

# The growing problem of patent trolling

Cash-hungry patent trolls are squelching innovation—and should be screened out

By **Lauren Cohen**,<sup>1,2\*</sup> **Umit G. Gurun**,<sup>2,3\*</sup>  
**Scott Duke Kominers**<sup>1,2,4\*</sup>

The last decade has seen a sharp rise in patent litigation in the United States; 2015 has one of the highest patent lawsuit counts on record (1). In theory, this could reflect growth in commercialization of technology and innovation—lawsuits increase as more firms turn to intellectual property (IP) protection to safeguard their competitive advantages. However, the majority of recent patent litigation is driven by nonpracticing entities (NPEs), firms that generate no products but amass patent portfolios for the sake of “enforcing” IP rights (2). We discuss new, large-sample evidence adding to a

**POLICY** growing literature (3–7) that suggests that NPEs—in particular, large patent aggregators—on average, act as “patent trolls,” suing cash-rich firms seemingly irrespective of actual patent infringement. This has a negative impact on innovation activity at targeted firms. These results suggest a need to change U.S. IP policy, particularly to screen out trolling early in the litigation process.

How does NPE patent litigation affect innovation? One hypothesis suggests that NPEs are efficient intermediaries that enforce small inventors’ patents against large, well-funded firms that could otherwise infringe on small inventors’ patents without consequence. A conflicting hypothesis suggests that NPEs are patent trolls, extracting rents from productive, innovative firms by exploiting the fact that—because defending against litigation is costly, and the legal system is imperfect—a threat of legal action is sufficient to induce most targeted firms to settle, whether the asserted patent is valid and/or infringed.

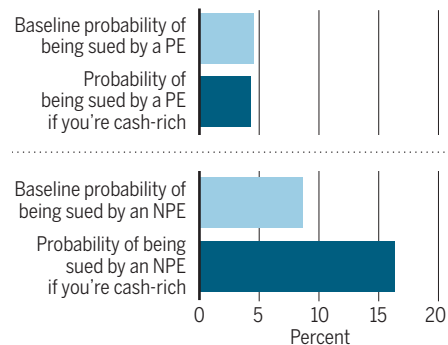
We use two large data sets that capture the complete universe of U.S. NPE litigation from 2005 through 2015 to provide evidence on determinants of NPE litigation (8). We

explore how patent trolling has evolved in recent years, despite legislation intended to reduce trolling (e.g., the America Invents Act of 2011). We focus on publicly traded firms, for which there are rich, publicly available measures of firm characteristics, external activities, income, profitability, and patent holdings.

**NPE PATENT LITIGATION.** Anecdotal evidence suggests that NPEs target firms opportunistically. Some high-profile NPEs have brought flurries of lawsuits on the basis of low-quality patents. We also see empirical markers of potential NPE opportunism. First, it is estimated that 59% of patents owned by NPEs have at least one

## NPEs target cash-rich firms

“Cash-rich” describes a firm with 1 SD more cash than the average firm in the sample. The difference for NPEs is highly statistically significant ( $P < 0.001$ ). The difference for PEs is in the opposite direction and statistically insignificant. See SM for data and methods.



claim that is invalid (9) [compared with 42% for all asserted patents (10)]. Second, there appears to be “forum shopping” by NPEs. Some well-known innovation hubs (e.g., Silicon Valley) have large numbers of NPE suits. However, the preponderance of NPE patent litigation (>43% of all cases) is brought in the Eastern District of Texas, which is not a major innovation center; its courts are favored by NPEs because they are perceived to be plaintiff-friendly [anecdotally and because of specific procedural rules; see (3, 11, 12)].

We find strong evidence that cash is the main correlate of NPE litigation (see the first figure). NPEs frequently sue firms with large cash holdings or that have recently ac-

cumulated large amounts of cash. We find that NPEs are especially likely to sue firms that are engaged in other (non-IP-related) lawsuits, as well as firms that have especially small legal teams (13).

When viewing firms’ profits by business segment, we see that cash holdings in segments unrelated to alleged infringement drive NPE litigation just as much as holdings in related business segments do. Even when the allegedly infringing segment is losing money, NPEs still sue in order to claim profits from unrelated segments; this is hardly litigation in response to “profitable infringement.”

Wouldn’t anyone suing for patent infringement display the behaviors we see for NPEs? This is not what we find. The cash-targeting that we observe is primarily the behavior of large patent aggregators—not small inventors (8). There has not been an increase in patent litigation among practicing entities (PEs, e.g., Apple, Microsoft, and GE) commensurate with the rise in NPE litigation (see the second figure). In stark contrast to NPEs’ record, PE patent litigation is not driven by cash (see the first figure), and only 7% of suits by PEs are brought in Eastern Texas.

One might also think that litigation behavior more broadly should be related to defendant cash holdings; however, this is not the case. When replicating the analysis underlying the first figure for other types of litigation against publicly traded firms, no other type of litigation (environmental, labor, contract, securities, or tort) involves the same cash focus that we see in NPE-driven patent litigation (8). This suggests that the main determinant of non-IP litigation is the infraction itself (e.g., polluting a waterway in the case of an environmental suit). Both within the patent space and across litigation more broadly, NPE patent litigation is unique in the extent to which it is driven by cash.

**NPEs’ IMPACT ON INNOVATION.** Patent trolling by NPEs has a sizable negative impact on innovation at targeted firms. We estimate that, after settling with NPEs (or losing to them in court), firms on average reduce research and development (R&D) investment by >25% (8). Others have found similarly sized reductions in R&D (14, 15) and other negative impacts of NPE litigation (16, 17).

<sup>1</sup>Harvard Business School, Boston, MA 02163, USA. <sup>2</sup>National Bureau of Economic Research, Cambridge, MA 02138, USA.

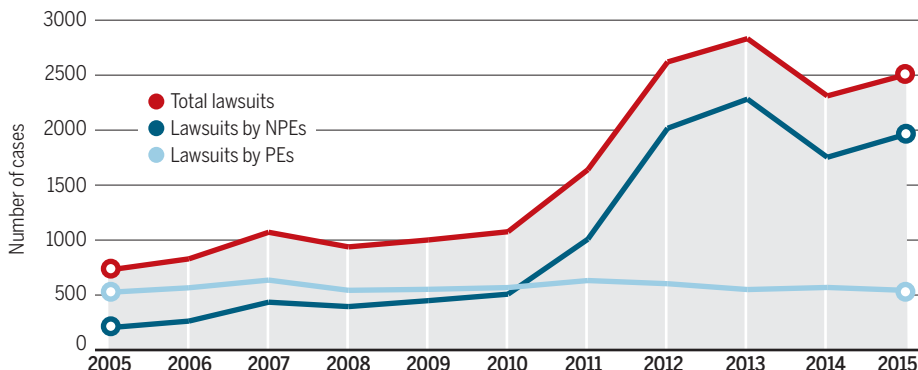
<sup>3</sup>University of Texas at Dallas, Richardson, TX 75080, USA.

<sup>4</sup>Society of Fellows, Department of Economics, Center of Mathematical Sciences and Applications, Center for Research on Computation and Society, and Program for Evolutionary Dynamics, Harvard University, Cambridge, MA 02138, USA.

\*Corresponding authors contributed equally. Email: lcohen@hbs.edu, umit.gurun@utdallas.edu, kominers@fas.harvard.edu

## Recent trends in patent litigation

NPE, PE, and total patent litigation against publicly traded firms, 2005–2015. Data derived from public filings [Public Access to Court Records (PACER)]. See SM for data and methods.



Causes of the R&D reductions at NPE-targeted firms are not directly identifiable, and deserve further study: Do firms reduce innovation because they have lost resources through litigation and/or settlement? Do they shift focus in order to avoid future litigation? Furthermore, it is not evident that this reduction in innovation is made up for by increased invention elsewhere. In theory, NPEs could improve small inventors' incentives to innovate by reducing infringement by other firms and by promoting a financial transfer to inventors when infringement occurs. However, the value of NPEs to small inventors (through direct transfers or in terms of increased bargaining power) is mediated by the fractions of settlements and damage awards that NPEs pass through to small inventors (8)—only money that reaches inventors matters for those inventors' incentives. The pass-through of NPE patent litigation proceeds to inventors is estimated to be low (18–20), so even large settlements or damage payments from targeted firms to NPEs do not clearly support external innovation. Evidence also indicates that NPE patent litigation has not resulted in increased small-inventor activity (8, 21).

**POLICY OPTIONS.** Our results imply a need to reduce patent trolling by NPEs, through legislation or changes in the IP marketplace. Since 2010, Congress has considered more than a dozen bills that seek to reduce patent trolling (H.R.9, the “Innovation Act” is currently on the docket). But most of the proposed policy changes focus on punishing trolls “after the fact” for bringing lawsuits that are declared to be frivolous (or “extraordinary”) after court proceedings. The Innovation Act, for example, would require mandatory fee-shifting for patent lawsuits that the courts determine not to be “reasonably justified.”

However, the average costs of patent

litigation are large [\$1 to \$4 million (22)], and the process is drawn out. Even with the prospect of posttrial fee-shifting, patent litigation targets may find it cost-effective and less disruptive to simply settle with NPEs—even in unfounded lawsuits. Consequently, punishing trolling after the fact is not enough. Policies should screen out trolling at or before the time of patent assertion.

Part of the solution is to reduce the cost of challenges to low-quality patents. In the United States, patents can be contested on the basis that the claimed inventions are not truly “original” (i.e., prior art exists). But filing a single such inter partes review challenge costs tens or hundreds of thousands of dollars. Thus, even easily identifiable “junk patents” remain in force. Such patents can be used in trolling litigation and rarely see court challenges because most trolling actions end in settlement.

Additionally, mechanisms should be adopted to weed out low-quality patent lawsuits. A system of “advance screening” could require that patent litigation be preceded by a brief court appearance and/or patent review. The review would provide preliminary evaluation of whether the plaintiff's infringement claims are reasonable and of whether the asserted patents are of high quality. The cost of review must be set so as not to crowd out small plaintiffs.

Advance review could cripple trolling. A finding against the plaintiff would bolster the targeted firm's defense against unfounded patent infringement claims. In extreme cases, advance review could trigger reexamination (and potential invalidation) of asserted patents of sufficiently low quality. Nevertheless, advance review should generally benefit patent holders that have legitimate infringement claims; plaintiff-favoring findings might help patent holders by encouraging infringers to settle or by making it easier to secure litigation financing.

Prelitigation review could provide ex ante and ex post aid in separating meritorious infringement claims from opportunistically motivated ones. It could reduce stress on the patent litigation system, freeing up resources for resolution of credible claims. Screening mechanisms should garner widespread support. They stand to save firms and small inventors from frivolous, opportunistic infringement claims and thus to separate legitimate NPE claims from trolling. ■

### REFERENCES AND NOTES

1. J. Mullin, *Ars Technica*, 5 January 2016.
2. In line with the definition used by our data sources, by NPEs we mean “firms that derive the majority of their revenues from licensing and enforcement of patents.” Traditional “patent assertion entities” make up the majority of NPEs. Individual inventors are sometimes counted as NPEs, but universities are not (unless they have enforcement subsidiaries). In 2012, the America Invents Act changed the rules of patent litigation by “disjoining” lawsuits based on unrelated infringement claims. Thus, figures of patent lawsuits filed before and after 2012 are not quite comparable, especially because many NPEs file suits against multiple parties.
3. J. R. Allison, M. A. Lemley, D. L. Schwartz, “How often do patent assertion entities win patent suits?” (Working paper, Northwestern Univ., Evanston, IL, 2015).
4. C. Cotropia, J. Kesan, D. Schwartz, *Minn. Law Rev.* **99**, 649 (2014).
5. R. Feldman, E. Frondorf, *Stanford Technol. Law Rev.* **19**, 52 (2015).
6. J. O. Lanjouw, M. Schankerman, *J. Law Econ.* **47**, 45 (2004).
7. R. Feldman, T. Ewing, S. Jeruss, *UCLA J. Law Technol.* **18**, 1 (2013).
8. L. Cohen, U. G. Gurun, S. D. Kominers, “Patent trolls: Evidence from targeted firms” (Finance working paper no. 15-002, Harvard Business School, Boston, MA, 2015).
9. S. P. Miller, *Virginia J. Law Technol.* **18**, 1 (2012).
10. J. R. Allison, M. A. Lemley, D. L. Schwartz, *Tex. Law Rev.* **92**, 1769 (2014).
11. J. J. Anderson, *Univ. Pa. Law Rev.* **163**, 631 (2015).
12. Y. Leychikis, *Yale J. Law Technol.* **9**, Art. 6 (2007).
13. Most data we used are from RPX, Inc., which provides systematic data from Public Access to Court Electronic Records (PACER) on every lawsuit filed by more than 4000 NPEs back to 1977. We have replicated our results outside this sample on the publicly available data set of (4) hosted on [www.npdata.org](http://www.npdata.org). For details, see Table A4 in (8).
14. R. Smeets, “Does patent litigation reduce corporate R&D? An analysis of US public firms” (Working paper, Rutgers Univ., New Brunswick, NJ, 2014).
15. C. Tucker, *Patent Trolls and Technology Diffusion: The Case of Medical Imaging* (Working paper, Massachusetts Institute of Technology, Cambridge, MA, 2014).
16. C. V. Chien, *Stanford Technol. Law Rev.* **17**, 461 (2014).
17. S. Kiebzak, G. Rafert, C. E. Tucker, *Res. Policy* **45**, 218 (2016).
18. J. E. Bessen, M. J. Meurer, *Cornell Law Rev.* **99**, 387 (2014).
19. J. E. Bessen, J. Ford, M. J. Meurer, *Regulation* **34**, 26 (2011).
20. F. M. Scott Morton, C. Shapiro, *Antitrust Law J.* **79**, 463 (2014).
21. R. Feldman, M. A. Lemley, *Iowa Law Rev.* **101**, 137 (2015).
22. American Intellectual Property Law Association, “AIPLA Report of the Economic Survey 2013” (AIPLA, Arlington, VA, 2013).

### ACKNOWLEDGMENTS

The authors thank D. McCurdy, C. Reohr, and S. Tiwari at RPX for data used in (8) and this study, and thank S. Dickstein, K. Felter, J. Golden, J. E. Humphries, P. Kominers, J. Lerner, O. Luk, D. Schwartz, and several reviewers for helpful comments. The authors acknowledge funding from the NSF (grants SciSIP-1535813, SES-0847395, SES-1459912, and CCF-1216095). S.D.K. acknowledges the support of the Harvard Milton Fund and the Wu Fund for Big Data Analysis.

### SUPPLEMENTARY MATERIALS

[www.sciencemag.org/content/352/6285/521/suppl/DC1](http://www.sciencemag.org/content/352/6285/521/suppl/DC1)

10.1126/science.aad2686



**The growing problem of patent trolling**

Lauren Cohen, Umit G. Gurun and Scott Duke Kominers (April 28, 2016)

*Science* **352** (6285), 521-522. [doi: 10.1126/science.aad2686]

Editor's Summary

---

This copy is for your personal, non-commercial use only.

---

- Article Tools** Visit the online version of this article to access the personalization and article tools:  
<http://science.sciencemag.org/content/352/6285/521>
- Permissions** Obtain information about reproducing this article:  
<http://www.sciencemag.org/about/permissions.dtl>

*Science* (print ISSN 0036-8075; online ISSN 1095-9203) is published weekly, except the last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. Copyright 2016 by the American Association for the Advancement of Science; all rights reserved. The title *Science* is a registered trademark of AAAS.