risks and costs of litigation favor PAEs, "whose legal fees are low (since they do not have to provide much evidence to assert that there has been patent infringement), and who do not have to pay the fixed costs of a manufacturing operation."[66] Others, such as Professor Chien, have raised concerns over the impact on the defendant's operations during the pendency of a PAE trial, arguing that these burdens are particularly harmful to start-ups and other small entities.[67]

There is some theoretical basis to question the claim that PAEs benefit from longer rather than shorter litigation. Given that PAEs are generally not entitled to injunctions or lost profits, defendants in PAE cases might actually face *lower* operational risks than defendants sued by patent holders who practice their patents or compete in the same markets. Defendants sued by PAEs face a lower risk of preliminary injunctions, which immediately interrupt the accused activity and could impose massive operational costs. These defendants also typically do not face the risk of permanent injunctions at the conclusion of the lawsuit, which could be disruptive to the extent they remain engaged in the infringing activity. Also, without lost profits available, the measure of damages shifts to a royalty on the defendant's revenues derived from the infringing product, which the defendant may have more ability to control and which accordingly may pose less risk than lost profit

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63 *See id.* at 386.

64 *See supra* Part III. As noted above, though, other factors in addition to settlements likely contribute to the disparity between case filings and decision rates, such as dismissals, consolidations, and other case dispositions. Also, the incentives of both parties are relevant in actual settlement agreements.

65 WHITE HOUSE REPORT, *supra* note 5, at 6 (citing Catherine Tucker, Patent Trolls and Technology Diffusion 4-5 (Mar. 26, 2013) (unpublished manuscript), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2136955##).

66 *Id.*

67 Chien, *supra* note 4, at 16-17.

damages. This suggests that PAEs might in fact derive fewer benefits from protracted litigation than practicing entities.

Information about the length of decided litigations provides direct data to investigate this point. This Article measures the number of days between the initial complaint and start of trial for PAE and non-PAE cases that went to trial and resulted in an award.[68] From 1995 through 2008, there was no statistical difference between the length of PAE and non-PAE cases. On average, PAE cases lasted 935 days (2.56 years) from complaint to trial and non-PAE case lasted 1,026 days (2.81 years).[69] This Article also conducted the same analysis on cases awarding damages for infringement which were decided from 1995 through 2011. Once again, there was no significant difference in the length of litigation for PAE cases relative to non-PAE cases. Over the longer 1995 to 2011 time frame, PAE cases lasted 1,014 days (2.78 years) on average and non-PAE cases lasted 1,040 days (2.85 years) on average.[70]

3. PAE Venue

Venue in patent cases is a highly contentious issue, and PAEs in particular have long been accused of forum shopping by bringing suit in courts favorable to them and inconvenient to their defendants. Certain U.S. district courts—the Eastern District of Texas being the most notable example—are known to be hotbeds of PAE activity. Part of the issue is based in the federal laws governing venue, under which a defendant may be sued in any U.S. district court that has personal jurisdiction over the defendant for that suit. Personal jurisdiction in patent cases is often satisfied if the defendant has sold or offered for sale the accused product in the relevant district.[71] Accordingly, many defendants find themselves sued in districts far from their principal places of business, which raises the costs and inconvenience of litigation if they cannot achieve transfer to a more favorable venue.[72]

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68 Based on cases decided through 2008 in which the patent holder was successful.

69 This analysis included 281 cases, 25 of which involve PAEs. A t-test for equal means with equal variances provides a t-statistic of 0.696 and a p-value of 0.492. An additional non-parametric two-sample Wilcoxon rank-sum test was also run. The test statistic is z = 0.191 with a p-value of 0.849.

70 This analysis included 416 cases, 35 of which involve PAEs. A t-test for equal means with equal variances provides a t-statistic of 0.288 and a p-value of 0.775. An additional non-parametric two-sample Wilcoxon rank-sum test was also run. The test statistic is z = -0.446 with a p-value of 0.656.

71 28 U.S.C. § 1400(b) (2006); *see* VE Holding Corp. v. Johnson Gas Appliance Co., 917 F.2d 1574, 1577-78 (Fed. Cir. 1990).

72 Jake Holdreith, *IP: The Failure of Venue and Joinder Reform in Patent Litigation*, INSIDE COUNSEL (Apr. 9, 2013), http://www.insidecounsel.com/2013/04/09/ip-the-failure-of-venue-and-joinder-reform-in-pate (discussing venue transfer on motion and other litigation practices after passage of the AIA).

Empirically, there is also evidence that certain venues are particularly favorable to PAEs. For example, the 2013 PwC Study found that 39 percent of all NPE decided cases from 1995 to 2012 were concentrated in five district courts, with the Eastern District of Texas having the highest percentage of decisions.[73] The Eastern District of Texas also has one of the highest overall success rates for NPE plaintiffs relative to other districts.[74]

This Article finds very similar results in the data on PAEs from 1995 to 2011. Approximately 50 percent of PAE cases are concentrated in five district courts: the Eastern District of Texas, the Northern District of Illinois, the District of Delaware, the Northern District of California, and the Central District of California. The Eastern District of Texas also provided PAEs the highest win rate of any district court that saw at least five PAE cases. None of these results were driven by a single PAE litigating many times in any one place.

These results are also in line with those of non-PAE cases. The same courts appear at the top of both lists, and both types of plaintiffs have similar success rates. The only difference is that the Central District of California appears a bit further down the list for non-PAEs. To that end, it is not clear that PAEs engage in forum shopping to a greater extent than any other patent plaintiffs.

C. *PAE Patent Acquisitions and Opponents*

1. Age and Assignment History of PAE Patents When Asserted

Another core concern about PAE litigation is that it extracts aftermarket value from patents at the expense of practicing entities as PAEs assert claims from older patents after the inventions have disseminated through the relevant industries. For example, PAEs have been noted to acquire portfolios from defunct entities whose technologies have entered the marketplace. Whereas practicing entities might face barriers to asserting these patents—for example, the threat of "blocking patents" being asserted against them in retaliation and the necessity of a cross-license to continue practicing their rights—PAEs may have more freedom to bring such claims because they do not manufacture or sell products that could be the basis of infringement claims. Furthermore, older patents may increase the risk of holdup, whereby irreversible investments may have been made in the technology, preventing design-around and other efforts to avoid ongoing infringement.

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73 2013 PWC STUDY, *supra* note 28, at 24.

74 *Id.*

With respect to patent age, there is no difference in patent age at the time of trial for PAE and non-PAE plaintiffs that win in court. The average patent age at trial is 2,149 days (5.89 years) for PAEs and 2,318 days (6.35 years) for non-PAEs.[75] This difference is not statistically significant, so it does not appear that PAEs generally asserted older patents in cases awarding damages for infringement.

Similarly, this Article examined the number of assignments prior to litigation of PAE patents versus practicing entity patents. If PAEs acquire their patents predominantly through after-market transactions, one would expect to see more assignments on average in patents asserted by PAEs than by practicing entities. In cases decided from 1995 to 2008, there is a significant (at the 5 percent level) but very small difference in the average number of assignees to the patents on which damages were awarded for PAEs relative to non-PAEs, with PAE patents having a slightly higher number of prior assignments.[76] PAE patents had 1.481 assignees on average whereas non-PAE patents had 1.317 assignees on average.[77]

According to both of these parameters, patent age and number of assignments, patents asserted by PAEs look very similar to patents asserted by practicing entities in cases awarding damages for infringement.

2. Size of Defendants in PAE Suits

Professor Chien and others have focused on particular issues that arise when start-ups are sued by PAEs.[78] Although any litigation exposure is harmful for a fledgling business, patent infringement suits are often considered to be especially difficult to predict and avoid in certain technology fields, particularly in the Silicon Valley information and computer technology industries, where software patents, component-based inventions, and mobile technology are prevalent.[79] Professor Chien's survey data also suggest that PAEs often target start-up companies who are on the verge of venture capital financing rounds, acquisitions, and other major transactions, in order to drive up settlement values.[80]

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75 This analysis used awards granted from 1995 to 2008 in the dataset. It included 338 cases, 27 of which involve PAEs. A t-test for equal means with equal variances provides a t-statistic of 0.473 and a p-value of 0.637. An additional non-parametric two-sample Wilcoxon rank-sum test was also run. The test statistic is z = 0.431 with a p-value of 0.666.

76 Further work is required to determine the exact assignment histories of these patents.

77 This analysis included 339 cases, 27 of which involve PAEs. A t-test for equal means with equal variances provides a t-statistic of -1.296 and a p-value of 0.196. An additional non-parametric two-sample Wilcoxon rank-sum test was also run. The test statistic is z = -2.07 with a p-value of 0.038.

78 *See* Chien, *supra* note 4, at 16-17.

79 *See id.* at 3-5.

80 *Id.* at 11-12.

This Article examines the entity size of all patent defendants sued by both PAEs and non-PAEs across the dataset, to determine whether, among decided cases, a significant difference can be observed in the entity size of the defendant. PAEs tend to sue Fortune 500 firms more often than non-PAEs, although the difference is not significant.[81] PAEs sued Fortune 500 defendants in 22 percent of their cases and non-PAEs sued Fortune 500 defendants in 13 percent of their cases in which damages were awarded.[82] This data could suggest that patent assertions by practicing entities, as compared to suits by PAEs, pose an equal or greater threat to start-ups.[83] However, as mentioned above, given that the data include only decided cases, this result may be driven in part by smaller entities settling before a final judgment—data on cases filed by PAEs versus practicing entities and the size of the defendants sued by them respectively would need to be studied directly to confirm.

V. CONCLUSIONS

The findings in this Article reveal a number of important facts about PAEs and their patent assertion practices, some of which are directly contrary to popular positions in the "patent troll" debate. Rather, in some respects the data paint a very different picture of PAEs, showing them in some cases to assert patents and conduct litigation in ways that are highly similar to other patent holders enforcing their rights. From the perspective of decided cases, it is very difficult to distinguish the "trolls" from any other patent plaintiff.

Some important caveats should be noted. This Article does not address settled cases directly, or demand letters and licensing arrangements that do not involve litigation,[84] and it is possible that PAEs significantly differ from practicing entities when it comes to out-of-court assertion practices. However, as discussed above, decided cases provide useful information on assertion generally and the expectations of parties in settlement and licensing negotiations. At a minimum, these findings highlight the need to empirically study patent assertion practices in their various forms before robust conclusions can be drawn and policies can be implemented. Also, the dataset focuses primarily on cases finding infringement (with the exception of suc-

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81 This analysis uses awards granted from 1995 to 2008 in the dataset.

82 In this analysis there were 340 cases, 27 of which were PAEs. A chi-squared test resulted in a test statistic of 1.589 and a p-value of 0.207 (Fisher's exact = 0.244).

83 Notably, the data afford only a partial picture as they do not include settlements, and start-ups might in fact settle significantly more frequently when sued by PAEs than by practicing firms. The absolute incidence of suits by PAEs against start-ups and magnitude of resulting liabilities and other costs are necessary to complete the picture.

84 *See* GAO PATENT ASSERTION STUDY, *supra* note 3, at 26 ("[P]atent assertion occurs without firms ever filing lawsuits . . . .").

cess rates and certain other findings that include patent-holder losses), and the number of PAE cases in the dataset is relatively low, so some refinement to these results can be expected with more data.

To briefly summarize the results of this Article, regarding patent quality, there is no evidence of PAEs generally asserting lower-quality patents or litigating cases that are weaker on their merits than other patent holders. Instead, in some instances there is evidence of PAEs asserting higher-quality patents than other plaintiffs in cases where damages were awarded. This could indicate that PAEs are developing specialized expertise at patent assertion and are being highly selective about the patents they acquire and assert.

Regarding litigation practices, there is no evidence of PAEs "drawing out" their lawsuits to a greater extent than other patent holders. Also, there are no significant differences in venue for PAE cases compared with other patent holders. Accordingly, to the extent the district concentrations observed indicate forum shopping by PAEs, non-PAE plaintiffs appear to engage in similar tactics. These results suggest further similarity between PAEs and practicing entities in the ways they litigate their patent suits.

Regarding patent acquisitions by PAEs and the types of companies they target in assertion, contrary to popular belief, PAEs do not appear to assert significantly older patents than other patent holders. PAE defendants appear to be roughly the same size as or possibly larger than defendants sued by practicing entities across decided cases awarding damages. Additional work is needed to determine which types and sizes of entities PAEs are likely to sue, and the magnitude of the impact that PAEs have on start-ups and other small entities.

On the whole, the findings of this Article suggest that the realities of PAE assertion practices are complex, and it is difficult to identify clear signs of abuse or misuse of their patents relative to other patent plaintiffs. Rather, the observable similarities between PAEs and practicing entities highlight the risk that attempts to limit PAEs' enforcement rights or restrict the remedies available to them could inadvertently affect all patent holders and cause adverse effects on the ability of practicing entities to enforce and otherwise monetize their patents. These results counsel caution in designing policies aimed at PAEs and patent assertion practices.

Moreover, these results further indicate that modern patent assertion practices may yield unique efficiencies and benefits relative to traditional enforcement actions by practicing firms. It is necessary to understand the relationship between modern patent assertion, patent monetization, and patent value in its variety of forms before it may be identified which practices "promote progress" and which prevent it. True "patent trolls" are difficult to find, and all patent rights are at issue in the hunt to apprehend them.