

## **THE DIRECT COSTS FROM NPE DISPUTES**

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## The Direct Costs from NPE Disputes

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### **Abstract:**

In the past, “non-practicing entities” (NPEs), popularly known as “patent trolls,” have helped small inventors profit from their inventions. Is this true today or, given the unprecedented levels of NPE litigation, do NPEs reduce innovation incentives? Using a survey of defendants and a database of litigation, this paper estimates the direct costs to defendants arising from NPE patent assertions. We estimate that firms accrued \$29 billion of direct costs in 2011. Moreover, although large firms accrued over half of direct costs, most of the defendants were small or medium-sized firms, indicating that NPEs are not just a problem for large firms.

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## Executive Summary

This paper analyzes the direct costs of patent assertions by “non-practicing entities” (NPEs) against operating companies using a survey of defendants and a comprehensive database of NPE lawsuits. The main findings include:

- NPE litigation is growing rapidly, affecting 5,842 defendants in 2011.
- The direct costs of NPE patent assertions are substantial, totaling about \$29 billion accrued cost in 2011, including the costs of non-litigated assertions. This figure excludes various indirect costs to the defendants’ businesses such as diversion of resources, delays in new products, and loss of market share.
- Much of this burden falls on small and medium-sized companies. The median company sued had \$10.8 million in annual revenues. 82% of the defendants had less than \$100 million in revenue and these accounted for 50% of the defenses. Small and medium-sized companies account for 37% of the accrued direct costs. Moreover, compared to revenues, the direct costs of NPE patent assertions are relatively larger for small companies.
- We find little evidence that NPEs promote invention overall. Publicly-traded NPEs cost small and medium-sized firms more money than these NPEs could possibly transfer to inventors. This reduces the net amount that firms of any size have available to invest in innovation.
- NPEs appear to be highly heterogeneous. Much of the litigation appears to consist of nuisance suits that settle for a few hundred thousand dollars. But some NPEs are “big game hunters” who seek and get settlements in the tens or hundreds of million dollars.

## Introduction

What sort of costs do Non-Practicing Entities (NPEs) impose on firms targeted for the assertion of their patents? What do target firms spend on legal services and how much do they pay for licenses? And what sort of firms do NPEs target? We present answers to these questions based on a unique survey of defendant companies and a comprehensive database of NPE litigation. The survey, which covers 82 firms who mounted 1,184 defenses against NPE litigation, is unique in three ways. First, it includes defendant companies that are privately held, including small firms. Second, it reveals information about costs associated with cases in which NPE patents are asserted but which are resolved before a lawsuit is filed. Finally, it provides aggregated information about NPE patent license fees. These kinds of information have not been available, in part, because the terms of patent licenses are often secret, and in part because previous surveys have simply not asked about assertions that did not advance to the filing of lawsuits. The costs disclosed by this survey are significant and should play a prominent role in policy debates about the treatment of NPE patent lawsuits.

NPEs are individuals and firms who own patents but do not directly use their patented technology to produce goods or services, instead they assert them against companies that do produce goods and services. In the past, some NPEs have played a valuable role in bringing innovations from small inventors to market. Some inventors lack the resources and expertise needed to successfully license their technologies or, if necessary, to enforce their patents. NPEs provide a way for these inventors to earn rents that they might not otherwise realize, thus providing them with greater incentives to innovate. But in

the past, also, some NPEs have used patents opportunistically. During the late nineteenth century, “patent sharks” were widely seen as extracting money from innocent individual farmers and railroad companies (Magliocca 2007).

However, while NPEs have been around for a long time, over the last few years, NPE litigation has reached a wholly unprecedented scale and scope (Patent Freedom, 2012; RPX, 2012). In 2011, 2,150 unique companies were forced to mount 5,842 defenses in lawsuits initiated by the actions of NPEs.<sup>1</sup> Moreover, the number of defenses has been growing rapidly (see Figure 1). Part of this growth has been fueled by new sources of funding and new business models.

The costs born by defendants in these assertions are key to evaluating the private and social impact of this new phenomenon. In previous research with co-author Jennifer Ford (Bessen et al. 2011), we have estimated the total costs of NPE litigation for publicly listed firms using stock market event studies. This study complements our earlier study by obtaining estimates of the direct cost portion of total costs using data from a survey of defendants.<sup>2</sup> Direct costs include the cost of outside legal services, licenses fees, and other direct costs incurred in response to NPE litigation risk.<sup>3</sup>

This study also complements our earlier study by providing information on companies that are not publicly listed, including small companies. This information helps

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<sup>1</sup> These figures come from the RPX database described below. About 4% of these defenses were mounted as declaratory actions rather than infringement suits; these were nevertheless initiated by the NPEs. The figure for 2011 reflects, to some extent, an effort by NPEs to initiate litigation before the America Invents Act took effect, restricting multi-party lawsuits. Nevertheless, the trend shown in Figure 1 illustrates rapid growth before 2011.

<sup>2</sup> The survey was conducted by RPX, a firm that helps companies manage risk from exposure to patent litigation. The Coalition for Patent Fairness reimbursed RPX for part of the expense of conducting this survey.

<sup>3</sup> Indirect costs captured by our event study methodology include the opportunity costs of the effort exerted legal, managerial, engineering, and scientific personnel inside the firm, and other business disruption costs such as loss of goodwill, loss of market share, or disruption of innovative activities.

reveal the extent to which NPEs help small firms realize profits from their innovations and the extent to which small firms, to the contrary, incur costs as the targets of NPEs.

## **Literature Review**

Large scale NPE patent litigation is a recent development, thus the empirical literature is thin. Our NPE lawsuit event study is the most closely related piece of earlier research; in it we found that the annual wealth lost from NPE lawsuits was about \$80 billion for publicly traded U.S. firms (Bessen et al. 2011). In theory, this cost could be composed mostly of transfers in the form of royalty payments to NPEs. Indeed, a number of papers argue that NPEs play a socially valuable role by enabling small inventors to realize greater profits from their inventions (Hosie 2008, McDonough 2006, Shrestha 2010, Myhrvold 2010, Morgan 2008). These papers, however, do not provide empirical evidence to support that assertion.

Our 2011 paper rejected that possibility based on the evidence available to us; we concluded that much of the cost borne by technology companies as they defend against NPE lawsuits is a social loss and not a mere transfer. The survey results we describe below provide strong additional support for our view that much of cost imposed on defendants is a social loss. In particular, the current study finds that NPEs impose costs not only on large technology companies, but also on very many small and medium firms, making it even less likely that innovative start-ups are net beneficiaries of NPE activity.

One other researcher has quantified the costs to defendants from NPE litigation. Catherine Tucker examines the effect of a lawsuit by an NPE (Acacia) against several firms that make medical imaging software. She compares the impact of the lawsuit on sales of both medical imaging and text-based medical software produced by the targeted firms. She

also compares the sales by the targeted firms to the sales of medical imaging software made by other firms in the industry who were not targeted with a lawsuit. She finds that sales of medical imaging software declined by one-third for targeted firms. She attributes the sales decline to a “lack of incremental product innovation during the period of litigation,” and she conjectures that incremental innovation was deterred by concerns it would create additional risks in the on-going litigation. (Tucker 2011).

Two other strands of previous research are especially relevant to this project. First, earlier work has quantified legal fees associated with patent litigation. We collected data about legal fees that were made public in court decisions concerning fee-shifting in patent cases (Bessen and Meurer 2012). Also, the American Intellectual Property Law Association conducts a biannual survey of its members and includes questions about fees in patent lawsuits (AIPLA 2011). The sources are helpful and we report some of their findings below, but they do not contain information about NPE litigation in particular, and they do not contain information about assertions that never reach the filing of a lawsuit.

A better-developed strand of literature reports various characteristics of NPE litigation.<sup>4</sup> While not measuring costs, these studies do shed light on the question of whether the private losses to firms targeted by NPE patent assertions also tend to be social losses. The answer appears to be yes. NPE patent litigation has all the hallmarks of patent notice failure that distorts the patent system and makes it impede technological progress. In *Patent Failure* (Bessen and Meurer 2008) we show that the U.S. patent system works well for chemical and pharmaceutical inventions because the system provides clear notice to the world of the scope and existence of patent-based property rights. For most other inventions,

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<sup>4</sup> This includes Allison et al. (2010), Chien (2009), Love (2010), Risch (2012), Schwartz (2012), and Tucker (2012). Other studies have looked at the characteristics of NPE patents asserted in lawsuits, including Shrestha (2010), Allison et al. (2009), Risch (2012), and Fischer and Henkel (2011).

especially software and business methods, notice failure means that innovative firms are targeted in patent infringement suits through no fault of their own.

Notice failure is likely for NPE lawsuits. Sixty-two percent of the time they feature software patents (Bessen et al. 2011) which are notoriously difficult to interpret. Allison et al. (2010) study patents litigated multiple times and usually asserted by NPEs; they find that software patents account for 94% of such lawsuits. The patents asserted in NPE lawsuits are often subject to lengthy prosecutions which delays public access to information about patent claims (Allison et al., 2009, Love 2010, Risch 2012). Rather than transferring technology and aiding R&D it appears that NPEs usually arrive on the scene after the targeted innovator has already commercialized some new technology (FTC 2011).

## **Data**

### **Survey**

Between February and April 2012, RPX invited about 250 companies to participate in a survey of their NPE-related costs. The pool of invitees included RPX clients and non-client companies with whom RPX has relationships. Most invitees were technology companies, but certain non-technology companies with NPE exposure were also invited (for example retailers with e-commerce exposure). Participants provided information to the extent that doing so was consistent with their obligations to third parties. The information was aggregated and anonymized such that individual data was not disclosed.<sup>5</sup>

Participants filled out a standardized Excel template that included a range of questions about their NPE-related costs. The instructions for the template asked that participants include certain statistics estimating all of their direct (external spend) NPE-

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<sup>5</sup> Although RPX provided data for this study, RPX did not exercise control over the substance of our text.



related costs from 2005-2011. An NPE was defined to include patent assertion entities, individual inventors, universities, and non-competing entities (operating companies asserting patents well outside the area in which they make products and compete). This is the same definition of NPE used on the NPE Lawsuit Database (see below). A list of each participant's NPE litigations from that database was provided to ensure alignment between the survey response and database. Templates were submitted by email or directly into a secure online data room. To the extent possible, an RPX study team reviewed the submission for quality and completeness. If needed, the company was asked certain follow-up questions. Finally, RPX aggregated the submitted data within a secure computing environment. The resulting dataset forms the basis of the data tables provided in this document.

Of the 250 companies invited to participate, 82 provided data on lawsuits and of these, 46 also provided data on non-litigation patent assertions and related costs.

### **NPE Lawsuit Database**

In addition to the survey, we also used a comprehensive database of NPE litigation developed by RPX. These NPE litigation statistics are based on cases coded "830 Patent" in the PACER database which is maintained by the Administrative Office of the U.S. Courts.<sup>6</sup> In case counts, RPX excludes misfiles, non-patent, false marking and other non-core patent infringement cases. When a case is transferred, RPX counts it as one case and allocates it to the venue to which it was transferred. When several cases are consolidated into one, RPX counts it as one case but with multiple defendants. When a case is severed RPX counts it as separate cases. In defendant counts, RPX rolls up operating company subsidiaries into a

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<sup>6</sup> This database does not include patent disputes before the International Trade Commission.

parent entity (Samsung Group and Samsung Electronics count as one defendant).

Declaratory actions are included in case counts unless otherwise noted.

RPX defines NPEs as discussed above and identifies NPEs through a manual review process. In this review process, RPX reads patent complaints found in PACER and checks information in the complaint against its NPE database. RPX also checks its database of plaintiff counsel, searches public filings and performs web research. Some of the factors they consider when determining whether a company is an NPE (or more specifically a patent assertion entity “PAE”) include: Is the entity the same as or share a substantial financial link with a known PAE? Is there any evidence that the company sells a product or offers a service? Does the entity webpage prominently mention technology, licensing, and patents; and not offer a product or sales? Does the complaint indicate whether the entity has a product in-market or in-development that is being harmed by infringement? Are the lawyers involved known to specialize in representing NPEs? Is this entity known as an NPE or as an established operating company?<sup>7</sup>

### **Sample characteristics**

Table 1 compares characteristics of the survey sample with RPX’s database of NPE lawsuit defenses. Data for the survey are on the left while data for the entire database of NPE defenses are on the right. The 82 surveyed companies collectively mounted 1,184 defenses in NPE lawsuits beginning between 2005 and 2011. Of these, 784, or 66%, were resolved by adjudication or settlement and did not involve indemnification or other factors that cause costs to be atypical.

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<sup>7</sup> There are a range of views among scholars and policy-makers about the appropriate definition of NPE, and different analysts are likely to assemble different NPE litigation databases. Based on our experience researching patent litigation, we believe that the RPX database yields statistics that are consistent with information about NPE patent litigation from other sources.

Note that a possible truncation bias arises because so many lawsuits were unresolved at the time of the survey. Because lengthier disputes tend to be more costly, at least as far as legal costs are concerned (Kesan and Ball 2005), and because the number of lawsuit filings has risen sharply in recent years, cost estimates based only on resolved lawsuits might be understated.

We divided the companies into sub-categories based on their revenue in the most recent year reported. We categorize companies as small, medium or large depending on whether reported revenue for the most recent year is less than \$100 million, between \$100 million and \$1 billion, or above \$1 billion. The \$100 million revenue cutoff for small companies corresponds roughly to 500 employees, which is the cutoff used by the US Patent and Trademark Office and other government bodies to categorize small companies. While we have revenue data on all of the companies in the survey sample, the RPX database reports company revenue for only 74% of the defenses. These data come from public reports and from Dun and Bradstreet, which estimates revenues for private companies. It is thus likely that almost all of the companies without reported revenue are small companies. In much of the analysis below, we explicitly assume this to be the case. This assumption is conservative in that it results in a lower estimate of aggregate costs of litigation.

We also divided companies into two broad industry sectors depending on whether they were in the broad software industry, including e-commerce and finance, or instead in a hardware industry (everything else).<sup>8</sup> The latter distinction might be significant because most

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<sup>8</sup> To preserve data confidentiality, statistical analysis was performed by RPX personnel working under our direction.

hardware industries involve greater sunk capital costs than do software industries or finance and for this reason hardware industries may be more at risk of hold up.<sup>9</sup>

The right panel shows that small and medium firms dominate the universe of NPE defendants. Small and medium-sized companies make up 90% of the defendant firms, mounting 59% of the defenses. Firms making less than \$100 million in revenue account for 82% of the defendants and 50% of the defenses, assuming that firms with unreported revenue are small.<sup>10</sup> The median revenue of a defendant company reporting revenue is \$10.8 million.

As the Table shows, our survey sample consists of companies that are larger, more likely to be public and which experience relatively more lawsuits than the average NPE defendant firm. In the rows that control for size and industry sector, survey firms appear to experience about twice as many lawsuits as companies in the comprehensive database. This is not surprising, however, it raises the possibility that our sample might be unrepresentative of the broader population, possibly experiencing costs that are greater or smaller than those of the universe of sued companies. Below we do a check on legal costs to test whether the survey appears to have unrepresentative costs.

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<sup>9</sup> Readers should be mindful of the distinction between the industry of the defendant and the technology covered by the patent asserted by the NPE. In particular, it is important to recognize that problematic software patents are often asserted against hardware manufacturers.

<sup>10</sup> If, instead, we look only at firms with reported revenue, 66% are small, accounting for 33% of the defenses.

## Findings

### Mean and median costs

Table 2 provides estimates of mean legal<sup>11</sup> costs, licensing costs and total costs (the sum of these) with standard errors in parentheses. The table also shows median costs.

Median total costs per litigation defense fall roughly around half a million dollars, smaller for small and medium firms, larger for big ones. However, mean total costs are *much* higher, nearly eight million dollars for our survey sample. This difference implies that the distribution of costs is highly skewed, as we explore below. Thus one must be particularly careful in extending judgments about the costs of litigation based on small samples. While “typical” costs might only be a few hundred thousand dollars, mean costs—reflecting the large costs in a small number of very costly lawsuits—are an order of magnitude higher.

Mean total costs are, not surprisingly, significantly greater for large companies than small and medium companies. This difference is significant at the 1% level.

The first column reports the legal component of costs. Mean legal costs per defense range from \$420,000 for small/medium companies to \$1.52 million for large companies.

Column 2 of Table 2 reports the dollar amounts paid to the plaintiff to settle the case.<sup>12</sup> Column 3 reports the total costs, the sum of legal and settlement costs. The mean settlement costs for small/medium companies are \$1.33 million and for large companies,

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<sup>11</sup> In the survey estimated legal costs for a particular case were specified as: “Value of any legal costs related to this matter through December 31, 2011. Include outside counsel (lead and local), experts, discovery costs, prior art searching, jury consultants, graphics, other expenses, and other related costs. Include any costs that were ultimately recouped or expected to be recouped by indemnification agreements or other mechanisms. Exclude in-house legal costs.”

<sup>12</sup> In the survey estimated settlement costs for a particular case were specified as: “Value of settlement. If a running royalty, estimate the present value of royalties. If there was an exchange of patents or other non-standard deal structure then estimate expected present value cost of that deal.” Settlement costs include damage awards in a small number of cases.

\$7.27 million. Mean total litigation costs are \$1.75 million for small/medium companies and \$8.79 million for large companies.

Legal costs are about a third as large as settlement costs, or about one quarter of total litigation costs (slightly larger for small/medium companies).<sup>13</sup> This implies that a substantial part of direct costs of NPE litigation is a deadweight loss to society.<sup>14</sup> For the median case, legal costs are roughly equal to settlement costs.

Also note that NPE litigation is relatively more costly to smaller companies. In our sample, the large company litigation costs were five times as high as small/medium company litigation costs. But (see Table 1) the mean revenue of large companies in our sample is nearly seven times the mean revenue of the small and medium companies. This means that, roughly speaking, smaller companies pay more in direct NPE litigation costs relative to their size.

Hardware firms have higher costs than software firms. This difference is significant at the 5% level. Since hardware firms generally have greater sunk costs than software firms, this difference is consistent with the interpretation that hardware firms are more easily subject to holdup and hence they have to pay more to settle litigation.

### **Comparison to other studies**

As noted above, the survey sample was not randomly selected and hence it could be unrepresentative. In particular, it might be that survey respondents tended to be firms with higher than average litigation costs.

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<sup>13</sup> Weighting the ratios in Table 2 to represent the relative weights of small and large companies in the total database, legal costs are 23% of the total and licensing costs are 77%.

<sup>14</sup> The indirect costs of NPE lawsuits, such as those measured by Tucker (2011) and Bessen et al. (2011) are likely to be a more significant source of deadweight loss.

We can check the representativeness of our sample by comparing our findings to other empirical evidence. In particular, legal costs can be compared to estimates derived from two other sources. First, AIPLA conducts a bi-annual survey of its members who estimate typical legal costs through discovery and through trial. They report these estimates for three categories of patent lawsuits depending on the amount at issue in the controversy, specifically, whether the amount at issue is less than \$1 million, between \$1 million and \$25 million, and greater than \$25 million. The first and third categories provide the ranges shown in the addendum to Table 2.<sup>15</sup> Few patent lawsuits go to trial (Kesan and Ball 2005), so the figure for costs through discovery is probably closer to the mean cost for patent litigation. On this basis, the AIPLA cost estimates are comparable or even higher than the mean cost estimates from our survey.

We also compared the survey means to means from 137 cases where one party in a lawsuit had been required to pay the others' legal fees. These were for cases between 1985 and 2004 (Bessen and Meurer 2012). Converted into 2011 dollars, the cost for lawsuits that ended in summary judgments was \$840,000; the cost for those that ended in a trial verdict was \$3.64 million. Since most lawsuits are not settled by an initial summary judgment but are settled before trial, mean legal costs should fall between these figures. Again, the survey estimates seem broadly comparable. This suggests that our survey sample is not unrepresentative.

It is possible, of course, that our survey might report representative legal costs but unrepresentative licensing costs. This might happen, for instance, if our survey over-represented hardware companies who tend to have relatively higher licensing costs. However, Table 1 suggests that the share of hardware firms in the survey roughly matches

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<sup>15</sup> For the middle range, the estimated costs are \$1.6 million through discovery and \$2.8 through trial.

the share in the universe of NPE defendants found in the database. Generally speaking, firms with higher licensing costs will tend to have higher legal costs, all else equal. This is because firms facing a large payout can typically reduce the payout or the likelihood of having to pay damages in trial by mounting a more aggressive (and more expensive) legal defense. That said, we cannot be certain that our estimates are representative, nevertheless, the representativeness of our legal cost estimates provides some comfort that licensing cost estimates are not too far off.

### **The distribution of litigation costs**

Sample means do not capture the distribution of costs. In fact, litigation costs are highly heterogeneous. Figure 2 shows cumulative distribution plots of total litigation costs for the small/medium and large companies in our sample. The smooth curves represent lognormal distribution functions fitted to the data.

As can be seen, the distribution is highly skewed. The median total litigation cost for small/medium companies is \$318,000 and for large companies it is \$646,000. A large fraction of lawsuits cost less than \$200,000. But a small number of lawsuits cost much, much more. For large companies, 5% of the lawsuits cost more than \$22 million.

This heterogeneity likely arises in part from variation in NPE tactics. Schwartz (2012) reports that some NPEs pursue nuisance suits in which they sue many companies, big and small. Plaintiffs using this tactic are willing to settle for small payments, often no more than the amount a defendant would spend on legal fees to defend the case. As one such plaintiff lawyer put it, “An NPE intuitively understands that we could go for triples or home runs, but we can also go for singles and get a good return and work on other things (Schwartz 2012).” Alternatively, NPEs may act like big game hunters, targeting only one or a few firms, but hoping to win tens of millions of dollars. The lawsuit by NTP against BlackBerry maker



RIM is a good example. NTP asserted patents of doubtful validity but managed to win at trial and obtain a settlement of \$612.5 million from RIM (Bessen and Meurer, 2006). The survey data does not permit us to clearly identify NPE tactics, but it does suggest that NPE activity is not uniform.

While there are far fewer suits initiated by “big game hunters,” they represent a disproportionate share of the cost. The distribution of costs is such that the top 5% of defenses for large companies account for about two thirds of the total cost of defense for large companies.

### **Costs from cases settled without litigation**

Many NPE patent assertions are settled without a lawsuit being filed. To gather information on non-litigated assertions, the survey also asked a series of questions regarding these. Rather than count assertions, the survey asked respondents to report cumulative costs. Most reported costs for the period from 2005 – 2011, but some did not have data for the entire period. Moreover, only 46 of the companies completed this section of the survey.

The costs of assertions settled without litigation consist mainly of legal fees and settlement costs paid to patent holders. They also include smaller amounts spent on NPE-specific patent buying programs (including RPX services), on NPE-specific clearance searches and on re-examinations of NPE patents.

The means of these components are reported in Table 3 along with the cumulative litigation costs incurred by these same companies. For the sample as a whole, NPE costs from cases without litigation were about half of the comparable costs of litigated cases. For small/medium companies, in particular, however, costs of non-litigated cases exceeded litigation costs. This might be because smaller firms lack internal legal resources, making it relatively more expensive for them to pursue litigation. Also, costs of non-litigated cases

were higher relative to litigation costs for hardware firms, perhaps again because hardware firms, being more at risk of hold up, find it less costly to settle sooner. This difference is not, however, statistically significant.

In any case, it is clear that non-litigated patent assertions are responsible for much of the direct costs imposed by NPEs on operating companies. In this regard, it is likely that our sample under-represents these costs because we have only surveyed companies that have been involved in litigation. That is, we have not included potentially large numbers of small companies that have only settled NPE patent assertions and have not gone to court. Anecdotal evidence from small companies suggests that there might be very many such firms and their costs are missing from our analysis.

## **Aggregate Costs of NPE Assertions**

### **Aggregation**

What is the aggregate cost of NPE patent assertions, including both litigated and non-litigated assertions? To estimate this, we began by estimating the mean cost of resolved litigation for small/medium firms and for large firms. We could have directly used the data in Table 2, however, this might overstate costs because the average small/medium firm in our survey sample is larger than the average small/medium firm in the entire database (see Table 1).<sup>16</sup> To correct for this within-category variation, we regressed log cost against log revenue for the survey sample and, using this, computed the predicted mean cost over the actual distribution in the database for each size category.<sup>17</sup> In using these means, we assume

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<sup>16</sup> In fact, we calculated aggregate costs using the data in Table 2, including the software/hardware categories. These estimates came out about 5-10% higher than those reported in Table 4.

<sup>17</sup> Regressions are reported in the Appendix. We used a regression that also included a dummy variable for firms with less than \$100 million in revenue in order to capture a non-linearity in the relationship between log cost and log revenue. The predicted mean cost per litigation was \$1.527 million for small/medium firms and

that the lawsuits in each category in the database will on average accrue costs equal to these respective mean values. That is, for lawsuits where the defendant was indemnified by a third party, we assume that some party will pay an amount equal to the mean cost for defendants in that category, even if the defendant firm itself does not necessarily pay this amount. Also, we assume that lawsuits that are still underway will eventually accrue costs equal to these means, even if the current out-of-pocket costs are not yet equal to this accrued cost.

To adjust these figures to account for assertions that are settled without litigation, for each category we divided the total cost of non-litigated cases by the total number of lawsuits filed, including lawsuits that were still active. This gave us a pro-rated cost of non-litigated cases per lawsuit filed. We added this to the mean litigation cost for each category to give a total cost of NPE assertions per lawsuit filed.<sup>18</sup>

The second part of this exercise consisted of breaking the cases in the RPX NPE database into the two size categories. Where revenue was reported (about 74% of the database), we allotted the defenses to small and large cells depending on whether the revenue was smaller than or larger than \$1 billion.<sup>19</sup> We conservatively assigned those companies without reported revenue to the “small” cells.

### **Year-by-year accrued costs**

The left portion of Table 4 reports the number of defenses reported in the NPE database by year for each size category. The right portion shows the aggregate cost of NPE assertions per year calculated by multiplying the number of defenses reported on the left by the prorated total cost of defense per cell (where the cost of defense includes license cost).

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\$5.641 million for large firms. We also ran regressions using hardware/software dummy variables, however, the coefficients on these dummies were not statistically significant.

<sup>18</sup> These are \$3.17 million for small/medium firms and \$7.59 million for large firms.

<sup>19</sup> RPX gathered revenue data from financial statements of publicly listed firms as well as estimates based on information such as number of employees available for private firms. Revenues were not reported when a private firm could not be definitely identified in their data sources.

The final column reports the aggregate cost, summing over both categories for each year. Aggregate direct costs of NPE patent assertions grew rapidly from about \$7 billion in 2005 to \$29 billion in 2011.<sup>20</sup>

It is important to note that these totals represent *accrued* costs, not necessarily the immediate out-of-pocket cost. That is, we accrue the projected cost of a lawsuit in the year in which the suit was filed, even though the lawsuit might not be resolved. This is important because about half of the lawsuits filed in 2011 were not resolved at the time of our survey. The implication is that substantial sums will be flowing to NPEs over the next several years from lawsuits already filed. Because the number of NPE lawsuits has been growing so rapidly, the current revenues of NPEs likely understate the total costs of lawsuits already filed.<sup>21</sup>

Moreover, the effect of these assertions does not just fall on a small number of large companies. Some NPE advocates have argued that NPE litigation is largely a matter of lawsuits against a small number of large “serial infringers.” These data show, to the contrary, that about 59% of the litigation events are directed to small and medium-sized companies and about 37% of the aggregate cost falls on small and medium-sized companies. Moreover, this share is likely understated because, as discussed above, this analysis does not include those companies that have only had NPE assertions that did not go to court.

Finally, these tabulations do not include the indirect effects of NPE assertions on the business of defendants. Case study evidence suggests that there are significant indirect costs of NPE patent assertions (Tucker 2011). These include diversion of management or

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<sup>20</sup> As a point of comparison, Polinsky and Shavell calculate “the litigation costs associated with the U.S. tort system are approximately \$46 billion per year.”

<sup>21</sup> We also caution readers not to rely on intuition based on the median cost of defending against NPE patent assertions. Median cases are “typical” but of course it would not be correct to multiply the median cost by the number of assertions to calculate aggregate costs numbers.

engineering resources, delays in new product introductions and improvements, loss or delay of revenue, and credit constraints. Bessen et al. (2011) estimate the total business costs of NPE litigation for public firms using stock market event studies. Although the samples and methods are not directly comparable, they find an aggregate loss of stock market capitalization of around \$80 billion per year during recent years, corresponding to an aggregate cost in operational funds to the firms of about half that amount. This suggests loosely that total business costs of NPE assertions might be at least twice as large as the figures reported in Table 4.

### **Benefits to innovators**

It is sometimes argued that NPEs facilitate innovation by providing incentives to small inventors who would not otherwise be able to license their patents. In this view, “NPEs create patent markets, and that those markets enhance investment in start-up companies by providing additional liquidity options. NPEs help businesses crushed by larger competitors who infringe valid patents with impunity. (Risch 2012)”

Michael Risch (2012) looks at the original assignees of patents used in NPE lawsuits and finds that the David vs. Goliath narrative is not representative. Few of the patents in his sample came from venture capital financed startup firms. Although 29% of the patents in his sample were originally filed by individual inventors, 43% were from large companies. The median revenue of a company filing an NPE patent in his sample is \$6.3 million. Given that the median revenue of a company in the RPX database of firms sued by NPEs is \$10.8 million, it appears that the typical firm sued by an NPE is roughly the same size as the typical firm benefiting from NPE activity.

How much of the costs accrued by defendants actually flow to inventors? We can gain some indication of this by looking at the expenditures of publicly listed NPE firms.

Table 5 reports cumulative figures in 2011 dollars for 12 NPE firms that were active from 2005 – 2011.<sup>22</sup> During this period, these firms cumulatively earned \$5.8 billion in revenues. If we assume that these revenues consisted entirely of licensing royalties from resolved patent assertions and we assume that defendants in these cases also incurred legal costs in the same ratio as those reported in Table 2, then these NPEs were responsible for \$10 billion in direct accrued costs to defendants from 2005 – 2011, about 10% of the totals reported in Table 4.<sup>23</sup>

Looking at the financial statements of these NPE companies, we find that the cumulative net increase in intangible assets—acquisitions of patents from small inventors would be included in this accounting category along with acquisitions of other intangible assets—amount to \$679 million, or about 7% of the direct costs to defendants. Two of the publicly listed NPE firms also perform their own R&D. That amounts to about 14% of the direct costs to defendants. These two categories might overlap somewhat if R&D generates intangible assets. Nevertheless, these figures indicate that for publicly listed NPE firms, no more than a quarter of the direct spending by defendants flows to innovative activity.

Based on these figures, it seems difficult to make a convincing argument that the effect of NPEs is to increase innovation incentives. First, previous research has shown that the defendants in these lawsuits are largely tech companies that invest heavily in R&D (Bessen et al. 2011, Chien 2009). This estimate suggests that their losses are much larger than the possible flows to small inventors, especially if one adds indirect costs of NPE litigation to the direct costs reported in Table 5. Effectively, what defendants pay in costs as a result of

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<sup>22</sup> Not all of these firms were publicly listed all years. Note that we perform a similar exercise in Bessen et al. (2011).

<sup>23</sup> To calculate accrued costs from lawsuits already filed, we divide revenue by .75. That is, since 75% of lawsuits in the total database are unresolved (Table 1), we assume that these NPE firms have so far received only 75% of the revenue they will receive from the lawsuits already filed.

NPE litigation reduces their own R&D budgets. This is because companies become targets for litigation mainly when they introduce innovative products.<sup>24</sup> Hence R&D managers must anticipate NPE costs as part of the cost of innovating. Small inventors would have to be an order of magnitude more innovative per dollar of R&D than the defendant companies, in order for the net effect of NPE activity on innovation to be positive.

Second, to the extent that small inventors are important for innovation, NPE patent assertions hurt small inventors in at least two ways. As we have seen, the majority of defendants in NPE lawsuits are small/medium companies and these companies accrue larger costs relative to their size. Small/medium firms accrue 37% of the costs, but small inventors receive at most 21% of NPE costs. Also, these costs make things more difficult for small inventors who wish to license their technology—not just their patents—to other firms. If the prospective licensees expect NPE-related costs, they will be less willing to license from small inventors or they will not be willing to pay as much.

Third, the incentives provided to patent holders by the current crop of NPEs may be the wrong kind of incentives. NPE activity may skew the research agenda of small firms away from disruptive technologies and toward mainstream technology and associated patents that can be asserted against big incumbents. Even worse, small firms are encouraged to divert investment from genuine invention toward simply obtaining broad and vague patents that might one day lead to a credible, if weak, lawsuit.

## **Policy implications**

The rapid growth and high cost of NPE litigation documented here should set off an alarm warning policy makers that the patent system still needs significant reform to make it a truly effective system for promoting innovation. The heterogeneous nature of NPEs –

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<sup>24</sup> Bessen and Meurer (2012) find that the hazard of being sued increases with firm R&D.

ranging from universities, to patent brokers, to trolls<sup>25</sup> – suggests that policy reform should address troll-like behavior rather than merely status as an NPE (Geradin et al., 2008; Merges, 2011).

The top priority is reform of the patent system to improve notice; this kind of reform will make the patent system perform more like an idealized property system (Bessen and Meurer, 2008; FTC, 2011). More rigorous enforcement of the claim definiteness standard would be an excellent step forward. Likewise, we favor rigorous implementation of recent Supreme Court decisions restricting the patentability of business methods and other abstract processes that are difficult to propertize. It is also crucial to provide greater transparency in the patent system. Feldman and Ewing (2012) document the remarkable opaqueness of Intellectual Ventures in connection to its patent ownership and patent assertion. Finally, courts should rigorously supervise patent damages awards to make sure that damages are proportionate to the value of the patented technology (Lemley and Shapiro, 2007). These reforms should not harm genuine inventors who crave publicity rather than secrecy, and who should still be able to obtain broad, but clear patent protection.

It is also instructive to look for policy reforms suggested by the law and economics analysis of the generic problem of frivolous lawsuits. One promising policy reform is greater use of fee-shifting to favor defendants in cases brought by trolls. Allison et al. (2010) find that troll patents fare poorly in court. The bargaining power of a troll seeking a nuisance settlement would be great diminished in an aggressive fee-shifting regime. Similarly, more

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<sup>25</sup> “To some the use of the troll “moniker might be considered derogatory, [but] recently, in *Highland Plastics, Inc. v. Sorensen Research and Development Trust*, 11-cv-2246 (C.D.Ca. Aug. 17, 2011), the court denied a motion to strike the term “patent troll” from the complaint, stating that patent troll “is a term commonly used and understood in patent litigation and is not so pejorative as to make its use improper.” *Id.*, Dn. 21 at 3.” Ralph Dengler, [Is It Open Season Now for NPEs?](http://www.iplawalert.com/2011/10/articles/patent-1/is-it-open-season-now-for-npes/) IPLaw Alert, Oct. 31, 2011, available at: <http://www.iplawalert.com/2011/10/articles/patent-1/is-it-open-season-now-for-npes/>



stringent pleading requirements have been justified in other areas of the law as a method of reducing frivolous lawsuits; this strategy might also work for patent litigation (Blaze, 1990).

## **Conclusion**

Using these survey data and the associated database of NPE litigation our major findings are these:

- The direct costs of NPE patent assertions are substantial, totaling about \$29 billion accrued in 2011. This figure does not include indirect costs to the defendant's business such as diversion of resources, delays in new products, and loss of market share. Even so, the direct costs are large relative to total business spending on R&D, which totaled \$247 billion in 2009 (NSF 2012), implying that NPE patent assertions effectively impose a significant tax on investment in innovation.
- Much of this burden falls on small and medium-sized companies who make up 90% of the companies sued, accounting for 59% of the defenses, and who pay about 37% of the direct costs. The median revenue of companies sued by NPEs is \$10.8 million. NPE litigation costs smaller companies more relative to their revenues. In addition, smaller companies pay relatively more to NPEs from assertions that do not go to court. The burden of all of these costs appears to rebut the assertions that NPEs play an important role in improving the profits of innovative start-ups.
- About a third of the cost to defendants involves patent assertions that do not go to court. Moreover, we have likely underestimated these costs because we

have not surveyed small companies that do not also have NPE patent litigation.

- NPEs appear to be highly heterogeneous. Much of the litigation appears to consist of nuisance suits that settle for a few hundred thousand dollars. But some NPEs are “big game hunters” who seek and get settlements in the tens or hundreds of million dollars.
- Much of the cost to defendants implies a net loss of social welfare. About one quarter of the cost of NPE litigation consists of legal fees. Of the total direct cost, no more than a quarter could possibly represent a flow to fund innovative activity.

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## Tables and Figures

Table 1. Summary Statistics of Sample

	Sample				All NPE lawsuits			
	Companies	Lawsuit defenses	Lawsuits / company	Mean Revenue (\$million)	Companies	Lawsuit defenses	Lawsuits / company	Mean Revenue (\$million)
Number	82	1,184	14.4	\$12,474.7	9,385	20,565	2.2	\$3,243.3
Resolved lawsuits		784				15,486		
Percent resolved		66%				75%		
Company size	Share	Share			Share	Share		
Small/medium	44%	13%	2.7	\$297.1	90%	59%	1.4	\$82.6
Large	56%	88%	14.9	\$22,005.0	10%	41%	9.0	\$16,666.4
Company industry								
Software	37%	26%	6.7	\$7,103.1	22%	31%	3.1	\$3,654.8
Hardware	63%	74%	11.2	\$15,573.7	78%	69%	1.9	\$3,087.2
Public company	72%				14%			

Notes: For 2005 – 2011. The left panel describes the sample used for this study. The right panel reports summary statistics from RPX’s database of all NPE lawsuits. In the sample, all companies report revenue. In the RPX database, only 74% of companies have reported revenue; we assume that companies without reported revenue are small/medium sized. The resolved lawsuits have been terminated due to settlement or adjudication. The number of resolved suits excludes those that were simple transfers, had zero litigation costs (e.g., for incorrect defendants), where the company was substantially indemnified, or where the costs born by the company do not reflect the total direct costs of litigation for other reasons. Revenues are for the most recent year. Small/medium companies are those with revenues less than or equal to \$1 billion; large company revenues exceed this amount. Companies identified as “software” include companies whose main product is software, e-commerce, finance, or undefined. “Hardware” includes everything else.

Table 2. Mean Litigation Costs per defense in million dollars

	Direct legal costs		Licensing costs		Total cost	
	Mean	Median	Mean	Median	Mean	Median
All	1.38 (0.26)	0.20	6.53 (1.76)	0.22	7.91 (1.86)	0.56
<u>Company size</u>						
Small/medium	0.42 (0.12)	0.07	1.33 (0.42)	0.18	1.75 (0.49)	0.32
Large	1.52 (0.30)	0.23	7.27 (2.01)	0.23	8.79 (2.13)	0.65
<u>Industry</u>						
Software	1.50 (0.41)	0.17	1.82 (0.45)	0.30	3.32 (0.81)	0.55
Hardware	1.33 (0.33)	0.21	8.14 (2.35)	0.18	9.48 (2.48)	0.59

**Addendum on legal costs**

AIPLA survey (2011)

Cost through discovery 0.49 – 3.60

Cost through trial 0.92 – 6.00

Fee shift cases (Bessen and Meurer 2012)

Summary judgments 0.84

Trial 3.64

Note: Standard errors in parentheses. The total number of cases is 666; sub-category shares are listed in Table 1. Fee shift data have been deflated to 2011 dollars.

Table 3. Costs for cases settled without litigation  
(per company in million dollars)

	Mean cost by type			Total Cost per company, non-litigated cases	Comparable Litigation Cost per company
	Legal	Licensing	Other	Mean	Mean
All	0.50	24.59	4.66	29.75 (13.89)	58.38 (19.18)
<u>Company size</u>					
Small/medium	0.05	7.85	0.23	8.14 (7.68)	7.06 (3.15)
Large	0.77	34.40	7.25	42.43 (21.22)	88.47 (28.95)
<u>Industry</u>					
Software	0.38	11.83	4.14	16.35 (9.14)	38.34 (20.74)
Hardware	0.56	30.76	4.91	36.24 (20.03)	68.08 (26.46)

Note: Standard errors in parentheses. Results are for a sub-sample of 46 companies that reported full litigation and non-litigation costs. Figures are totals over 2005-11 per company, although not all companies reported all years.

Table 4. Aggregate Accrued Direct Costs of NPEs by Year

Year	Number of Defenses		Aggregate Direct Accrued Costs (millions)		
	Small/medium	Large	Small/medium	Large	TOTAL
2005	919	482	\$2,916	\$3,657	\$6,574
2006	899	530	\$2,853	\$4,021	\$6,874
2007	1,238	976	\$3,929	\$7,406	\$11,334
2008	1,571	1,004	\$4,985	\$7,618	\$12,603
2009	1,461	1,198	\$4,636	\$9,090	\$13,726
2010	2,588	1,857	\$8,213	\$14,090	\$22,303
2011	3,424	2,418	\$10,866	\$18,347	\$29,213
Size shares	59%	41%	37%	63%	

Note: Aggregate costs are calculated by the method described in the text. Aggregate costs include legal costs, settlement costs and other costs for resolved lawsuits, unresolved lawsuits and non-litigated assertions. These report accrued costs, that is, we include the full projected cost of currently unresolved lawsuits.

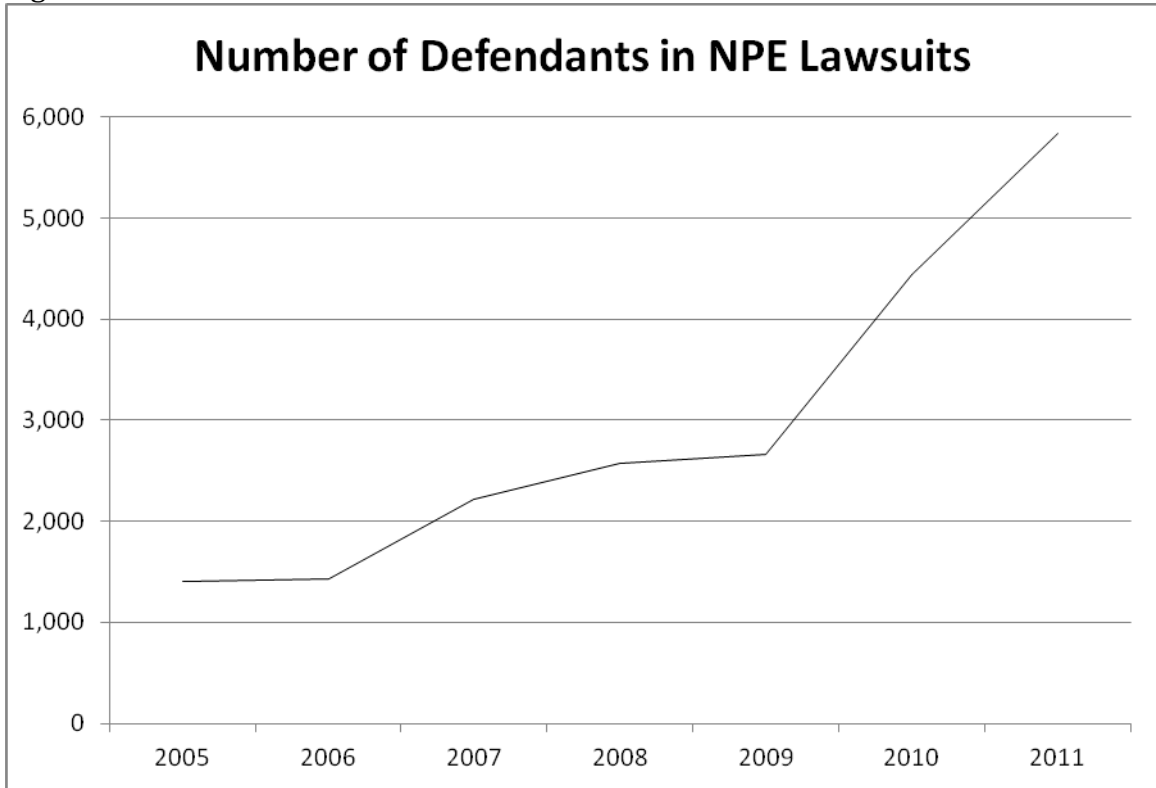


Table 5. Public NPEs: innovation investments relative to costs to defendants

	<u>Millions (2011\$)</u>	
Revenues	\$5,782.9	
Implied accrued direct costs	\$9,924.1	100%
Net increase in intangibles	\$679.4	7%
R&D spending	\$1,369.1	14%

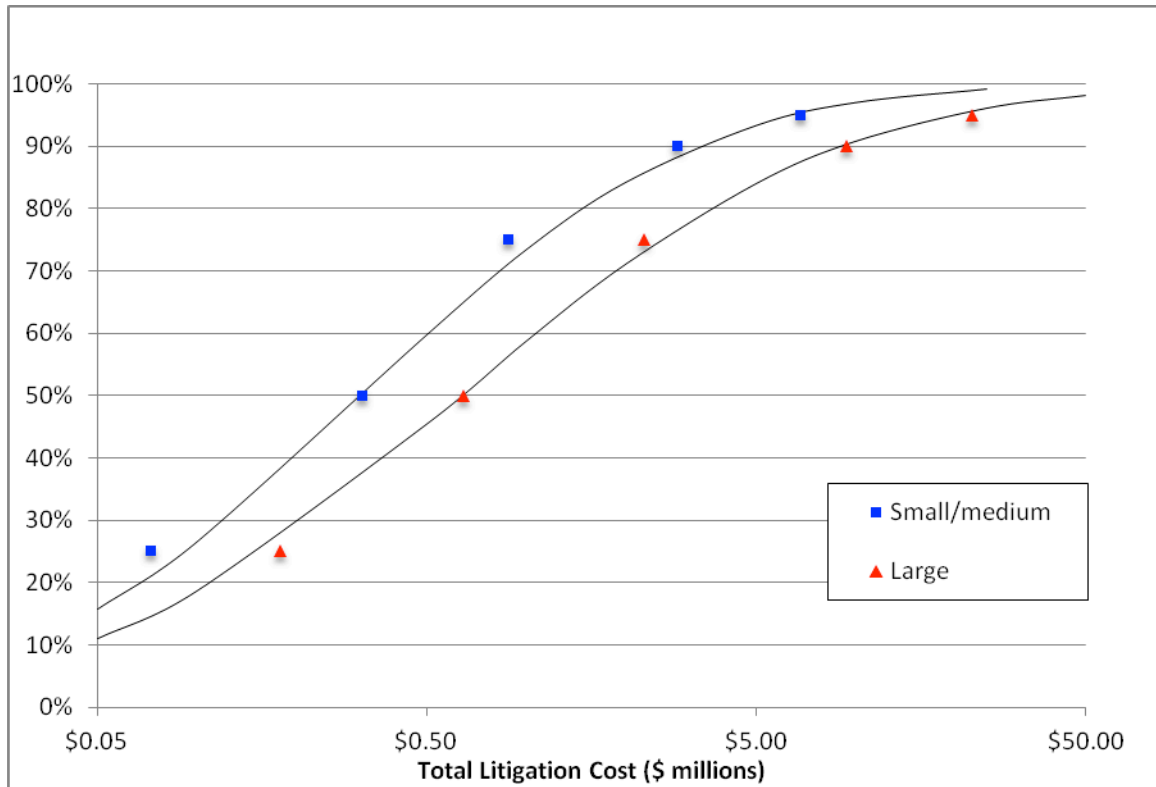
Note: For 12 publicly listed NPE firms. Assumes that all revenues are royalties from licensing patent assertions. The implied accrued direct costs are calculated by adding legal costs to defendants to the assumed licensing payments, using the ratio of legal to total costs in Table 2, and then dividing by the portion of lawsuits that have been resolved in the database (75%) to capture costs that have been accrued but not yet paid. All figures are in 2011 dollars.

Figure 1.



Source: RPX database

Figure 2. Cumulative Distribution of Total Direct Litigation Cost by Company Size



Note: Horizontal axis is logarithmically scaled. Distributions are fit with lognormal cumulative distribution functions. The distributions are for resolved lawsuits.

## Appendix

Table A1. Log cost regressed against log company revenue

	(1)		(2)	
	<i>Coefficients</i>	<i>Standard Error</i>	<i>Coefficients</i>	<i>Standard Error</i>
Intercept	10.30	(0.85)	10.90	(0.91)
Ln(Rev)	0.13	(0.04)	0.10	(0.04)
Revenue < \$100m			-1.11	(0.63)

Note: 784 observations.