

# **DO NPEs MATTER?: NON-PRACTICING ENTITIES AND PATENT LITIGATION OUTCOMES**

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## **ABSTRACT:**

It is widely argued that so-called “patent trolls” are corrupting the U.S. patent system and endangering technology innovation and commercialization at large. Yet, there is no clear definition of “patent troll” or agreement as to what types of business models, patent enforcement, and licensing practices are in fact problematic. Moreover, the existence and extent of any systematic effects of so-called “troll-like” behavior remains unclear. Due to this lack of clear definitions, many entities that own patents but only license them out (Non-Practicing Entities or NPEs) are viewed with some wariness. This study develops novel empirical evidence to inform the debate over the effects of NPEs on patent litigation and lays the groundwork for future analysis. Specifically, we conduct a large-scale empirical analysis of more than 1,750 patent infringement cases decided by a judge or jury in United States district courts between 1995 and 2011. We focus on case outcomes including findings of validity and infringement and well as the level of damage awards. We find some relatively small differences in terms of lower success rates and damage awards in cases where the patent holders are NPEs. Perhaps more interestingly, there are substantial differences based on various subcategorizations that we employ – in other words, the NPEs are different from each other. Moreover, we find evidence that NPEs engage in strategic and rational patent assertion practices that reflect, or perhaps derive from, an economic separation of patent rights from the technologies they cover. In this new marketplace of patent monetization, our findings suggest that while the economic value of patents is invariant to whether the patent-holder is a practicing entity or non-practicing entity, the incentives governing and implications arising from different patent assertion practices may be paradigmatically distinct.

**PRELIMINARY AND INCOMPLETE: DO NOT CITE OR QUOTE**

# DO NPEs MATTER?: NON-PRACTICING ENTITIES AND PATENT LITIGATION OUTCOMES

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## INTRODUCTION

It is widely argued that so-called “patent trolls” are corrupting the U.S. patent system and endangering technology innovation and commercialization at large. Case in point, an influential study estimated the “direct costs” of patent troll litigation in the U.S. in 2011 at \$29 billion.<sup>1</sup> Yet, there is no clear definition of “patent troll” or agreement as to what types of business models, patent enforcement, and licensing practices are in fact detrimental. Moreover, the extent (or even existence) of any systematic effects of so-called “troll-like” behavior remains unclear. Due to this lack of clear definitions, many entities that own patents but only license them out (Non-Practicing Entities or NPEs) are viewed with some wariness. This study develops novel empirical evidence to inform the debate over the effects of NPEs on patent litigation and lay the groundwork for future analysis. Specifically, we analyze patent infringement awards obtained by NPEs and their characteristics and systematic value drivers. We conduct a large-scale empirical analysis of over 1,750 patent infringement cases decided by a judge or jury in United States district courts from 1995 to 2011. Using this analysis, we examine the real economic implications of different types of NPEs and modern patent monetization practices.

There has been significant concern and media attention over “patent trolls” in recent years. The popular NPR piece “When Patents Attack” exemplifies common sentiment against the perceived harms inflicted by entities that abuse the patent system.<sup>2</sup> Yet as the term “patent troll” has entered the public lexicon, the metes and bounds of that label, and the actual economic

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<sup>1</sup> [BESSEN MEURER]

<sup>2</sup> [WHEN PATENTS ATTACK]

effects of the practices that have been so labeled, remain poorly understood. The definition of “patent troll” is highly amorphous, and the types of business models, patent enforcement, and licensing practices that are considered to constitute “trolling,” as opposed to more socially acceptable forms of monetizing patent rights, vary widely in public opinion.

Concerns about “troll-like” behavior have also dominated academic debate and patent policy discussions. The FTC’s most recent report addressing patent remedies *The Evolving IP Marketplace, Aligning Patent Notice and Remedies with Competition*, devoted several sections to exploring leading scholarship and potential economic implications of Patent Assertion Entities (PAEs) and other NPEs.<sup>3</sup> It examined leading theories and positions on both ends of the spectrum, exploring possible positive and negative effects of modern patent monetization and assertion practices. Yet, the FTC Report did not evaluate the systematic effects of PAEs or other NPEs more generally, and it specifically called for new empirical analysis to examine these issues.

This paper studies NPE practices from the basis of patent infringement remedies and systematic value factors. We conduct a large-scale empirical analysis of over 1,750 U.S. district court patent infringement case decision from 1995-2011 to determine whether fundamental characteristics and differences between NPE and non-NPE awards can be identified. In particular, we focus on two principal questions. First, we examine the raw data to see how the NPEs are represented within the universe of cases over time and how successful they have been in winning cases. Next, we conduct targeted regressions with a small number of variables to determine whether NPE litigation has a statistically significant effect on expected award value. This analysis sheds light on the economic effects of NPE enforcement relative to other patent litigants. Subtending both lines of inquiry, more generally, is the question of patent assertion practices and the evolving new economy of patent monetization.

Our key findings include the following:

- The share of cases where patent holders are not practicing the invention has remained relatively stable over time. Given the significant increase in case filings that other studies have attributed to PAEs, our result may indicate a greater willingness of PAEs to settle litigation before adjudicated outcomes.
- Also, we find a noticeable shift from individuals to patent assertion entities as plaintiffs over the last several years. This might provide evidence of the upstream remuneration of inventive activity that PAEs are thought to provide.
- Interestingly, cases involving awards to NPEs appear to be evenly distributed by award value across the dataset. This may suggest that NPEs face similar litigation risks as practicing entities and generally do not have superior information that could advantage them in case selection.

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<sup>3</sup> [FTC REPORT] [hereinafter, “FTC Report”].

- Importantly, NPEs are somewhat less successful in the case outcomes, both in terms of findings of validity and infringement and in terms of damage award levels in successful cases.
- There are differences in outcomes when we classify non-practicing patent holders into finer categories. Specifically, non-practicing firms (or PAEs) have better results than individuals and universities. The trend in overall cases indicates that individuals are involved in fewer cases in more recent years, with PAEs making up the difference.

Section I addresses relevant conceptual background and scholarship. Section II outlines the research methodology employed in this study, presents descriptive statistics about the dataset and results of the preliminary empirical analysis. Section III discusses policy implications and questions for future study.

## I. BACKGROUND

This section addresses relevant theoretical background and scholarship informing our study of PAE litigation. First, we highlight some of the definitional ambiguity underlying the terms “Non-Practicing Entity,” “Patent Assertion Entity” and, indeed, “patent troll”. In so doing, we call out the structural similarities between these entities and their practices and situate the need for empirical analysis to identify systematic differences (if any) between them and relative to practicing patent holders. Next, we overview some prior studies that have addressed litigation rates involving NPEs and other relevant data.

### A. *Theoretical Background*

The FTC Report notably adopted the definition of “Patent Assertion Entity” in its assessment of modern patent enforcement and licensing practices. It identified several potential and theoretical concerns with PAE practices, including a general increase in patent litigation suits,<sup>4</sup> the risk of hold-up and excessive damages faced by practicing technology companies,<sup>5</sup> problems with patent notice and difficulty in identifying and clearing relevant patent rights,<sup>6</sup> and concerns over patent quality,<sup>7</sup> including with respect to patents held by PAEs.

However, the FTC Report also observed that a new marketplace of patent transactions is developing, and certain practices considered to be detrimental may in fact have net benefits in this new context. For example, PAEs can provide remuneration to individual inventors from whom they acquire patents.<sup>8</sup> In downstream patent markets, PAEs can provide liquidity for patent transactions and valuation comparisons for fair market benchmarking.<sup>9</sup> Additionally, by

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<sup>4</sup> [CITE FTC REPORT] [CITE MOST RECENT PWC STUDY]

<sup>5</sup> [CITE FTC REPORT]

<sup>6</sup> [CITE FTC REPORT]

<sup>7</sup> [CITE FTC REPORT]

<sup>8</sup> [CITE FTC REPORT]

<sup>9</sup> [CITE FTC REPORT]

amassing and monetizing large numbers of patent rights, PAEs may potentially help resolve some of the complexity of patent thickets and generally increase visibility of patent rights.<sup>10</sup>

Accordingly, as used in the FTC Report, “Patent Assertion Entity” is a broad and morally agnostic term used to describe a range of patent enforcement and transactional practices. The term PAE is itself a subset of the broader term “Non-Practicing Entity”. Unlike PAEs, NPEs include universities and other patent owners that primarily seek to develop and transfer technology.<sup>11</sup> Yet, even PAEs are split into multiple subcategories, with potentially vast differences between them.

For example, large patent aggregators often operate according to financial fund models that are motivated to maximize return on investment to a large and diverse group of stakeholders. These PAEs may be more likely to license or settle at fair market rates than to engage in holdup or discriminatory licensing practices involving more risk, higher transaction costs and negative publicity. Indeed, patent aggregators may be thought of as vertically separating patent rights from the goods and services embodying the patented technologies. As such, aggregators may achieve cost reductions and other efficiencies that are not available to practicing companies. Indeed, if PAEs enforce their patents in a non-discriminatory fashion, this theoretically could produce a more level playing field for competition in practicing markets than strategic patent assertion by horizontally situated patent holders.<sup>12</sup>

At a more fundamental level, the differences between PAEs and practicing entities, and the meaning of the term “troll,” do not simply involve a question of definition. Rather, the taxonomical ambiguity between types of non-practicing entities reflects a structural ambivalence inherent to patents. It is difficult to answer, for example, whether it is more legitimate for a university to enforce its patent portfolio than for a patent litigation fund to do so? Or, one can ask if there is a difference economically between an individual inventor exploiting her rights directly or first assigning her rights to a PAE? Even muddier still is the question of “defensive” patent portfolios owned by practicing entities. If a company shields its product lines from competition by enforcing patents that do not cover those products, is this more socially beneficial than if a PAE sues each entity indiscriminately in a downstream technology market? Going further, how should we view large companies that build massive patent portfolios, which they cross-license to other industry titans<sup>13</sup> and/or hold as arsenals to avoid being sued for infringing activity? Are these more legitimate uses of patent rights than fund models focused on monetization?

These questions are not the result of modern business practices or innovation in the ways patent rights are exploited. They arise from the patent grant itself. There is no requirement for a patent holder to practice its rights in order to maintain or be entitled to enforce them. Patent rights like other property are fully transferable and alienable. Exclusive and non-exclusive licenses can be subdivided to infinitesimal degrees of scope, duration and control rights. These

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<sup>10</sup> [CITE FTC REPORT]

<sup>11</sup> FTC REPORT

<sup>12</sup> [SOMEWHAT NAÏVE VIEW GIVEN LICENSING/LITIGATION REALITIES]

<sup>13</sup> [KIEFF]

features are fundamental to patents and are true for patents held by universities, inventors, practicing companies, PAEs and true “trolls” alike.

From this perspective, it is difficult to think of any basis from which to study the differences between NPEs and practicing entities. However, patent infringement awards provide a useful starting point. In the area of remedies, at least, there are certain key differences between NPEs and other patent litigants. Current U.S. case law reduces the chances for NPEs to be awarded injunctions for patent infringement.<sup>14</sup> Post-*eBay*, studies have found that damages are the sole remedy available to NPEs and other entities that do not practice in the relevant technology market.<sup>15</sup> Moreover, Non-Practicing Entities by definition are not entitled to lost profit damages, which require proof of direct competition with the accused infringer.<sup>16</sup> Therefore, contrasted with practicing entities, reasonable royalties are likely to be the predominant form of remedy available to PAEs and other types of NPEs.<sup>17</sup>

Accordingly, patent infringement awards offer one potential area of distinction between NPEs and practicing entities from which other, perhaps fundamental characteristics and differences may be identified. In this paper, we analyze NPE awards generally and seek in particular to identify and characterize PAE practices. Moreover, we endeavor to parse out specific types of NPE litigation to help develop a principled understanding of whether certain practices have net negative effects and the circumstances under which they arise.

## B. *Relevant Prior Scholarship*

In this paper, we conduct the first large-scale analysis of patent infringement damages awarded to Patent Assertion Entities. Notably, certain previous studies have undertaken empirical analysis of PAE and other NPE practices from other angles. The following paragraphs briefly overview the relevant prior scholarship.

A set of articles from 2000-2004 by Lanjouw and Schankerman study the predictability and determinants of patent infringement suits generally.<sup>18</sup> The authors find certain characteristics of litigants and patents that tend to lead to more or less litigation. For example, the probability of patent litigation increases if the patent is core to a set of follow-on innovations for a corporation and if a corporation has closely-related rivals and needs to maintain a reputation for protecting its intellectual property.<sup>19</sup> On the other hand, corporations that are part of concentrated industries or that have large patent portfolios are less likely to see litigation.<sup>20</sup> Further, they identify certain patent characteristics lending to an increased likelihood of suit,

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<sup>14</sup> [eBay]

<sup>15</sup> [Chris Seamen; others]

<sup>16</sup> [Panduit]

<sup>17</sup> [sec. 284]

<sup>18</sup> See e.g., Lanjouw, J. O. and Mark Schankerman, *Characteristics of Patent Litigation: A Window on Competition*, Rand J. Econ. Vol. 32, no. 1, pp. 129-51 (2001); Lanjouw, J. O. and Mark Schankerman, *Protecting Intellectual Property Rights: Are Small Firms Handicapped?*, J. L. and Econ. Vol. XLVII, no. 1, pp. 45-74 (2004); Lanjouw, J. O. and Mark Schankerman, *Patent Quality and Research Productivity: Measuring Innovation with Multiple Indicators*, Econ. J. Vol. 114, pp. 441-65 (2004).

<sup>19</sup> Id. Lanjouw and Schankerman (2001) at 129-30.

<sup>20</sup> Lanjow and Schankerman (2004) at 48.

most notably a higher number of claims and more forward citations per claim.<sup>21</sup> However, these studies did not specifically focus on litigation by PAEs.

A recent study by Allison, Lemley & Walker studies litigation rates with respect to highly litigated patents and addresses “trolls” litigation in this context. The authors find that litigation rates and litigant characteristics vary significantly by industry, especially for the most litigated patents.<sup>22</sup> Moreover, the authors find that among the most-litigated patents, there are significantly more Non-Practicing Entities than among the once-litigated patents. Additionally, a prior study addressing litigation rates by Lemley and Shapiro found that NPEs filed between 30%-40% of all infringement suits in computing and electronic industries during the period studied.<sup>23</sup> However, other studies have found that NPEs do not initiate a disproportionately large number of infringement suits.<sup>24</sup>

Despite the focus on litigation rates, very few studies have addressed awards for patent infringement. In particular, the PwC studies from 2009 and 2010 report a 10% higher success rate for practicing companies than NPEs.<sup>25</sup> The PwC studies also reported time and other trend statistics relating to NPE awards and observed higher median damages awards to NPEs than practicing companies.<sup>26</sup>

Additionally, our prior work found that litigation awards generally are highly systematically predictable and deterministic, and certain factors have a statistically significant tendency to increase or decrease award values.<sup>27</sup> However, we did not focus on NPEs before the present study.

Finally, Yu conducted one recent study of NPE royalty rates in negotiated transactions based on RoyaltySource and ktMINE data. He found no difference between royalty rates obtained by NPEs in licensing negotiations and those paid to practicing entities. To the extent licensing occurs “in the shadow” of litigation, this study gives added reason to question how NPEs fare in litigation and what systematic characteristics of their awards can be observed.

Moreover, given the significant increase in litigation rates that certain other studies have attributed to PAEs, it is critical to understand the outcomes of such litigation. If PAE awards are systematically different than awards obtained by practicing entities, modern PAE practices may have a distinct and possibly detrimental economic impact on technology innovation and commercialization activity. Conversely, if PAE awards are indistinguishable from other awards, the issue refocuses to understanding the effects of *more* but not necessarily *different* patent

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<sup>21</sup> *Id.* at 131.

<sup>22</sup> John R. Allison, Mark A. Lemley & J.H. Walker, *Extreme Value or Trolls on Top? The Characteristics of the Most Litigated Patents*, 158 U.Penn.L.Rev. 1 (studying litigation rates of patents in specific industries). However, this study does not address the outcomes of the litigation, but notes “that is the subject of a companion piece by the authors, tentatively entitled Patent Quality and Risk Aversion Among Repeat Patent Litigants.” *Id.* at 5 n. 14.

<sup>23</sup> [LEMLEY SHAPIRO]

<sup>24</sup> HALL & ZEIDONIS (2003); BALL & KESAN (2009); CHIEN (2009)

<sup>25</sup> [PWC 2009-2010] [ALSO, ALLISON, LEMLEY & WALKER FINDINGS]

<sup>26</sup> [PWC 2009-2010]

<sup>27</sup> [MHZ 2011]

litigation and assertion practices. Whereas the former situation may raise substantive issues of potentially excessive awards, poor patent quality and improper exploitation of patent rights, the latter situation may implicate more procedural concerns, such as inefficiencies in the litigation system (and attendant costs borne by litigants) and *ex ante* information failures in licensing markets. In any event, understanding the characteristics and behavior of PAE awards is essential to determining whether PAE practices are problematic and, if so, what types of remedial measures may be appropriate.

Accordingly, we set out to conduct an extensive empirical analysis of the characteristics and systematic value drivers of PAE and other NPE litigation. Our study seeks to develop an empirical understanding of NPE litigation as a whole, as well as PAE, university and individual patent-holder cases in particular. We seek specifically to determine whether any systematic differences between NPE and practicing entity awards can be identified and moreover whether awards differ based on the *type* of NPE involved in the litigation.

Notably, regarding terminology, we use the term “non practicing firms” to denote NPEs that are not universities or individuals, which we believe most accurately reflects the data. We think such “non practicing firms” are largely classifiable as “Patent Assertion Entities,” as such term is used in the FTC Report. As discussed above, whether any particular NPE company, university, individual or other patent litigant should be termed a “troll” is largely subjective, and accordingly we refrain from using that term in the analysis.

## II. DATA AND PRELIMINARY ANALYSIS

### A. Dataset

In order to take a closer look at the outcomes experienced by NPE plaintiffs in patent litigation, we obtained a database maintained by the accounting firm PricewaterhouseCoopers (PwC). The PwC database contains all decided patent cases reported in Westlaw from 1995 – 2011. PwC has used these data to publish annual reports on the status of patent litigation for their clients; statistics from these reports have been cited by policy makers in the most recent patent reform debate and were also an important source for the FTC Report described above. In addition, our recent working paper uses information from the PwC database (supplemented with additional variables) through 2008. The dataset has been fully reviewed and modified by the staff at PwC since 2008, so there will be some minor discrepancies between these analyses and those in our working paper.<sup>28</sup>

Through 2011, the PwC dataset contains 1,751 patent cases in Westlaw where a decision was made on patent validity and infringement at summary judgment or trial. Of those 1,751 cases, in 554 the patents were held valid and infringed. Among those cases where the plaintiffs were successful on validity and infringement, 421 had available award amounts or were cases related to Abbreviated New Drug Application (ANDA) litigation. There were 45 ANDA cases

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<sup>28</sup> The majority of cases from 2008 and prior are the same. However, we are still in the process of adding the patent and party variables for 2009-2011 that are present in our full dataset from 1995 – 2008. Because of this ongoing work, the descriptive analyses come from the PwC 1995 – 2011 database, but the regressions are still from the 1995 – 2008 full database. The regressions will be updated in future work.



with \$0 awards (since ANDA cases do not result in damages) and 376 cases with awards greater than \$0.<sup>29</sup>

The coding used by PwC incorporates the NPE designation, so we will use that abbreviation as we describe and utilize their data. One of the explicit goals of our paper is to employ detailed information about each case to make finer distinctions among the various kinds of Non-Practicing Entities. Toward that end, we note that in their 2011 update, PwC added new variables on whether one of the parties to the suit was a NPE. Of those 376 cases where the plaintiffs were successful and in which damages were awarded, 79 had an NPE party and 297 had no NPE. The PwC data went further and classified each of these NPEs as companies, individuals, or universities. Our initial look at the new data takes into account this initial distinction among NPEs as well. There are likely further nuances in categorizing NPEs, which we plan to explore in future studies.

Our preliminary analysis proceeds in four parts. First, we document information about cases decided – distinguishing between cases involving NPEs versus practicing companies and further distinguishing between cases in which the NPE is a company, individual, or a university. We then turn to the outcomes of cases, including whether validity and infringement are found by the court and the level of damages in cases won by the patent holder, and report the relevant statistics from the dataset. Finally, we perform preliminary regressions on the damages data to control for other factors affecting award size. This allows us to get a more precise estimate of the differences between NPE and non-NPE cases in the dataset.

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It does appear that the number of cases has increased significantly from 1995 to 2011, but that is most likely due to Westlaw reporting bias. Prior to 2002, federal district courts were not required to report all cases electronically, so case and award information were limited in those early years. Starting in 2002, most important case information was available electronically, which made it easier to obtain patent damage awards. So more likely we are seeing the majority of cases after 2002.

## B. Case Information

**Figure 1:**

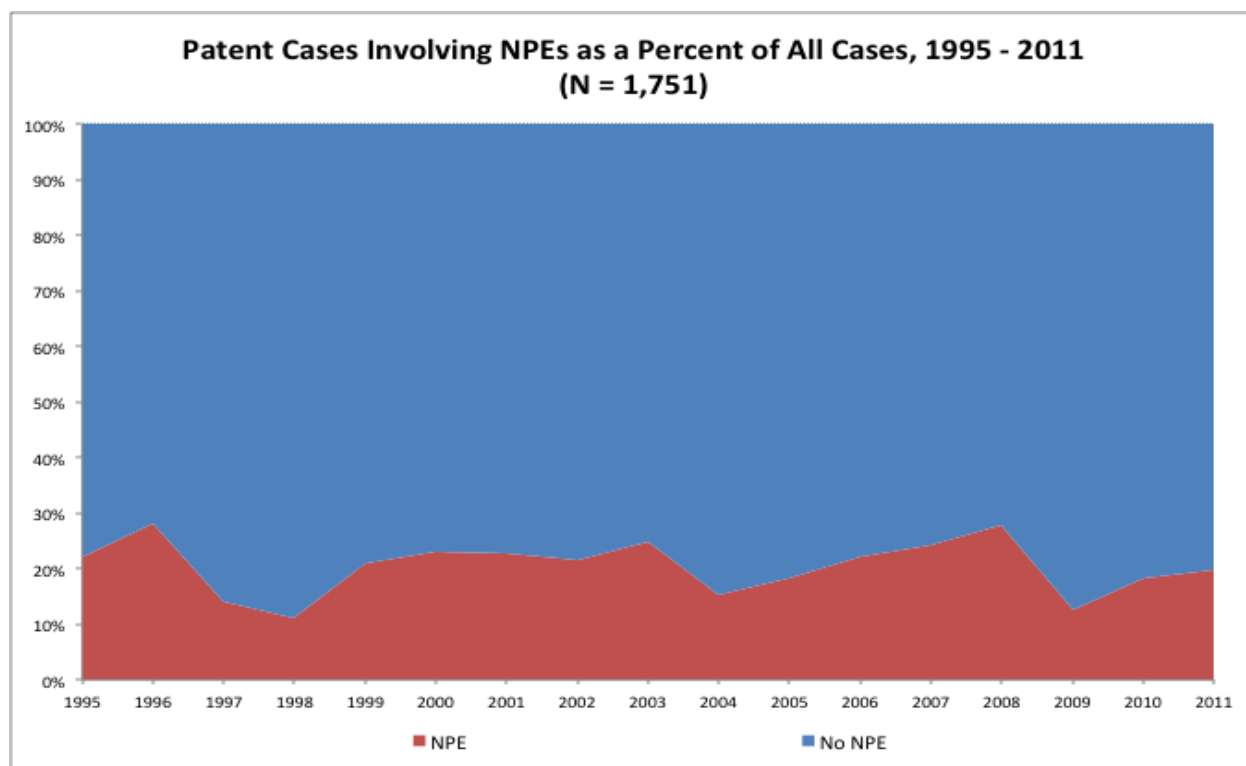


Figure 1 presents the annual total of cases each year, broken down by whether one of the parties was an NPE or not (No NPE). Of the 1,751 patent cases in the 2011 PwC dataset, cases containing at least one NPE party never reached over 30 percent in any given year.<sup>30</sup> In fact, even though the number of total and NPE cases has increased over time, NPE cases have remained a relatively consistent portion of the total patent caseload – in terms of cases decided – for 17 years. To the extent that the presence of NPEs in patent litigation has become more pronounced over time (as many commentators have asserted), such trends have not yet showed up in patent case decisions. This may be due to heterogeneity in settlement behavior or lags in the court system; in Section III we posit possible explanations that seem consistent with PAE incentive structures, although we think further investigation of this factor is warranted.

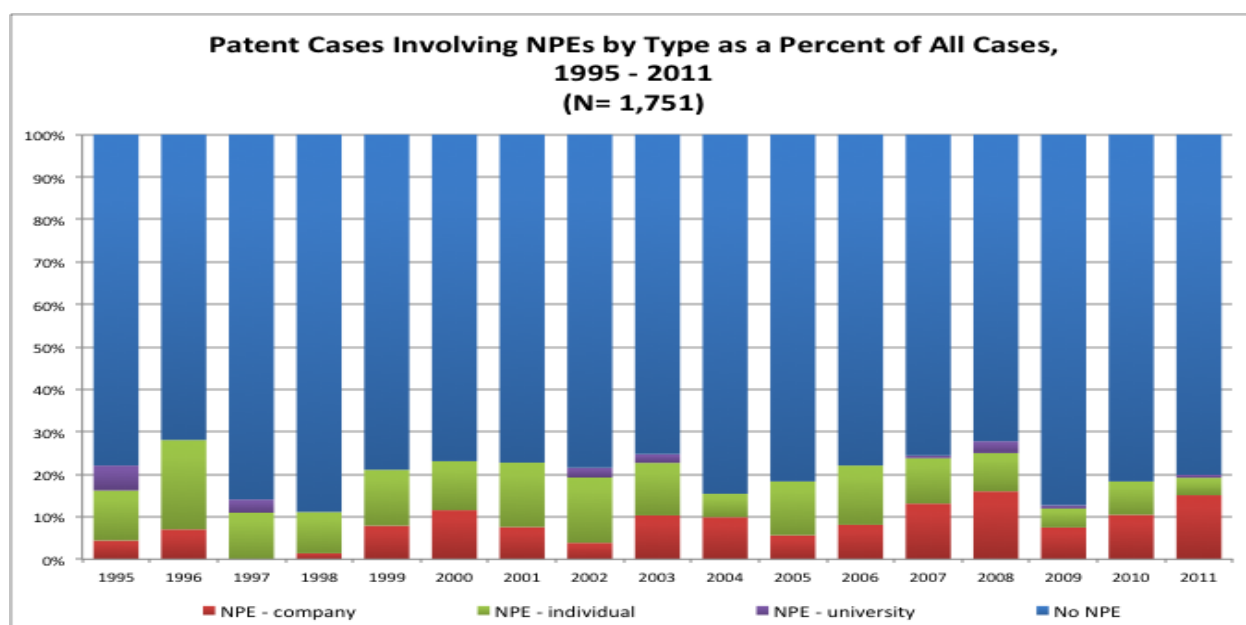
Where the overall share of NPE cases have remained quite stable over the 1995-2011 period, there appear to be changes over time in the types of NPEs appearing in patent cases (Figure 2). From the figure below, one can see again that NPE cases make up less than 30 percent of the cases each year. However, there has been a noticeable shift in the respective shares of cases involving NPE individuals and NPE companies. Prior to 2004-2005, NPE cases were dominated by individual inventors (the green bar on the graph) but since then, a larger

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Note that “year” here refers to the date of the decision in the case. Of course, individual cases may be filed several years before the decision is delivered. Our data end at this decision stage, and do not include appeals (though many of the decisions in the cases have been subsequently appealed).

percent of NPE cases involved companies (the red bar on the graph). This could be a reflection of the increased number of IP holding companies and IP aggregators that have entered the market recently. Also, to the extent the data indicates a shift from individuals to firms, it could reflect upstream patent transfers between them (which have been thought to be a potential benefit of PAEs by providing direct financial rewards to inventors). As we break down the identity of these parties further, we plan to focus attention on this trend and try to identify the explanation for the shift and study its overall impact on the success of patent holders and the level of damages awarded.

**Figure 2:**



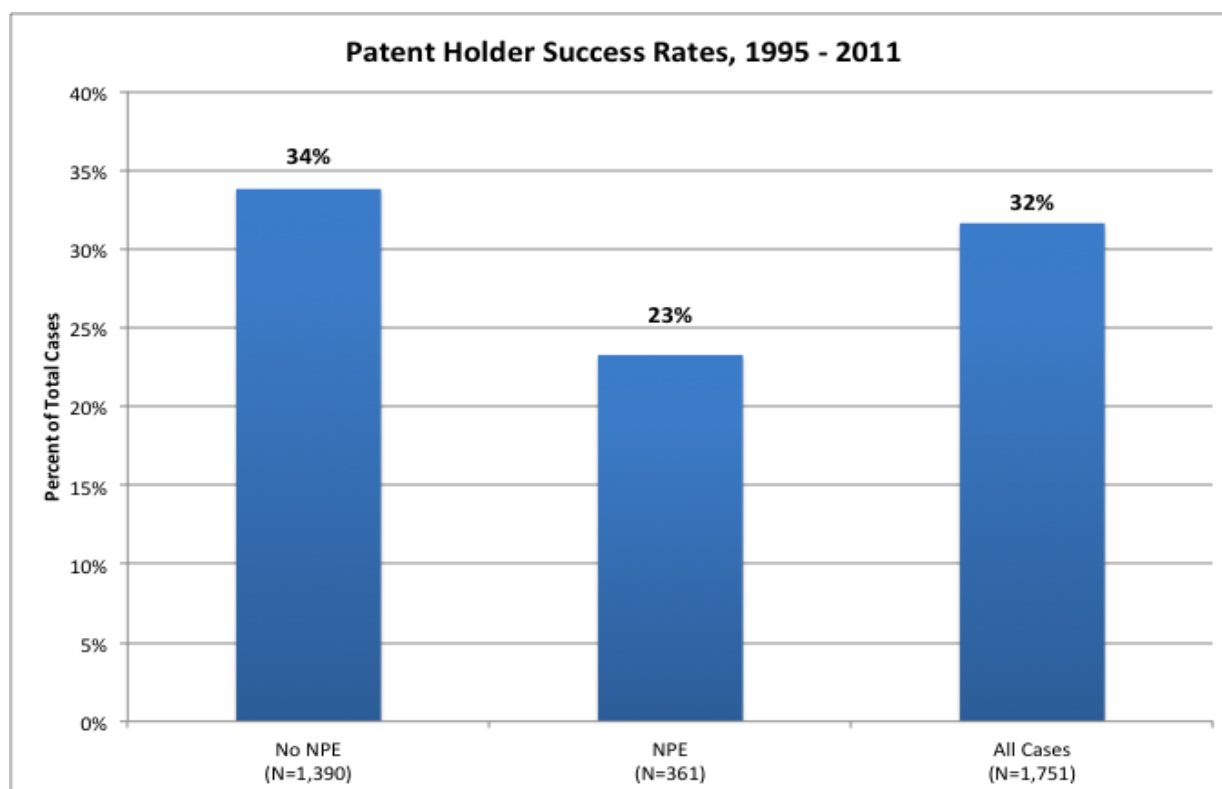
### C. *NPE Success Rates*

Our next set of graphs examines the success rates of patent holders, in terms of findings of validity and infringement. In all cases across the dataset (the rightmost bar in Figure 3), the patent holder success rate is 32 percent. However, there is a marked difference in patent holder success rates between cases that have an NPE party and those that do not. Of the 1,390 cases with no NPE (the farthest left bar), the success rate is 34 percent. For the 361 cases involving an NPE, we find that the success rate is more than 10 percentage points lower (the middle bar in the graph).

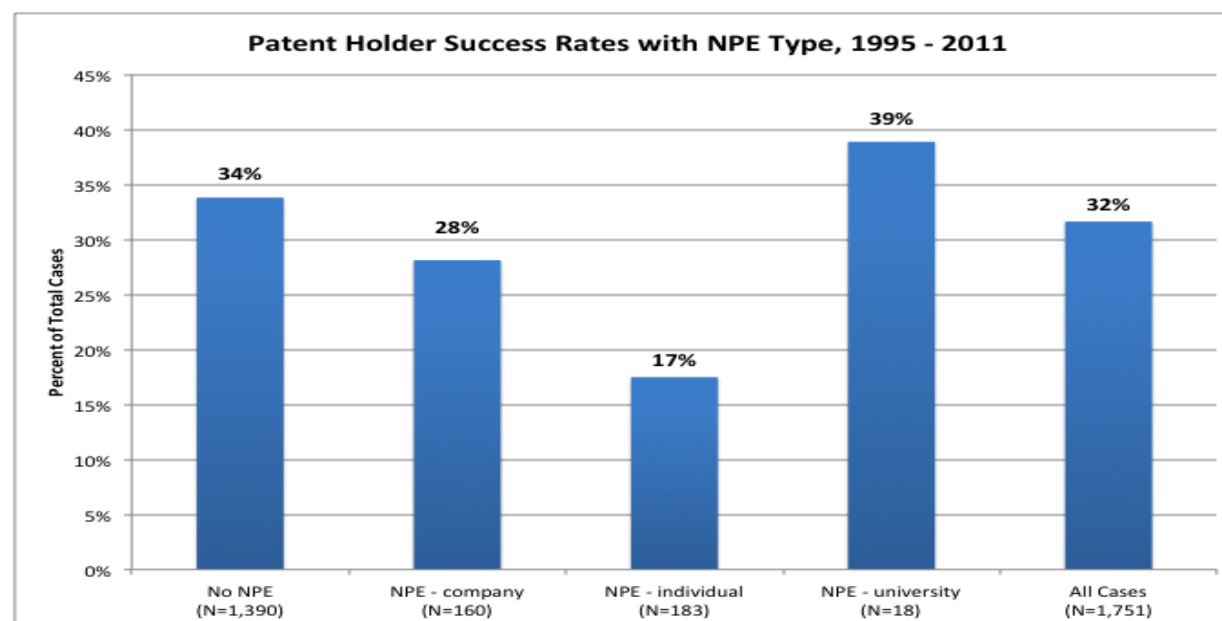
This lower success rate is not equally true across the different NPE categories. As seen in Figure 4, cases involving universities have a higher patent holder success rate than any other category. NPE individuals do not fare quite as well, with only a 17 percent success rate. We plan to explore a variety of potential explanations for this phenomenon, including the possibility that individuals may be more likely to bring lower quality suits or may have fewer resources necessary to obtain a favorable ruling in court. It will also be useful to investigate the extent to

which the lower success rate of individuals may be tied to the shift from NPE-individuals to NPE-companies that we documented in the previous graph.

**Figure 3:**

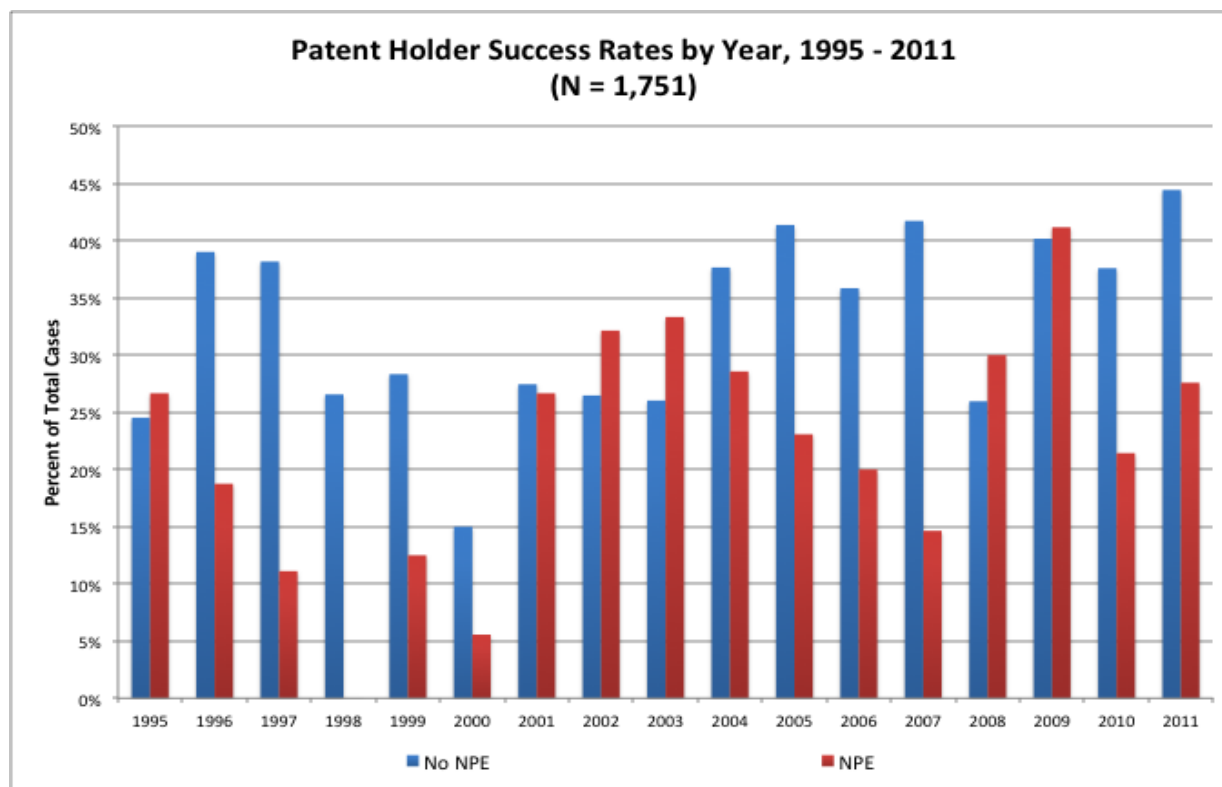


**Figure 4:**



As we look over time in the dataset between 1995 and 2011, the trends in patent holder success rates do vary in individual years (Figure 5). For example, in 2002 and 2003, NPEs appear to have a higher overall success rates. However, in most years, cases with no NPEs have higher success rates. Even in the years where NPE cases have higher success rates, the difference between the NPE cases and the non-NPE cases are not more than 10 percent.

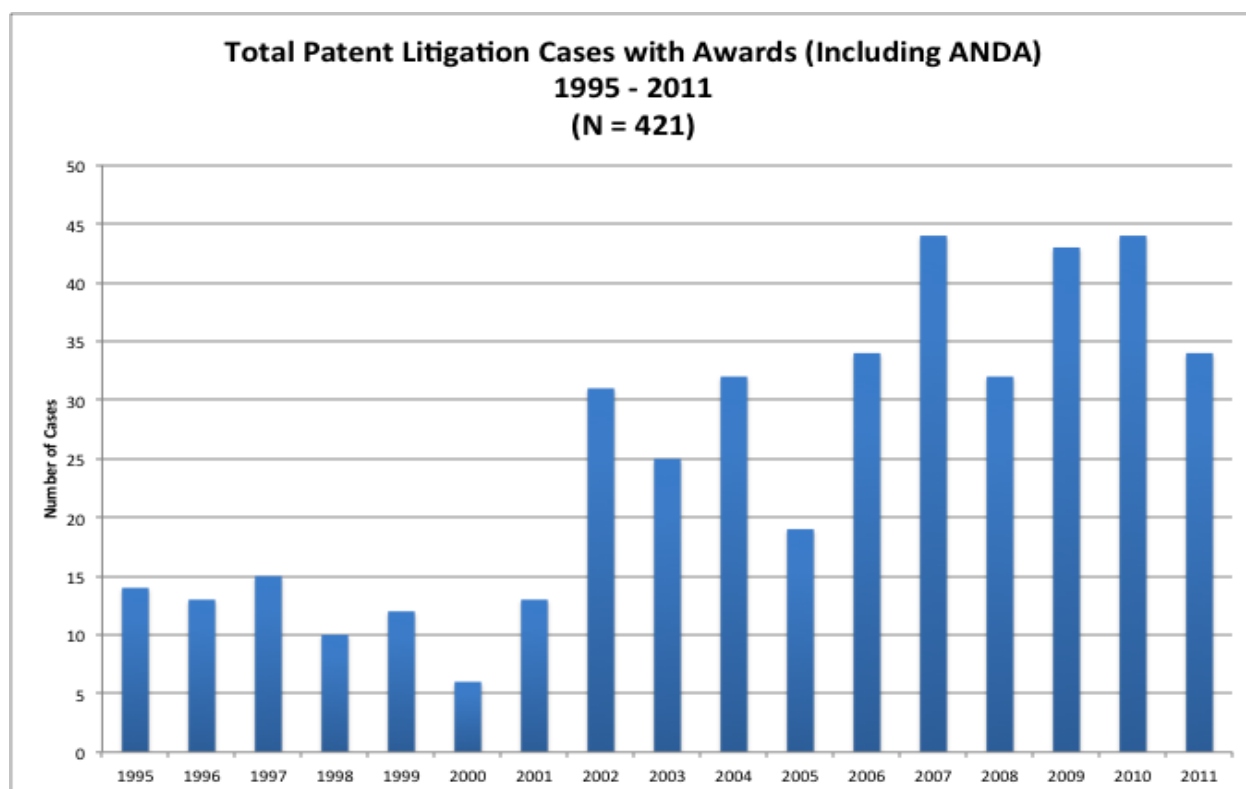
**Figure 5:**



Generally, we observe that the percent of cases involving NPEs has not changed and year over year the success rates between NPE and non-NPE cases are similar (or lower). However, the type of NPE involved does seem to make a difference to the outcome.

#### *D. Awards and Jury Trials*

Next, we look at the number of cases in which damages were awarded, and whether the cases were decided by judge or jury. Of the 1,751 cases from 1995 – 2011, 554 resulted in a valid and infringed patent. Of those cases, 421 were ANDA cases or had available damages information (Figure 6).

**Figure 6:**

Consistent with the results described in the previous subsections, most of the cases with patent damage awards do not have NPE parties. This is confirmed in Figures 7 and 8, which separate out the total number of cases by NPEs and non-NPEs first and then by each of the NPE categories. It is worth noting here that of the NPE cases, the NPE companies are most represented among the cases with damage awards. This is especially true in the most recent years of the dataset. As before, we will conduct further research regarding whether the difference between NPE companies and NPE individuals is due to NPE companies' relative sophistication with IP litigation and larger resources and the extent to which this may be causing shifts in the types of NPEs we observe in the data. Also, some of these changes over time could reflect PAEs acquiring patents from individuals and asserting them, which we also plan to investigate in future work.

Figure 7:

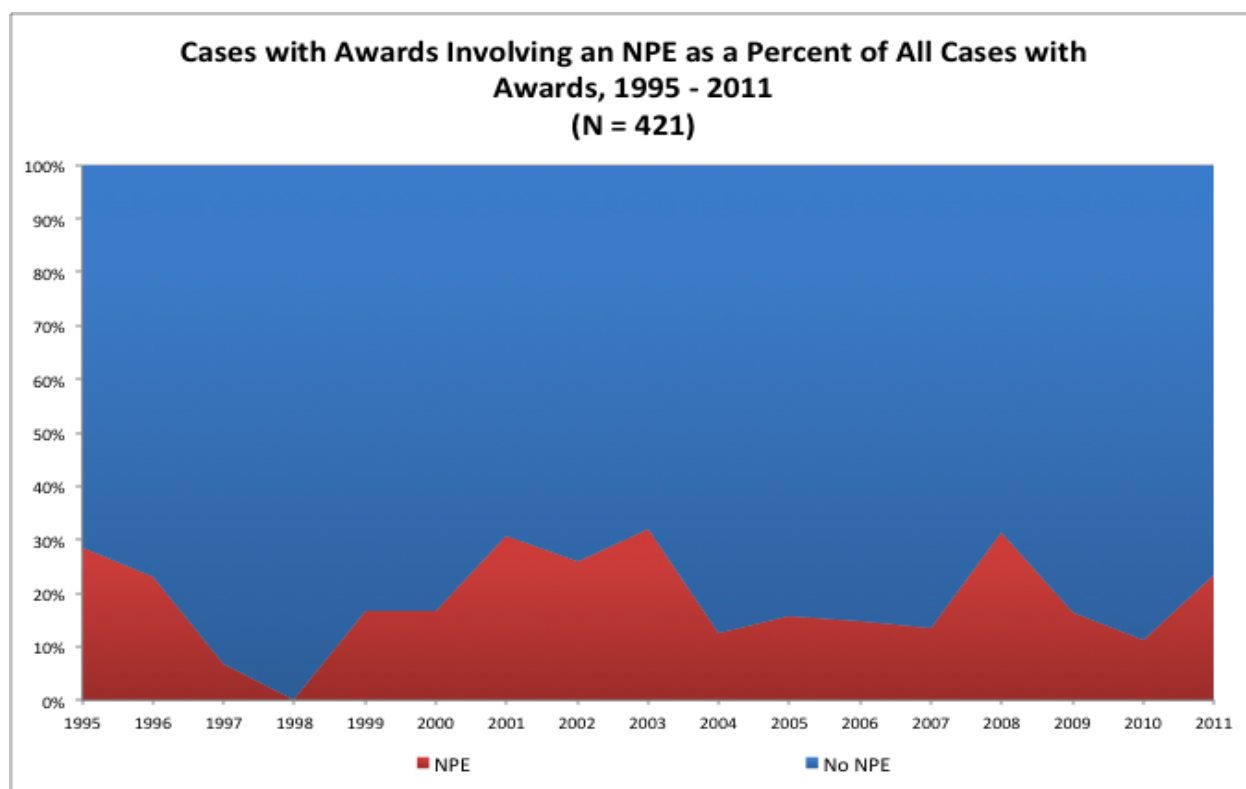
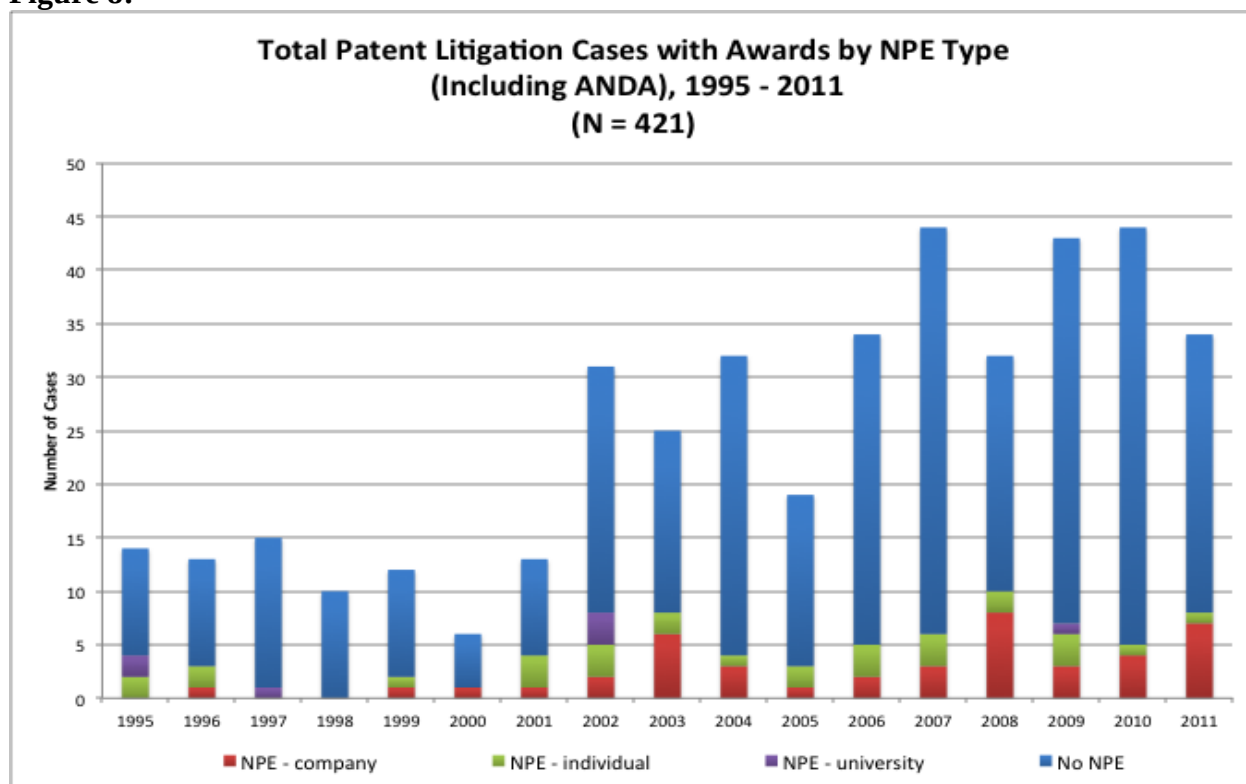
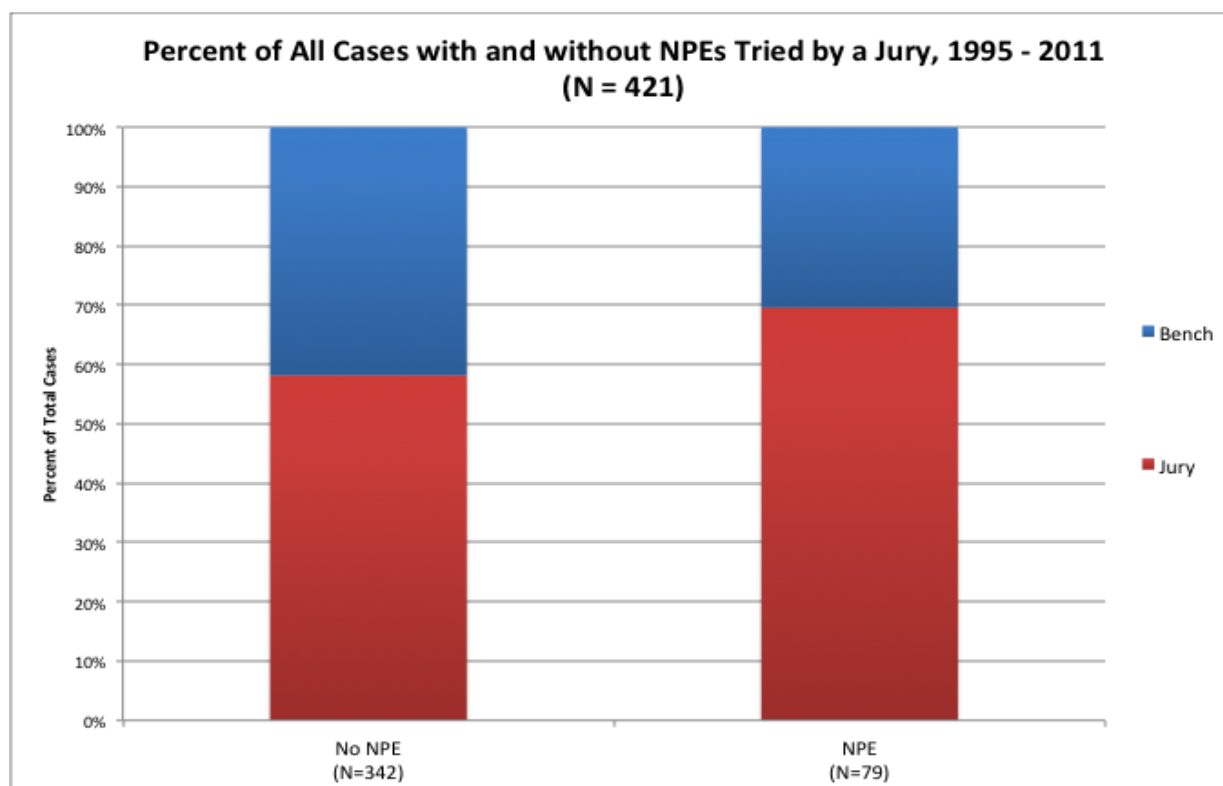


Figure 8:

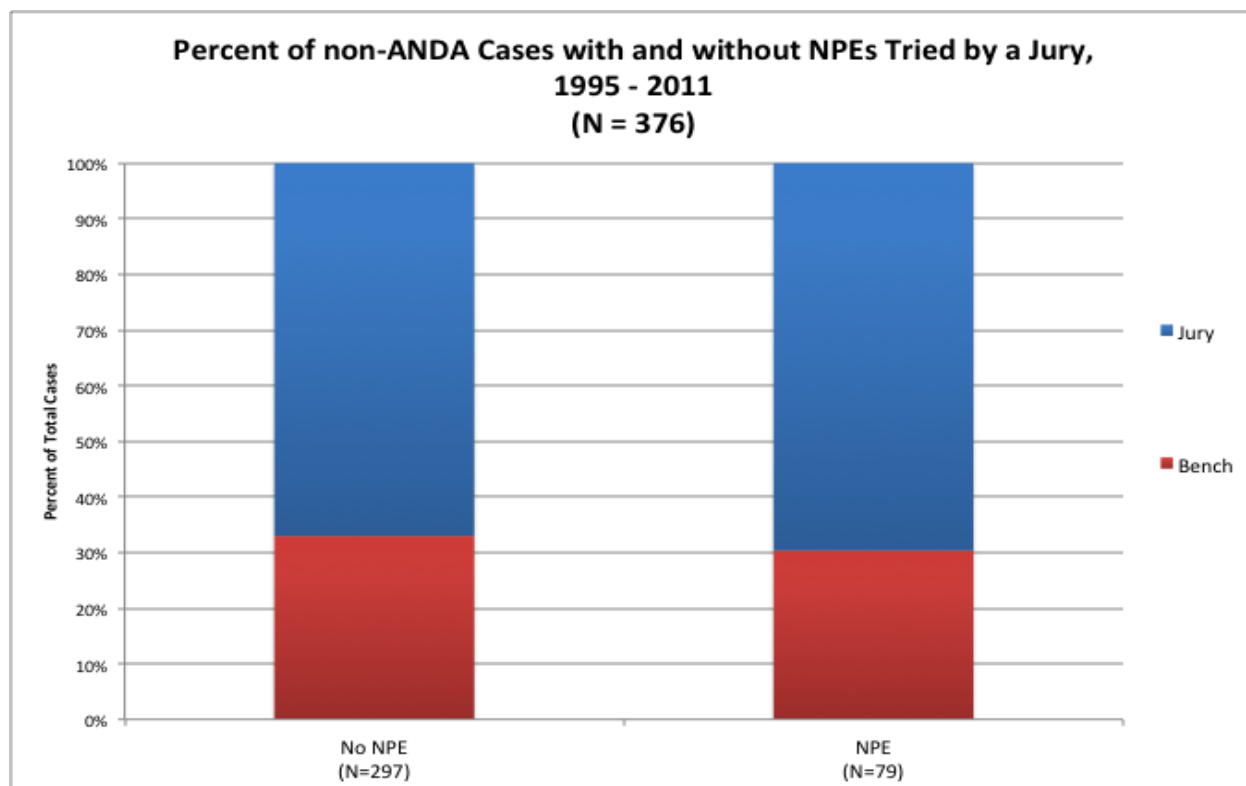


Another interesting analysis was to see whether NPE cases were more likely to be decided by a jury, which has been shown to result in higher damage awards. According to Figure 9, the answer is yes. Just under 60% of non-NPE cases were heard by a jury, whereas 70% of the NPE cases were heard by a jury. However, this result may be misleading as the non-NPE cases include ANDA cases, which are not NPE cases and are only decided on a bench trial, and therefore may skew the results. Figure 10 excludes ANDA cases to provide a more level comparison.

**Figure 9:**





**Figure 10:**

As shown in Figures 9 and 10, much of the difference between jury trials in cases with and without NPEs can be attributed to ANDA cases. After removing the ANDA cases, there is no difference between non-NPE and NPE cases in whether they are heard by a jury. Based on these raw data, there is not much evidence to suggest that differences between NPE and non-NPE cases would be driven by selection in to jury or bench trials.

#### *E. Damages Awarded to NPEs*

We turn now to the size of damage awards. All awards are in millions of dollars, with dollar values adjusted account for inflation – all figures are reported in 2011 dollars. Table 1 presents summary statistics, by year, on the observed distribution on damage award amounts in the data set, excluding ANDA cases. The main takeaway from this table is that, within any given year, the distribution of damage award amounts is highly skewed.<sup>31</sup>

<sup>31</sup> These represent an update from a similar table/graph in our previous working paper on patent damages. The numbers will differ due to minor differences in data collection and because the base was changed from 2008 to 2011. However, our original findings still hold: in each year the damage awards are highly skewed but the medians remain relatively stable.

**Table 1:**

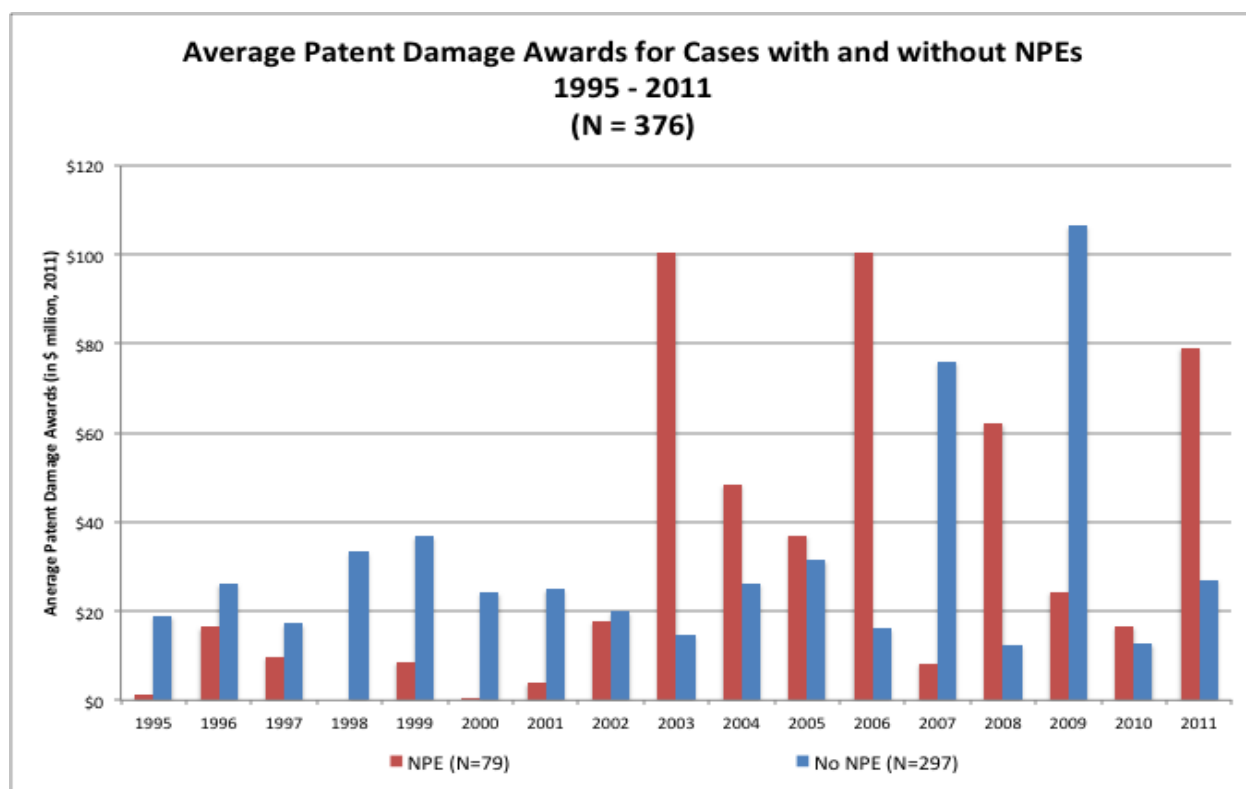
Damage Award Distribution 1995 – 2011 (in millions \$ 2011)

(N = 376)

| Year | Minimum | First Quartile | Median  | Third Quartile | Maximum    |
|------|---------|----------------|---------|----------------|------------|
| 1995 | \$0.03  | \$0.38         | \$3.51  | \$13.89        | \$91.44    |
| 1996 | \$0.02  | \$0.41         | \$4.44  | \$40.07        | \$136.20   |
| 1997 | \$0.31  | \$1.38         | \$6.59  | \$21.20        | \$101.96   |
| 1998 | \$0.01  | \$0.82         | \$3.24  | \$11.07        | \$235.98   |
| 1999 | \$0.29  | \$4.85         | \$16.15 | \$25.54        | \$222.48   |
| 2000 | \$0.50  | \$2.07         | \$6.36  | \$20.49        | \$82.44    |
| 2001 | \$0.06  | \$1.65         | \$10.24 | \$19.86        | \$99.12    |
| 2002 | \$0.02  | \$0.64         | \$5.38  | \$28.13        | \$122.66   |
| 2003 | \$0.08  | \$2.12         | \$11.77 | \$28.09        | \$636.43   |
| 2004 | \$0.04  | \$0.55         | \$5.35  | \$28.58        | \$182.92   |
| 2005 | \$0.01  | \$4.09         | \$10.25 | \$50.35        | \$147.45   |
| 2006 | \$0.02  | \$0.77         | \$3.44  | \$24.93        | \$342.43   |
| 2007 | \$0.00  | \$0.23         | \$3.57  | \$24.32        | \$1,668.59 |
| 2008 | \$0.01  | \$1.19         | \$2.96  | \$24.01        | \$451.20   |
| 2009 | \$0.03  | \$2.54         | \$7.35  | \$20.46        | \$1,937.85 |
| 2010 | \$0.02  | \$0.24         | \$1.85  | \$16.30        | \$109.09   |
| 2011 | \$0.00  | \$0.70         | \$8.50  | \$31.00        | \$593.36   |

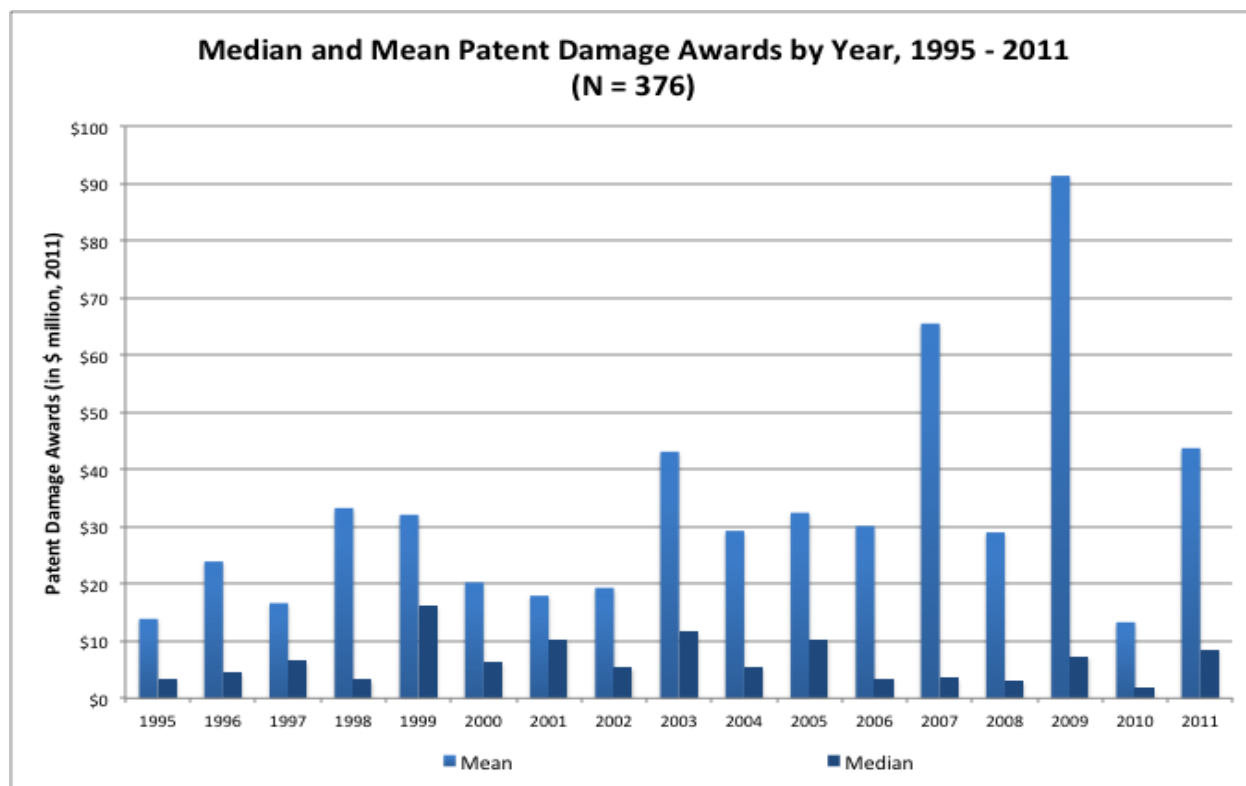
As a result, and perhaps as seen more clearly in Figure 11, the averages (or means) vary widely and are highly dependent on a handful of very high awards, such as the over \$1 billion awarded in the Lucent case in 2007 or in the Abbott case in 2009.

Figure 11:



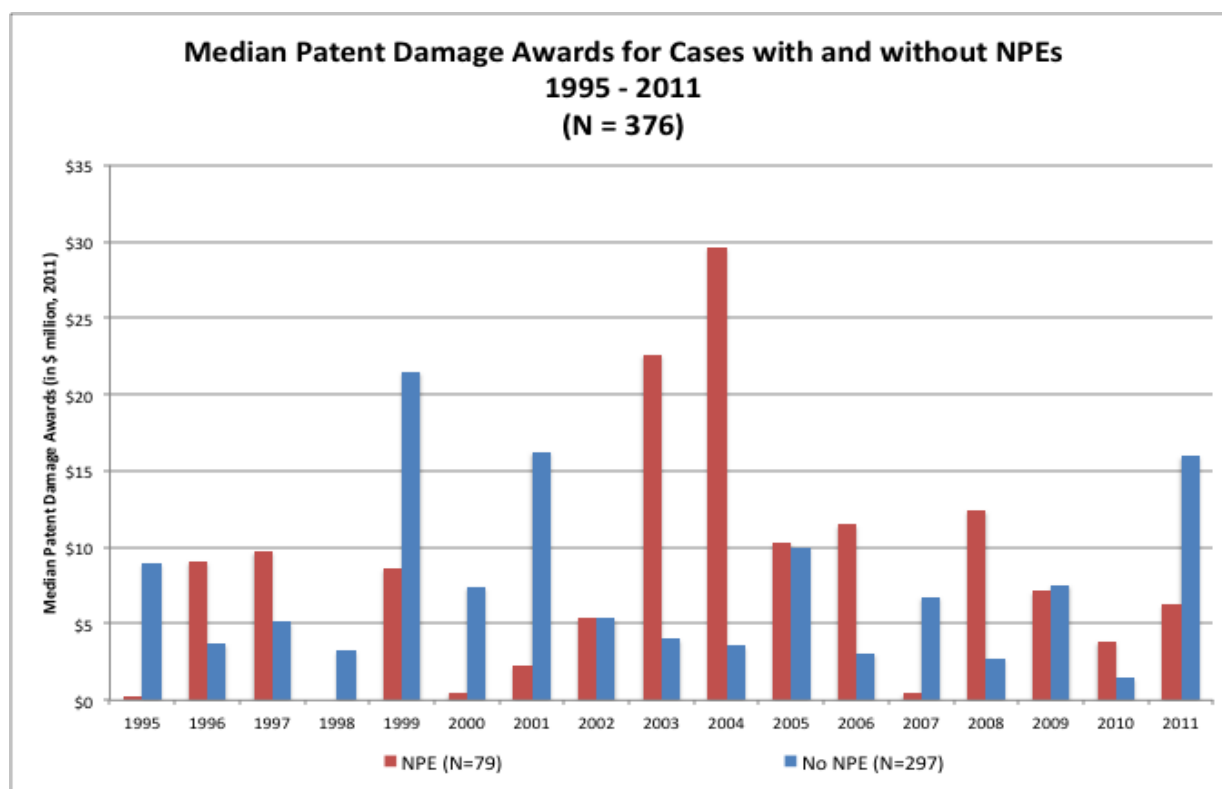
The medians, however, are consistent and never rise above \$16 million. Over the period of our data, these medians remain quite stable – refuting claims of substantial trend toward higher damages that have commonly been made (Figure 12).

Figure 12:



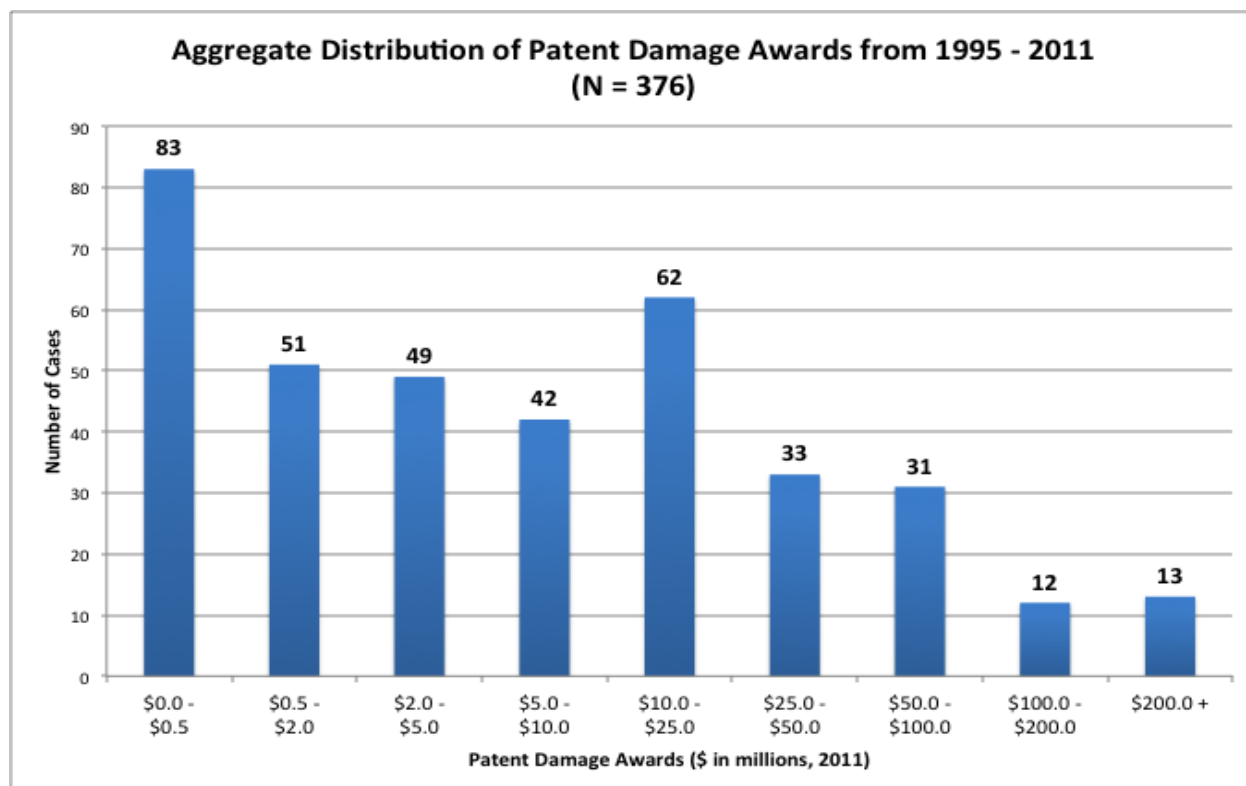
A key question is whether NPE cases result in higher damages than non-NPE cases. In making a comparison between NPEs and non-NPEs on a year-by-year basis, we see that the relative small numbers of cases per year generate an uneven pattern. A quick comparison of means in Figure 11 suggests that NPE cases can result in very high awards, but it is not always the situation that NPEs have higher awards on average. On the whole, this seems to be more consistently true in recent years. Because of the relatively small number of cases annually, we present in the figures below data on medians as well, though the pattern is similarly uneven (Figure 13).

Figure 13:



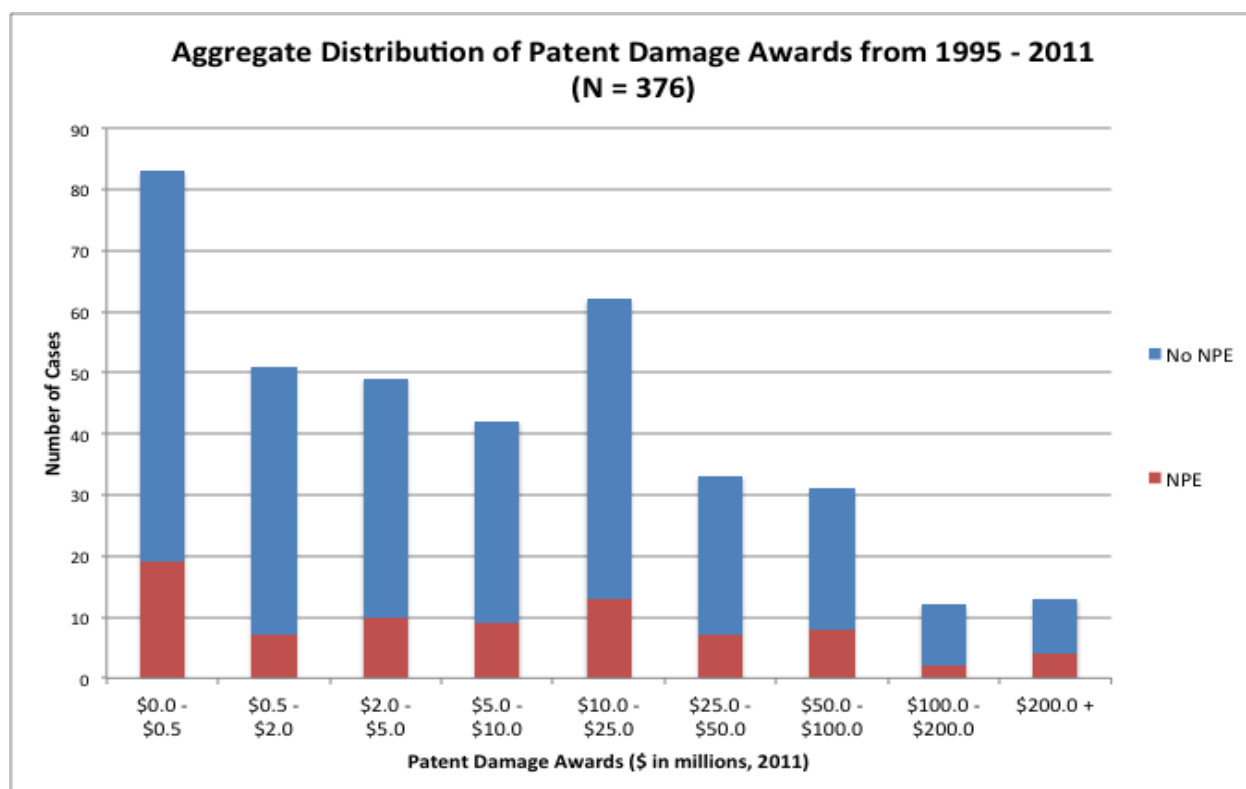
Since the relatively small numbers make year-by-year comparisons of damage awards somewhat problematic, in what follows we aggregate the distribution of damage awards across all the years. The aggregate distribution in Figure 14 shows a very highly skewed distribution of award levels overall. The majority of cases are under \$10 million and only a small handful (about three percent) are the very large awards over \$200 million. About five times as many awards are in the under \$0.5 million category as are in the over \$200 million category.

Figure 14:



In Figure 15, we separate out each of the award level categories by their NPE or non-NPE status. Notably, while NPE cases make up about 20 percent of each distribution category generally, this is not true in the highest dollar figure category, where NPE cases are 30 percent of the total. Because the last category only contains 13 cases, it is difficult to draw inferences from the change in NPE case percentage. However, this is worth investigating further to see if there is any relationship between NPE cases and higher damage awards. The regressions in our final section attempt this, while controlling for other factors that may help determine the size of individual awards.

Figure 15:



#### F. Regression Analysis

To achieve a more precise picture of the difference between NPE and non-NPE outcomes in patent litigation, it is necessary to control for various factors that may have an impact on the amount of damages awarded across the cases. For example, previous studies, including our previous working paper, have demonstrated that there is a strong correlation between factors related to the economic value of the patents at issue in the case and the level of damage awards. The financial strength of defendants and other case features have a similar impact. Any measure difference between NPEs and non-NPEs could be misleading if NPEs are systematically over or under-represented among cases with an independent correlation with damage award size.

We address this issue by performing a regression analysis on the damage award amount data described above, focusing our attention on the differential impact of NPE presence in the case. Our key explanatory variable, therefore, is an indicator for cases with an NPE litigant. Suitable control variables include proxies for the economic value factors described above – specifically, we include the following in our regression:

- *Average number of patent claims:* Patents with a higher number of claims may be more economically valuable, leading to higher damage awards if validity and infringement are found.
- *Number of patents:* Individual cases can involve the infringement of multiple patents, with a higher number suggesting the potential for more economic harm.
- *Average number of forward citations:* The economic value of patents may be positively correlated with the number of times the patent is cited in future patent applications.
- *Average age of patents:* All else equal, an older patent would have a longer time horizon over which infringement (and therefore harm) may have occurred.
- *Defendant is a Fortune 500 or Public Company:* These are proxies for the size of the defendant in the case, as larger firms are potentially associated with higher damage awards.
- *Dummy for Jury Trial:* Cases decided by juries have been shown to have higher damage awards (perhaps because of the complexity of patent cases and/or selection bias by patent plaintiffs).
- *Year of Decision:* This can be used to establish an independent time trend (i.e., controlling for the mix of cases) in the damages data.
- *Time to Trial:* Measured in days, this could represent a measure of the complexity of cases and litigation expenses.



We run the regression on all of the observations from our dataset for which we have damages data (excluding ANDA cases) as well as information on all of the variables described above. This limits our dataset to only 240 observations, and we plan to fill in data on more of the observation in subsequent analysis.<sup>32</sup> The signs and statistical significance of the control variables in the regressions reported below are consistent with our conjectures of their potential association with award level outcomes.

**Table 2:**  
Significant Factors Influencing Damage Awards Plus NPE Dummy, 1995 - 2008

|                                                                 |           |                   |       |       |                      | Number of obs | 240    |
|-----------------------------------------------------------------|-----------|-------------------|-------|-------|----------------------|---------------|--------|
|                                                                 |           |                   |       |       |                      | F(10,229)     | 15.560 |
|                                                                 |           |                   |       |       |                      | Prob>F        | 0.000  |
|                                                                 |           |                   |       |       |                      | R-squared     | 0.361  |
|                                                                 |           |                   |       |       |                      | RootMSE       | 0.887  |
| Dependent Variable: Log of patent damage awards in 2008 dollars | Coef.     | Robust Std. Error | t     | P>t   | [95% Conf. Interval] |               |        |
| Average Number of Patent Claims                                 | 0.00419   | 0.00168           | 2.50  | 0.013 | 0.00089              | 0.00749       |        |
| Number of Patents                                               | 0.07225   | 0.01469           | 4.92  | 0.000 | 0.04331              | 0.10119       |        |
| Average Number of Forward Citations                             | 0.00523   | 0.00183           | 2.86  | 0.005 | 0.00163              | 0.00884       |        |
| Average Age of Patent                                           | 0.00009   | 0.00004           | 2.29  | 0.023 | 0.00001              | 0.00016       |        |
| Defendant as Fortune 500 Company (or subsidiary)                | 0.25304   | 0.18620           | 1.36  | 0.175 | -0.11384             | 0.61993       |        |
| Defendant as Public Company (or subsidiary)                     | 0.63772   | 0.13472           | 4.73  | 0.000 | 0.37227              | 0.90318       |        |
| Dummy for Jury Trial                                            | 0.77230   | 0.15011           | 5.14  | 0.000 | 0.47652              | 1.06808       |        |
| Year of Decision (time trend)                                   | -0.05704  | 0.01563           | -3.65 | 0.000 | -0.08785             | -0.02624      |        |
| Time-to-Trial                                                   | 0.00032   | 0.00008           | 4.08  | 0.000 | 0.00017              | 0.00048       |        |
| NPE                                                             | -0.15382  | 0.13389           | -1.15 | 0.252 | -0.41764             | 0.11000       |        |
| Constant                                                        | 119.17690 | 31.24009          | 3.81  | 0.000 | 57.62213             | 180.73170     |        |

As mentioned above, the key explanatory variable of interest in Table 2 is the dummy variable indicating cases in which an NPE is involved. As the results show, the presence of an NPE has a negative effect, but the measure of impact is not statistically significantly different from zero. This means that, if anything, cases brought by NPEs may be associated with a lower damage awards once trials are decided. This fact appears consistent with the descriptive analysis

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In particular, we have not yet included the data from the most recent years – as such, these regressions only go through 2008. Our update will allow us to analyze the effects of NPEs through 2011. Note that the analysis does not include ANDA cases.

above, and may be indicative of a somewhat less substantial liability threat posed to businesses by NPEs than what is commonly argued.

Importantly, our descriptive analysis also suggests that the type of NPE matters with respect to award amount; accordingly, we investigate this further with detailed regressions. To examine whether different kinds of NPEs may have different influences on damage awards, we have included in the regression below (Table 3) a set of NPE dummy variables to indicate whether the NPE is a company, an individual, or a university. These more nuanced results suggest that the negative coefficient on the overall NPE dummy is mainly attributable to the NPE – University and NPE – Individuals awards. That is, universities and individuals appear to generally receive lower damage awards compared with NPE companies (or PAEs). Notably, the NPE – University estimated coefficient is significant at the 5 percent level; by contrast, the NPE – Company coefficient is positively signed and is statistically different from the signs of other two NPE category variables.

**Table 3:**  
Significant Factors Influencing Damage Awards Plus NPE Type Dummies, 1995 - 2008

|                                                                 |           |                   |       |       |                      | Number of obs | 240    |
|-----------------------------------------------------------------|-----------|-------------------|-------|-------|----------------------|---------------|--------|
|                                                                 |           |                   |       |       |                      | F(12,227)     | 14.860 |
|                                                                 |           |                   |       |       |                      | Prob>F        | 0.000  |
|                                                                 |           |                   |       |       |                      | R-squared     | 0.381  |
|                                                                 |           |                   |       |       |                      | Root MSE      | 0.877  |
| Dependent Variable: Log of patent damage awards in 2008 dollars | Coef.     | Robust Std. Error | t     | P>t   | [95% Conf. Interval] |               |        |
| Average Number of Patent Claims                                 | 0.00384   | 0.00159           | 2.42  | 0.016 | 0.00071              | 0.00696       |        |
| Number of Patents                                               | 0.06578   | 0.01535           | 4.29  | 0.000 | 0.03553              | 0.09602       |        |
| Average Number of Forward Citations                             | 0.00618   | 0.00179           | 3.45  | 0.001 | 0.00265              | 0.00970       |        |
| Average Age of Patent                                           | 0.00009   | 0.00004           | 2.35  | 0.020 | 0.00001              | 0.00016       |        |
| Defendant is Fortune 500 Company (or subsidiary)                | 0.28336   | 0.18775           | 1.51  | 0.133 | -0.08660             | 0.65331       |        |
| Defendant is Public Company (or subsidiary)                     | 0.62067   | 0.13439           | 4.62  | 0.000 | 0.35586              | 0.88547       |        |
| Dummy for Jury Trial                                            | 0.75271   | 0.14966           | 5.03  | 0.000 | 0.45781              | 1.04761       |        |
| Year of Decision (time trend)                                   | -0.06353  | 0.01523           | -4.17 | 0.000 | -0.09354             | -0.03352      |        |
| Time-to-Trial                                                   | 0.00033   | 0.00008           | 4.12  | 0.000 | 0.00017              | 0.00049       |        |
| NPE is Company                                                  | 0.15377   | 0.15271           | 1.01  | 0.315 | -0.14715             | 0.45468       |        |
| NPE is Individual                                               | -0.29756  | 0.20456           | -1.45 | 0.147 | -0.70064             | 0.10552       |        |
| NPE is University                                               | -0.87153  | 0.38809           | -2.25 | 0.026 | -1.63624             | -0.10681      |        |
| Constant                                                        | 132.19340 | 30.43319          | 4.34  | 0.000 | 72.22577             | 192.16110     |        |

### III. DISCUSSION

The study described above takes an unprecedented approach to examine the impact of NPEs on the landscape for innovators and businesses using patents and technology. We focus on the actual outcomes of litigated cases and try to distinguish differential impacts and trends between cases where patent-holders are practicing firms and cases where they are not. Our belief is that by looking at a comprehensive dataset on decisions, we can contribute systematic quantitative analysis to the debate over the effects of different NPEs. To the extent that stakeholders on both sides make passionate arguments, examining the data can add a degree of objectivity in judging which arguments are most compelling and provide empirical support the

competing positions. Moreover, we hope our work helps develop an understanding of the characteristics and economic effects of novel patent assertion practices.

Our data analysis suggests that cases involving NPE are not all that different than cases that do not involve an NPE as judged along various dimensions. Patent holder success rates are somewhat lower for NPE cases than for non-NPE cases and, controlling for other factors, the damages awarded in cases with valid and infringement patents are somewhat smaller (though not statistically significantly so). One might interpret this finding to suggest that concerns regarding NPEs are overstated – they are just not as successful in the end as other patent-holders. Or, this could provide evidence that NPEs are enforcing poorer quality patents or litigating so-called “strike suits” to threaten practicing entities and extort higher settlements. Furthermore, if NPEs are initiating more cases (which other studies have suggested) but losing more often than practicing entities, then it may be reasonable to consider the litigation costs attributable to NPEs and whether their practices are imposing an unmerited toll on practicing entities.

However, our findings also suggest that NPE cases are less likely to reach a final decision than cases filed by practicing entities. Specifically, we find that the proportion of NPE cases resulting in final decisions relative to non-NPE cases has not changed significantly over time. This finding should also be viewed in relation to other studies’ observations that filing rates of patent infringement suits have increased and a particular rise is attributable to PAEs. Taken together, these results could reflect a greater willingness on the part of PAEs to settle their patent suits relative to practicing entities. Such behavior is consistent with our understanding of PAE incentives with respect to patent suits. By definition, PAEs are not suing their competitors, and their position outside of technology industries may largely exempt them from the politics that often surrounds, and complicates, litigation between practicing entities. Rather, they are vertically separated from practicing companies and the technology embodying their patent rights. Accordingly, PAEs may have fewer reasons to bear the high costs and risks of patent litigation, and may be more likely to approach patent litigation as a means to obtain returns on their patent acquisitions. Thus, settlement may be a more rational decision for PAEs, even when they hold valid and infringed (and valuable) patent rights. This insight may have critical importance to companies facing suit by PAEs. Moreover, it casts patent assertion by PAEs in a new light, and even suggests that they might employ more efficient forms of patent enforcement than practicing companies.

We find further interesting results when subdividing the NPE patent holders into finer categories. In particular, it seems that PAEs are relatively more successful plaintiffs than other types of NPEs. Also, the trends in case decision composition and success rates have been shifting away from individuals and more toward PAEs. This may reflect the emergence of new firms that aggregate patents or otherwise replace individual patent holders as parties to lawsuits. In turn, this could provide evidence of PAEs providing remuneration to upstream inventors. More generally, it might indicate that PAEs are better at conducting patent litigation than individuals, whether due to larger resources, specialization of focus, a greater degree of separation from technology markets, or other factors. Also, there are other possible explanations for the apparent increase in PAE success rates. As PAEs develop in maturity and sophistication, and as their patent portfolios grow, they may be better positioned to prevail in infringement suits. Additional research could help explain these trends and analyze their possible implications.

Finally, we find that NPE awards are fairly uniformly dispersed across the distribution, and the percentage of NPE awards in each category does not vary significantly. This result is particularly interesting given the incentive structure of NPEs (and PAEs in particular) relative to other litigants. As discussed above, by virtue of their vertical separation from practicing technology industries, PAEs may be expected to approach patent litigation predominantly as a means to a financial end, and may be less likely to have competitive motives associated with their patent suits. On this basis, one might expect PAEs to have a greater selection bias towards higher value cases and settling out those with lower expected awards. Thus, the fact that NPE awards are uniformly distributed could suggest that, despite their incentives, they may not have sufficient information that would allow them to effectively select only high-value cases to litigate fully. To the extent this indicates an information deficit relative to other patent holders, this might also be attributable to their detachment from practicing industries; in any event, additional research is warranted to explain further.

#### IV. CONCLUSIONS

The fact that NPE awards generally, and PAE awards in particular, do not differ significantly from other awards suggests, at a more conceptual level, that modern patent assertion practices might not be fundamentally different than traditional forms of patent enforcement. This cuts to the core of the policy debate over PAEs. If PAEs are not obtaining higher awards or awards with significantly different value drivers than practicing entities, then we are not observing a different *type* of patent enforcement on their part. That is, from an awards perspective, “patent assertion” may be no different than other forms of patent litigation. If so, it follows that PAEs are not obtaining “excessive” awards (unless all patent awards are “excessive”), and moreover that PAEs are not exploiting patents illegitimately (unless all patent suits are unjustified).

These results are also important in the context of our previous findings that patent infringement awards are systematically predictable and deterministic. In prior work, we discovered a high degree of systematic predictability of patent infringement awards, and we concluded that this supports the understanding that the patent is a set of rights subsisting independently from the legal norms that define it.<sup>33</sup> Our present findings indicate that the same holds true for PAE practices. The predictability of PAE remedies, as an indistinguishable subset of other patent infringement remedies, validates at a systematic level the underlying rights so remediated.

Whether or not the modern rise of Patent Assertion Entities, and corresponding increase in patent assertion, are good or bad for technology innovation remains an open question. There is certainly friction between PAEs and practicing technology companies. But it should also be recognized that the vertical separation of patent rights from technology embodied by PAEs could have important advantages. Patent holders without industry ties have incentives to assert their rights indiscriminately and without anticompetitive motivations. Similarly, as the data suggests, they may be more likely to approach patent litigation rationally and settle when favorable royalties can be negotiated.

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These findings indicate that patent assertion practices may enjoy certain efficiencies that derive from the separation of patent rights from patented technology. Although PAEs exploit these efficiencies for private gain, this in itself does not justify policy intervention. Moreover, these advantages are not necessarily unavailable to practicing companies. Technology companies may develop novel ways to hold, license and enforce patent rights that allow them to unlock corresponding new value potential. With the evolving IP marketplace comes the innovation of new practices and new entities that redefine patent rights and the ways they are used.

In future refinement of this work, we plan to press further on the distinction between the NPE categories and connect them to both patent quality as well as litigation outcomes. Controlling for the differences between NPEs will further allow us to suggest particular policies or private strategies to react to the emergence of modern patent assertion practices and business models. We also plan to continue our focus on the structural differences between PAEs and practicing companies and further explore the incentives that motivate their respective approaches to patent litigation.

Returning to our initial impetus for study, the emergence of patent “trolls” and modern patent assertion practices have engendered significant public interest and concern. The relevant question underlying this attention is, “Do NPEs matter?” in patent litigation and technology markets. This paper finds that NPEs do matter, although perhaps not only in the ways most commonly feared. To the extent “patent assertion” represents a novel form of using patent rights, it challenges both common understanding of and traditional business practices engaging with patents and technology at large.