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Monitoring Behavior: Universities, Nonprofits, Patents, and Litigation

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MONITORING BEHAVIOR: UNIVERSITIES, NONPROFITS, PATENTS, AND LITIGATION

*Teo Firpo & Michael S. Mireles**

ABSTRACT

This paper examines the confluence of two important issues concerning patent law. The two issues are the merits of the debate concerning the supposed “patent troll” crisis and the increased patenting and licensing of university and other nonprofit inventions, including the litigation of those patents.

First, there is a debate in the literature concerning the presence and scope of the problem concerning so-called “patent trolls.” To some, supposed “patent troll” behavior is ordinary litigation behavior, and to others, it points to problems with the patent litigation system. Indeed, some may argue that the benefits of “patent trolls” may outweigh the negatives; however, the literature is not clear on an answer to that question. The literature does point to certain factors which indicate when a patent holder may be abusing the system and behaving as a “troll.” This paper provides a review and analysis of some important patent enforcement literature.

Second, there is a substantial amount of literature concerning the patenting and licensing by universities and other nonprofits since passage of the Bayh-Dole Act in 1980. The Bayh-Dole Act allows universities and other nonprofits to patent government funded invention. The literature points to issues that may arise concerning university patent related activity, including some efforts by universities to lobby to protect their interests. This paper provides a review and analysis of some of that literature.

Finally, this paper analyzes data from multiple sources at the confluence of those two issues, asking whether universities and other nonprofits are behaving similarly to so-called “patent trolls.” Our research finds that in some instances universities and nonprofits may share some characteristics

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similar to “patent trolls.” However, while we believe that casting a particular narrative over the data is relatively dangerous, there is cause for concern in the future. There are several factors that may make it more likely that universities and nonprofits will engage in additional litigation in the future, including perhaps abusive litigation practices resembling so-called “patent trolls.” Indeed, several factors may place increased pressure on universities and nonprofits to find ways to monetize their patents. For example, the U.S. government appears to desire to cut research funding to universities, and universities will be searching for additional revenue streams. Moreover, most technology transfer offices fail to generate enough revenue to sustain themselves and will likely push for increased patenting, licensing, and even litigating to fund their operations. And, universities appear to be changing their tenure policies to encourage commercialization activities. As universities and their technology transfer offices search for funding, they may believe that commercialization and patent enforcement is the answer. We conclude that university and nonprofit litigation should be carefully monitored in the future, including patent litigation by academic and research institutions based outside the United States.

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I. INTRODUCTION

THIS paper examines the confluence of two of the most controversial and important issues concerning intellectual property law in the United States.¹ The first issue is the so-called “patent troll” phenomenon.² The second issue is the rise of university and non-profit patenting.³ Specifically, this paper analyzes empirical data collected from multiple sources, including the Stanford Nonpracticing Entity Database, concerning litigation by universities and non-profits.⁴ The paper presents the data by examining the question of whether universities and non-profits are engaging in behavior that mirrors supposed patent trolls, including licensing patents to so-called patent trolls.⁵

For the last decade, policymakers and scholars have made proposals and debated the merits of patent trolls.⁶ Indeed, the debate has ranged from who is a so-called patent troll to whether patent trolls exist and the merits of patent trolls.⁷ From the White House to Congress to the Federal Trade Commission (FTC), proposals and studies addressing the issue have been published.⁸ Indeed, many court decisions are arguably directed to solve the patent troll problem, even as some argue that a problem does

1. For an interesting discussion of the patent troll issue in Europe, see Stefania Fusco, *Markets and Patent Enforcement: A Comparative Investigation of Non-Practicing Entities in the United States and Europe*, 20 MICH. TELECOMM. & TECH. L. REV. 439 (2014).

2. See, e.g., Brian L. Frye, *IP as Metaphor*, 18 CHAP. L. REV. 735, 735 (2015) (discussing the troll metaphor); Kristen Osenga, *Debugging Software's Schemas*, 82 GEO. WASH. L. REV. 1832, 1846 (2014) (discussing cognitive biases relating to so-called trolls).

3. See generally Michael S. Mireles, Jr., *States as Innovation System Laboratories: California, Patents, and Stem Cell Technology*, 28 CARDOZO L. REV. 1133 (2006) [hereinafter Mireles, *States as Innovation System Laboratories*].

4. Most universities are also non-profits. For purposes of this article, the term “non-profits” is used to describe non-university and non-university related non-profits.

5. Commentators have called for additional research on university behavior in patent litigations. See Robin Feldman, Tom Ewing & Sara Jeruss, *The AIA 500 Expanded: The Effects of Patent Monetization Entities*, 17 UCLA J.L. & TECH. 1, 50 (2013). Professors Robert P. Merges and Mark A. Lemley identified the line-drawing problem with respect to rent-seeking behavior by universities specifically. See Mark A. Lemley, *Are Universities Patent Trolls?*, 18 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 611, 612 (2008) [hereinafter Lemley, *Trolls*] (“[A] troll is as [a] troll does. Universities will sometimes be bad actors. So will non-manufacturing patent owners. So will manufacturing patent owners.”); Robert P. Merges, *The Trouble with Trolls: Innovation, Rent-Seeking, and Patent Law Reform*, 24 BERKELEY TECH. L.J. 1583, 1610–12 (2009) [hereinafter Merges, *Trouble with Trolls*].

6. See *infra* Part II.

7. See *infra* Part II.

8. See, e.g., FED. TRADE COMM’N, PATENT ASSERTION ENTITY ACTIVITY: AN FTC STUDY (2016), https://www.ftc.gov/system/files/documents/reports/patent-assertion-entity-activity-ftc-study/p131203_patent_assertion_entity_activity_an_ftc_study_0.pdf [<https://perma.cc/YQV8-RYC8>] [hereinafter FTC PAE REPORT]; Press Release, White House, FACT SHEET: White House Task Force on High-Tech Patent Issues (June 4, 2014), <http://www.whitehouse.gov/the-press-office/2013/06/04/fact-sheet-white-house-task-force-high-tech-patent-issues> [<https://perma.cc/TVY7-4V7J>] (describing five executive actions and seven legislative recommendations to address patent assertion entities); U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-13-465, INTELLECTUAL PROPERTY: ASSESSING FACTORS THAT AFFECT PATENT INFRINGEMENT LITIGATION COULD HELP IMPROVE PATENT QUALITY (2013) [hereinafter 2013 GAO REPORT].

not exist.⁹

Since the passage of the Bayh-Dole Act in 1980, which allows universities and non-profits to patent government funded inventions, university patenting has been on the rise.¹⁰ To some, this rise in patenting may result in unintended consequences, such as shifting norms at universities from basic research to applied research, to an increase in patents on fundamental technologies leading to the development of patent thickets or an anticommons.¹¹ Moreover, there are concerns with access to university created inventions—particularly those funded by the public.¹² Universities have also successfully lobbied for patent legislation that preserves a privileged status in securing and asserting patents against others.¹³ Furthermore, there are several recent examples of cases brought by universities that have merited the application of the moniker patent troll by the press.¹⁴ One such case involves Boston University. Boston University sued more than thirty defendants, including Apple, for infringing a late-term patent covering LED technology.¹⁵ Most of the suits settled in 2014.¹⁶

One of the most recent proposals to address the supposed “trolling” problem is from the Electronic Frontier Foundation (EFF) and targets behavior at the confluence of the patent troll debate and university and non-profit litigation.¹⁷ Around the fall of 2016, the EFF proposed its Reclaim Invention Program.¹⁸ The program was designed to target university litigation behavior and address the problem of universities licensing their inventions to supposed patent trolls.¹⁹ The program has two basic prongs²⁰: The first is to use grass roots activism to persuade universities to engage in certain behavior, including not licensing to so-called patent trolls.²¹ The second is to push model state legislation that would penalize public universities that license to so-called patent trolls.²² Indeed, a legis-

9. See *infra* Part II.

10. See *infra* Part III.

11. See *infra* Part III.

12. See *infra* Part III.

13. See *infra* Part III.

14. See Walter D. Valdivia, *Patent Infringement Suits Have a Reputational Cost for Universities*, BROOKINGS (Nov. 10, 2015), <https://www.brookings.edu/blog/techtank/2015/11/10/patent-infringement-suits-have-a-reputational-cost-for-universities-2/> [<https://perma.cc/3LRG-DMJB>] (describing lawsuits brought by universities); John Koetsier, *Congratulations, Boston University, You're Now a Patent Troll*, VENTUREBEAT (July 3, 2013, 12:17 PM), <https://venturebeat.com/2013/07/03/congratulations-boston-university-youre-now-a-patent-troll/> [<https://perma.cc/A4MX-C8FT>].

15. See Rich Barlow, *Companies Agree to Pay to Settle Patent Infringement Suit*, BU TODAY (Jan. 15, 2014), <http://www.bu.edu/today/2014/companies-agree-to-pay-licensing-fees-to-settle-patent-infringement-suit/> [<https://perma.cc/N3B3-ZQNA>].

16. See *id.*

17. See *infra* Part IV.

18. See *infra* Part IV.

19. See *infra* Part IV.

20. See *infra* Part IV.

21. See *infra* Part IV.

22. See *infra* Part IV.

lator in the state of Maryland introduced such legislation.²³

The EFF's program resulted in a response from noted property rights scholar Richard Epstein in *Fortune* magazine.²⁴ Professor Epstein essentially critiqued the EFF's proposal by arguing, in part, that there is not any empirical evidence that universities are misbehaving.²⁵ This paper provides information to assess and inform the debate on the behavior of universities and non-profits, and their licensees, in patent litigation. To put it bluntly, are universities, non-profits, and their licensees engaged in patent troll behavior?

Some studies have attempted to quantify the amount of university litigation and publish data concerning that litigation.²⁶ This study is one of the first to use the Stanford Nonpracticing Entity Litigation Dataset (Stanford NPE Dataset) to target university and non-profit litigation, and there appears to be more university and non-profit litigation than found in earlier studies.

Moreover, some of this behavior appears to mimic certain types of "troll" behavior.²⁷ For example, some variables used to predict "opportunistic" or trolling behavior appear in our dataset of university and non-profit actors.²⁸ Moreover, the characteristics of some of the patents also seem to be similar to trolling type patents.²⁹ However, some of this behavior may be characterized as common strategic litigation behavior, which may, as some scholars have argued, point to larger issues within the patent system itself.³⁰ Notably, a significant number of the litigated patents in the dataset are publicly funded.³¹ Moreover, numerous universities are land-grant universities and public universities.³² Thus, there are numerous universities that are receiving substantial public support with publicly funded inventions and are mimicking, in some respects, trolling behavior.³³ Additionally, foreign universities are patenting at a relatively high number and are engaging in litigation that bears some similarity to trolling behavior as well.³⁴

While casting a particular narrative over this data is relatively dangerous, we believe that there is cause for concern in the future. There are several factors which may make it more likely that universities and non-profits will engage in additional litigation in the future, including, perhaps, abusive litigation practices resembling so-called patent trolls.³⁵ In-

23. *See infra* Part IV.

24. *See infra* Part IV.

25. *See infra* Part IV.

26. *See infra* Part V.

27. *See infra* Part V.

28. *See infra* Part V.

29. *See infra* Part V.

30. *See infra* Part V.

31. *See infra* Part V.

32. *See infra* Part V.

33. *See infra* Part V.

34. *See infra* Part V.

35. *See infra* Part IV.

deed, the factors may place increased pressure on universities and non-profits to find ways to monetize their patents.³⁶ For example, the U.S. government appears to desire to cut research funding to universities.³⁷ Universities will be searching for additional revenue streams.³⁸ Moreover, most technology transfer offices fail to generate enough revenue to sustain themselves and will likely push for more increased patenting and licensing to fund their operations.³⁹ And, universities appear to be changing their tenure policies to encourage commercialization activities.⁴⁰ As universities and their technology transfer offices search for funding, they may believe that commercialization is the answer. Thus, university and non-profit litigation should be carefully monitored in the future.

This article has six parts: (I) Introduction; (II) The Patent Troll Issue; (III) University and Nonprofit Patenting and Litigation; (IV) Reasons for Concern, the EFF, and Richard Epstein; (V) Data; and (VI) Conclusion. Part II discusses the patent troll issue. Part III analyzes university and non-profit patent litigation. Part IV sets forth reasons for concern for the future and the controversy between the EFF and Professor Richard Epstein. Part V discusses the data collected based on the Stanford NPE Database, including methodology, and analyzes the data. Part VI is a conclusion.

II. THE PATENT TROLL ISSUE

This portion of the article analyzes the patent troll issue, including discussing the definitional problem of who exactly is a supposed troll.⁴¹ This Part also reviews the Stanford NPE Dataset and additional issues in the literature concerning patent trolls.⁴²

A. PATENT TROLLS AND THE DEFINITIONAL PROBLEM

The term patent troll and the related terms “non-practicing entity” and “patent assertion entity” are used to describe a certain class of patent holders who assert patents through demand letters and litigation. However, the question of who exactly is a patent troll is not entirely clear. Some appear to have a broad definition and others a much narrower definition. Some appear to believe the term should not be used at all.

36. *See infra* Part IV.

37. *See infra* Part IV.

38. *See infra* Part IV.

39. *See infra* Part IV.

40. *See infra* Part IV.

41. Professor Christopher Cotropia has stated, “Patent trolls are the targets of the current patent reform movement. One of the difficulties that has plagued the push for change, however, is a definitional one—what exactly is a patent troll?” *See* Christopher A. Cotropia, *The Individual Inventor Motif in the Age of the Patent Troll*, 12 *YALE J.L. & TECH.* 52, 56 (2009) [hereinafter Cotropia, *Individual Inventor*] (footnotes omitted).

42. The troll label has been used in the trademark and copyright context. *See, e.g.*, Michael S. Mireles, *Trademark Trolls: A Problem in the United States?*, 18 *CHAP. L. REV.* 815, 815–16 (2015); Brad A. Greenberg, *Copyright Trolls and Presumptively Fair Uses*, 85 *U. COLO. L. REV.* 53, 53 (2014).

The term patent troll is used to identify an entity that essentially acted as the proverbial troll under the bridge.⁴³ The troll taxes people who use the bridge even though the troll did not build the bridge. The patent troll is basically an entity who does not practice the patented invention, or perhaps did not invest in developing the invention, but seeks to assert that patent against others through either demand letters or litigation.⁴⁴ Based on the definition of what a troll is, the assumption is that if one is a troll then one is a “bad” actor.⁴⁵ The implicit assertion is that the troll contributes nothing to society and extracts high costs in the form of impeding innovation and pushing up costs for consumers for goods and services covered by patents.⁴⁶ Specifically, this activity could have a deleterious effect on start-ups, small firms, and entrepreneurs by preventing or delaying new entrants to markets.⁴⁷ Practicing entity resources, such as personnel time, could be channeled toward litigation activity and not at productive tasks, including inventive work.⁴⁸ Notably, there was a belief that entities engaging in “troll-like” behavior were a new phenomenon, but scholars have shown that entities similar to the current trolls existed in the nineteenth century.⁴⁹

That said, there are arguments that a so-called patent troll is not always a bad actor. On the question of the merits of patent trolls, even though the entity asserting the patent perhaps did not contribute to the develop-

43. The patent troll label has been credited to Peter Detkin, Anne Gundelfinger, and Mark Davis. See Joff Wild, *The Real Inventors of the Term “Patent Troll” Revealed*, IAM: BLOG (Aug. 22, 2008), <http://www.iam-media.com/blog/detail.aspx?g=cff2afd3-c24e-42e5-aa68-a4b4e7524177> [Perma link unavailable].

44. See Jason Rantanen, *Slaying the Troll: Litigation as an Effective Strategy Against Patent Threats*, 23 SANTA CLARA COMPUT. & HIGH TECH. L.J. 159, 164 (2006) (“[A] patent troll is an entity that neither develops novel technologies nor uses those technologies to provide goods or services to the market . . . [and] acquires patents for the sole purpose of using them to obtain a revenue stream from a firm that engages in activities arguably falling within the scope of the patent.”).

45. The FTC notes that “a label like ‘patent troll’ is unhelpful because it invites pre-judgment about the societal impact of patent assertion activity without an understanding of the underlying business model that fuels such activity.” FTC PAE REPORT, *supra* note 8, at 17.

46. The harm from PAEs could also include “keeping off the market products that would otherwise have been introduced or by causing a whole industry to pick an inferior technology.” See Fiona M. Scott Morton & Carl Shapiro, *Strategic Patent Acquisitions*, 79 ANTITRUST L.J. 463, 494–95 (2014).

47. FTC PAE REPORT, *supra* note 8, at 24–25; Colleen Chien, *Startups and Patent Trolls*, 17 STAN. TECH. L. REV. 461, 465 (2014) [hereinafter Chien, *Startups*] (“The characteristics of small companies can make it harder to absorb a PAE demand—40% of small companies that received a demand and responded to the survey . . . reported a ‘significant operational impact’: delayed hiring or achievement of another milestone, change in the product, a pivot in business strategy, a shut-down business line or the entire business, and/or lost valuation.”).

48. FTC PAE REPORT, *supra* note 8, at 9.

49. See generally B. Zorina Khan, *Trolls and Other Patent Inventions: Economic History and the Patent Controversy in the Twenty-First Century* (Hoover Inst. Working Grp. on Intellectual Prop., Innovation, and Prosperity, Working Paper No. 13001), <https://sls.gmu.edu/cpip/wp-content/uploads/sites/31/2013/09/Khan-Zorina-Patent-Controversy-in-the-21st-Century.pdf> [<https://perma.cc/NB9M-RKZ6>]; Adam Mossoff, *Patent Licensing and Secondary Markets in the Nineteenth Century*, 22 GEO. MASON L. REV. 959 (2015).

ment of the underlying patented invention or practice it, there was an inventor of the patented invention. One of the counter-arguments for patent trolls is that they may help the ultimate inventor recoup some costs of invention and, thus, the patent troll helps the patent system work for its intended purpose—to incentivize invention.⁵⁰ Additionally, others argue that some entities that exhibit characteristics of trolls may also help find commercialization partners.⁵¹ Basically, an entity may send out demand letters that theoretically could lead to a partner who may be interested in commercializing the invention. However, this theory may not work well because the potential partner may already practice the invention, which is the basis of the claim in the demand letter. This is known as the *ex post* and *ex ante* issue.⁵² If the invention is in practice, then the litigation demand is essentially *ex post* and more likely harms innovation, particularly if very little funding is returned to the inventor. As Professor Robert Merges has emphasized, the patent system must be tied to innovation and not merely embody untethered rent-seeking.⁵³ Importantly, Professor Brian Love found that “NPEs . . . assert[] their patents relatively late in the patent term and frequently continue to litigate their patents to expiration.”⁵⁴ This finding supports the theory that NPEs may “lie in wait” for practicing entities to commercialize technology and then assert their patents.⁵⁵

50. See Robin Feldman & Tom Ewing, *The Giants Among Us*, 2012 STAN. TECH. L. REV. 1, 96 (2012) [hereinafter Feldman & Ewing, *Giants*] (“In this world of imperfections, mass aggregators may provide a market mechanism for the forgotten inventor whose innovations are in use every day but who remains uncompensated.”); Robin Feldman & Mark A. Lemley, *Do Patent Licensing Demands Mean Innovation?*, 101 IOWA L. REV. 137, 142 (2015) [hereinafter Feldman & Lemley, *Demands*] (“[T]he patent holder has properly contributed to learning and dissemination by publishing its ideas in the form of a patent, and the product company has simply taken the idea from the patent’s disclosure. The patent troll, therefore, would be operating as a tax collector to facilitate the transfer of an appropriate payment to the person who gave the idea to the world.”). Professors Feldman and Lemley dispute this narrative by arguing that disclosures tend not to be adequate; fast-moving technologies are less likely to have products match claims; and independent invention, not copying, is predominantly occurring. Feldman & Lemley, *Demands, supra*.

51. See Feldman & Ewing, *Giants, supra* note 50, at 98 (“In addition to the possibility of compensating forgotten inventors, one could argue that mass aggregators serve as a form of efficient middle man, a market intermediary who helps patents find their way to those who would exploit them to create new products.”); Feldman & Lemley, *Demands, supra* note 50, at 141 (“And if the inventor is not in a position to commercialize the invention at all, in theory, patents can serve as a mechanism that allows the inventor to provide her new idea to someone who can make use of it.”).

52. FED. TRADE COMM’N, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION 32–72 (2011), <https://www.ftc.gov/sites/default/files/documents/reports/evolving-ip-marketplace-aligning-patent-notice-and-remedies-competition-report-federal-trade/110307patentreport.pdf> [https://perma.cc/73JS-RX5K] [hereinafter FTC MARKETPLACE REPORT].

53. See Merges, *Trouble with Trolls, supra* note 5, at 1599–1600.

54. See Brian J. Love, *An Empirical Study of Patent Litigation Timing: Could a Patent Term Reduction Decimate Trolls Without Harming Innovators?*, 161 U. PA. L. REV. 1309, 1312 (2013) [hereinafter Love, *Timing*] (“I find that the average product-company patent has been shelved by its owner before the average NPE patent has even been asserted.”).

55. See Merges, *Trouble with Trolls, supra* note 5, at 1590–91 (“Typically, the troll waits until a technology is fully entrenched before scouting around for patents to acquire

If the invention is not in practice when the demand letter is sent, then this is *ex ante*, which may aid innovation.⁵⁶ Additionally, patent trolls may provide expertise that some types of inventors do not have.⁵⁷ They are essentially specialized market players that have experience licensing patents.⁵⁸ This may aid the transfer of patented technology to entities that may need that technology to innovate and do not desire to independently develop a non-infringing substitute for that technology.⁵⁹ Patent trolls may also have access to funding to litigate cases.⁶⁰ Moreover, if mass aggregators are considered patent trolls, then patent trolls may provide patent licenses to companies that need a bargaining chip against other patent asserters or a package of patents covering a technology.⁶¹ One particular problem with aggregators is that if they assert numerous patents, investigating and analyzing each claim may be more expensive than taking a license.⁶²

“NPEs and PAEs may [also] help to create a stable and efficient marketplace for patents to be bought and sold, thereby creating liquidity in patents as corporate assets and reallocating litigation risk to parties better able to absorb it.”⁶³ NPEs can also avoid royalty stacking problems by collecting patents in portfolios.⁶⁴ NPEs may also reduce the probability of a patent thicket by “searching, monitoring, and screening complementary technologies,” including “weed[ing] out bad quality patents caused by

or asserting the patents it holds. Again, there is nothing intrinsically wrong with this strategy unless the patents at issue do not represent a true innovation.”).

56. FTC MARKETPLACE REPORT, *supra* note 52, at 8.

57. *See also* Feldman & Ewing, *Giants*, *supra* note 50, at 98 (“Inventors may not have the capital, expertise, or other necessary capacity to manufacture products.”).

58. James Bessen & Michael J. Meurer, *The Direct Costs from NPE Disputes*, 99 CORNELL L. REV. 387, 390 (2014) [hereinafter Bessen & Meurer, *Costs*] (“Some inventors lack the resources and expertise needed to successfully license their technologies.”).

59. *See* FTC MARKETPLACE REPORT, *supra* note 52, at 8.

60. 2013 GAO REPORT, *supra* note 8, at 35 (“Representatives from a university we spoke with also said universities look to outside entities, such as PMEs, to finance patent infringement litigation because universities cannot cover the up-front costs of filing a lawsuit.”). Professor David L. Schwartz has found that universities are also using contingency fee arrangements with patent litigation suits. *See* David L. Schwartz, *The Rise of Contingent Fee Representation in Patent Litigation*, 64 ALA. L. REV. 335, 376 (2012) (“[Technology Transfer Offices] often lack the financial resources to pay hourly billing patent litigators [and c]ontingent representation solves that problem.”).

61. *See also* Feldman & Ewing, *Giants*, *supra* note 50, at 102–04 (“When a company is sued for infringement or must enter into a negotiation to acquire rights from another entity, the company can shop for and acquire precisely the patents that could present a counter threat to the opposing party. . . . This type of strategy could ensure that a company has the comfortable freedom to operate vis-à-vis its competitors without worrying about patent suits that are the scourge of the modern patent world.”).

62. *See* Robin Feldman, *The Pace of Change: Non-Practicing Entities and the Shifting Legal Landscape*, 18 CHAP. L. REV. 635, 637 (2015) [hereinafter Feldman, *Pace of Change*].

63. FTC PAE REPORT, *supra* note 8, at 26–27. However, Professor Robert P. Merges notes that “[n]ot all arbitrage exchange is in fact efficient and socially desirable” and provides the example of blackmail. *See* Merges, *Trouble with Trolls*, *supra* note 5, at 1588.

64. *See* Jiaqing “Jack” Lu, *The Economics and Controversies of Nonpracticing Entities (NPES): How NPES and Defensive Patent Aggregators Will Change the License Market*, 47 LES NOUVELLES 55, 60 (2012).

patent proliferation.”⁶⁵

Moreover, Professors John R. Allison, Mark A. Lemley, and Joshua Walker found substantial overlap between the most valuable and most litigated patents—importantly, the most litigated patents are “disproportionately owned by nonpracticing entities.”⁶⁶ Thus, according to the authors, NPEs may deserve “more respect than the current patent system (and certainly patent reformers) gives them.”⁶⁷

Some entities that do not practice a patented invention but may assert that patent against others may not be considered patent trolls. On closer examination, for example, many believe that universities are not trolls even though they are unlikely to practice the invention. Moreover, some entities that are practicing entities may have patents that they do not practice but may assert them against others.⁶⁸ Relatedly, some practicing entities may license to non-practicing entities to assert patents that the practicing entities do not practice against competitors to raise their costs of doing business.⁶⁹ Given the level of nuance, and perhaps for strategic reasons, the definition of a troll has changed over the years. Some definitions began to refer to a broad class of entities called “Non-practicing Entities” or “NPEs” for short. This group of entities included universities, for example. And, some began to refer to “Patent Assertion Entities” or “PAEs.” PAEs exist solely to assert patents.⁷⁰ Another term used in the literature is a “Patent Monetization Entity” or “PME,” which appears to be similar to a PAE.⁷¹

Professor Lemley and Douglas Melamed further refer to certain entities who essentially exist to extract “nuisance type settlements” from

65. *Id.* at 61.

66. John R. Allison, Mark A. Lemley & Joshua Walker, *Extreme Value or Trolls on Top? The Characteristics of the Most-Litigated Patents*, 158 U. PA. L. REV. 1, 3 (2009) [hereinafter *Extreme Value*].

67. *Id.* at 29.

68. See Colleen V. Chien, *From Arms Race to Marketplace: The Complex Patent Ecosystem and Its Implications for the Patent System*, 62 HASTINGS L.J. 297, 301 (2010) [hereinafter Chien, *Arms Race*] (“Practicing companies have used their once-defensive patents to selectively sue in areas in where they no longer or never did operate, using the same tactics as patent-assertion entities.”).

69. See Fiona M. Scott Morton & Carl Shapiro, *Strategic Patent Acquisitions*, 79 ANTI-TRUST L.J. 463, 494 (2014) [hereinafter Scott Morton & Shapiro, *Strategic*] (“We consider the hybrid PAE model to be the most troubling. We have in mind a hybrid PAE that is using outsized threats to obtain payments in excess of reasonable royalties, while working with a practicing entity that has its own incentive to raise its rivals’ costs.”).

70. The FTC PAE Report defines a patent assertion entity as

a firm that primarily acquires patents and seeks to generate revenue by asserting them against accused infringers. . . . PAE business models focus on asserting patents that the firm has acquired from third parties, rather than obtained from the U.S. Patent and Trademark Office (USPTO) through prosecution. Patents are a PAE’s principal asset; a PAE does not manufacture, distribute, or sell products.

FTC PAE REPORT, *supra* note 8, at 15.

71. See 2013 GAO REPORT, *supra* note 8, at 19 (“PMEs we spoke with did not develop technology or sell products but, instead, derived most of their revenue from asserting patents against operating companies.”).

practicing entities as “bottom-feeders.”⁷² By settling claims below the amount required to defend the lawsuit, the bottom-feeder can take advantage of certain aspects of patent litigation to extract settlement amounts from practicing entities below the costs to litigate the matter.⁷³ For example, the FTC has relied on American Intellectual Property Law Association data to state that it costs about \$300,000 to litigate the early stages of a patent case.⁷⁴ Thus, the nuisance settlement amount is around \$300,000.⁷⁵ Further, the FTC has separated Patent Assertion Entities into two groups: Portfolio Patent Assertion Entities and Litigation Patent Assertion Entities.⁷⁶ Portfolio Patent Assertion Entities maintain large portfolios of patents and derive a significant amount of revenue from licensing.⁷⁷ Moreover, seventy-eight percent of Portfolio Patent Assertion Entities’ cases settled for a larger amount than \$300,000.⁷⁸ Litigation Patent Assertion Entities have small portfolios (less than ten patents); they sue and usually settle shortly thereafter for less than \$300,000.⁷⁹ Litigation Patent Assertion Entities appear to be closer to entities in Professor Lemley and Melamed’s bottom-feeder group. Perhaps the most troubling NPE is one that asserts poor quality patents.⁸⁰

In short, the taxonomy of potential trolls has become relatively compli-

72. See Mark A. Lemley & A. Douglas Melamed, *Missing the Forest for the Trolls*, 113 COLUM. L. REV. 2117, 2176 (2013) [hereinafter Lemley & Melamed]. Notably, “in 2012 PAEs sued more non-tech companies than tech companies.” Colleen Chien, *Patent Trolls by the Numbers*, at 2 (Santa Clara Sch. of Law Faculty Publ’ns, 2013), <http://digitalcommons.law.scu.edu/cgi/viewcontent.cgi?article=1610&context=facpubs> [Perma link unavailable] [hereinafter Chien, *Numbers*]. Lemley and Melamed also describe “lottery-ticket” trolls who “own[] a patent and hope[] to strike it big in court.” Lemley & Melamed, *supra*, at 2126.

73. Professor Lemley and Douglas Melamed argue that the patent troll debate is very much about systemic problems in the patent system and not so much about one class of entities and their behavior. Thus, much of the analysis should not be weighted heavily on practicing status or not. See generally, Lemley & Melamed, *supra* note 72, at 2121. For a critique of Professor Lemley and Melamed’s article, see David L. Schwartz, *On Mass Patent Aggregators*, 114 COLUM. L. REV. SIDEBAR 51, 60–61 (2014). Professors Fiona M. Scott Morton and Carl Shapiro have stated that PAEs will attempt to use an outsized threat, such as an injunction or exclusion order, to push a target to settle for a higher royalty rate. See Scott Morton & Shapiro, *Strategic*, *supra* note 69, at 471–75.

74. FTC PAE REPORT, *supra* note 8, at 43.

75. *Id.*

76. *Id.*

77. *Id.* at 42. Importantly, the FTC found that “Portfolio PAEs generally reached licensing commitments without bringing litigation against a potential licensee: they executed 71% of their licenses without litigation.” *Id.* at 46. And, “Portfolio PAEs accounted for 9% of all licenses in the study [and] these licenses generated 80% of all revenue reported in the study.” *Id.*

78. *Id.* at 91. Notably, the FTC Report found that “53% of Portfolio PAE royalties were greater than \$2.5 million and 25% were between \$300,000 and \$2.5 million.” *Id.* at 91–92.

79. *Id.* at 92.

80. See Chien, *Numbers*, *supra* note 72, at 7 (noting sources that show that repeat NPEs “(8x or more) . . . lose more than 90% of the time in court” and “dominate PAE cases—61% of defendants named in 2011–2012 were sued by a PAE who had brought the case 8+ times”).

cated⁸¹ and may be subject to gaming.⁸² And, indeed, the debate has moved toward examining specific behavior of certain NPEs to decide whether they are not acting in socially beneficial ways.⁸³ As Professor Colleen V. Chien noted in her seminal article, *From Arms Race to Marketplace: The Complex Patent Ecosystem and Its Implications for the Patent System*,

The competing and even contradictory approaches of the arms race and marketplace operate alongside each other, not only within industries, but also oftentimes within companies. A company may use certain patents defensively to gain freedom to operate, but it may also opportunistically sell its patents or sue upon them. It may enjoy patent *détente* with certain of its competitors while also exploiting the asymmetric stakes it has with companies whose products are covered by its patents. Some non-practicing entities sue established companies for infringement of patents they have acquired, and others develop their own technology and seek to commercialize it. Each company is unique, and the approach a company takes to its patents in one area may differ significantly from the approach it takes in another. These profiles make it harder to make value judgments about companies based solely on whether they do or do not practice their patents.⁸⁴

There are a number of factors that may indicate that a particular entity may be engaging in behavior that should be discouraged. Some factors that may indicate that a particular entity is behaving similarly to a troll or

81. See John R. Allison, Mark A. Lemley & Joshua Walker, *Patent Quality and Settlement Among Repeat Patent Litigants*, 99 GEO. L.J. 677, 683 (2011) (describing taxonomy of entities, which includes several categories of non-practicing entities); see also COUNCIL OF ECONOMIC ADVISERS ISSUE BRIEF, *THE PATENT LITIGATION LANDSCAPE: RECENT RESEARCH AND DEVELOPMENTS 3* (2016) [hereinafter COUNCIL OF ECONOMIC ADVISERS] (“The NPE category includes patent assertion entities (PAEs) that assert infringement of a patent with the sole goal of generating revenues from licensing or settlements of litigation and may include individual inventors and universities who solely license patents to others These distinctions are not always easy to draw when categorizing plaintiffs in patent litigation. As a result, some studies do not attempt to differentiate between PAEs and other NPEs.” (citation omitted)). For a broader discussion of the narratives in patent litigation, including NPEs, see Colleen V. Chien, *Of Trolls, Davids, Goliaths, and Kings: Narratives and Evidence in the Litigation of High-Tech Patents*, 87 N.C. L. REV. 1571, 1571 (2009) [hereinafter Chien, *David*].

82. See Feldman, *Pace of Change*, *supra* note 62, at 636 (“With much money at stake, numerous entities have an incentive to craft the definition in a way that omits their own business model, a process that has resulted in intense lobbying not only of government officials, but also of academics.”).

83. Professor Carl Shapiro has “cautioned that distinguishing various types of entities can be a ‘dicey exercise.’” See Erica S. Mintzer & Suzanne Munck, *The Joint U.S. Department of Justice and Federal Trade Commission Workshop on Patent Assertion Entity Activities—Follow the Money*, 79 ANTITRUST L.J. 423, 426 (2014). Professor Robert P. Merges has stated that, “Trolling, to put it simply, is a matter of behavior rather than status. One can act as a troll, but it will usually not be true that one simply is a troll. The ‘troll line,’ in other words, must be policed case-by-case and fact-by-fact.” Merges, *Trouble with Trolls*, *supra* note 5, at 1611; see also Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 2009 (2007) (“Defining a patent troll has proven a tricky business, but that does not mean [that] the problem does not exist.”).

84. Chien, *Arms Race*, *supra* note 68, at 332–33.

“behaving badly” could include seeking an amount of damages lower than the cost of litigating the lawsuit;⁸⁵ filing a case in the Eastern District of Texas or, more generally, strategic forum shopping;⁸⁶ seeking willful infringement damages to incentivize settlement; settling a case very early in the litigation;⁸⁷ and a number of defendants⁸⁸ and lawsuits involving the patent.⁸⁹ Some supposed trolls may be asserting patents that based on some metrics are relatively valuable patents,⁹⁰ and many are software patents.⁹¹ The metrics used to assess value include “more claims, more

85. The FTC PAE Report identified this as a characteristic of Litigation PAEs. FTC PAE REPORT, *supra* note 8, at 10.

86. See 2013 GAO REPORT, *supra* note 8, at 23 (“For 2007 to 2011, an estimated 32 percent of patent infringement lawsuits were filed in 3 of the 94 federal district courts: the Eastern District of Texas, the District of Delaware, and the Central District of California.”); FTC PAE REPORT, *supra* note 8, at 80 (“The Eastern District of Texas and the District of Delaware accounted for the largest share of cases in the study (53% and 22%, respectively).”); PRICEWATERHOUSECOOPER, 2014 PATENT LITIGATION STUDY 4 (2014), <http://www.patentinsuranceonline.com/wp-content/uploads/2016/02/2014-patent-litigation-study.pdf> [<https://perma.cc/TG6L-3X3D>] [hereinafter, PWC 2014 PATENT STUDY] (“NPE cases continue to be concentrated in certain district courts: five district courts (out of a total of 94) accounted for 41% of all identified decisions where the patent holder was an NPE, with the Eastern District of Texas alone accounting for 12% of all identified NPE decisions.”). The PWC 2014 Patent Study further found that, “Texas Eastern, with the most identified NPE cases by far, also has one of the highest success rates, almost double the NPE average.”

87. See David L. Schwartz & Jay P. Kesan, *Analyzing the Role of Non-Practicing Entities in the Patent System*, 99 CORNELL L. REV. 425, 449 (2014) [hereinafter Schwartz & Kesan] (suggesting that future studies consider “the length of time NPE cases last”). Notably, the 2013 GAO Report found that, “Lawsuits brought by both operating companies and PMEs settled or likely settled at similar rates. . . . However, our analysis showed a statistically significant difference between suits involving software-related patents, of which 82 percent settled compared with 89 percent of suits that did not involve software-related patents.” 2013 GAO REPORT, *supra* note 8, at 25 n.46. Moreover, Professor Michael Risch notes that,

[S]ettlements might occur because the patents are strong, because the patents are weak, because defendants feared a jury, because the NPE sought a reasonable settlement that reflected the value of the patent, or because the NPE sought a nuisance settlement that overvalued the patent but remained less than trying the case.

See Michael Risch, *A Generation of Patent Litigation*, 52 SAN DIEGO L. REV. 67, 123 (2015).

88. Professor Colleen Chien found that, “‘Bottom feeder’ trolls make demands of many companies at once in order to get nuisance settlements. . . . The consensus appeared to be that many small companies settle such claims made by PAEs, whatever the merit, because they could not afford to fight them.” Chien, *Startups*, *supra* note 47, at 477.

89. *Id.* at 477–78 (“Small companies are also being used in order to secure a royalty rate or venue or ‘feed the war chest’ in support of campaigns against larger, deeper-pocketed targets, several interviewees said.” (footnote omitted)).

90. *Extreme Value*, *supra* note 66, at 28–29.

91. 2013 GAO REPORT, *supra* note 8, at 22 (“Specifically, about 84 percent of PME lawsuits from 2007 to 2011 involved software-related patents, while about 35 percent of operating company lawsuits did.”); Bessen and Meurer, *Costs*, *supra* note 58, at 394 (“Notice failure is likely for NPE lawsuits. Sixty-two percent of the time, they feature software patents, which are notoriously difficult to interpret . . . [and] patents asserted in NPE lawsuits are often subject to lengthy prosecutions, which delay public access to information about patent claims.” (footnote omitted)); see also FTC PAE REPORT, *supra* note 8, at 75–76 (“[A]pproximately 75% of cases solely involved Computers & Communications patents [and o]nly 7% of Portfolio PAE cases involved patents outside of the Computers & Communications or Other Electrical & Electronic categories. . . . [F]ewer than 15% of

prior art citations, more forward citations, a higher likelihood of assignment between issue and litigation, and larger numbers of continuation applications.”⁹² Trolls may also assert patents that are late-term patents—the patented invention has already been developed and the troll is merely taxing the invention.⁹³ Trolls may also strategically assert patents near major funding events of companies,⁹⁴ make outsized claims resulting in settlements at a nuisance level, assert low quality lawsuits, and “target firms that are flush with cash.”⁹⁵ All or a combination of these characteristics may point toward a particular entity exhibiting troll-like behavior.

B. AN OVERVIEW OF THE LITERATURE AND JUDICIAL AND LEGISLATIVE RESPONSES⁹⁶

The literature concerning patent trolls is substantial and arguably mixed as to whether troll behavior is problematic.⁹⁷ However, despite the mixed nature of whether there is a problem and vigorous arguments concerning the merits of patent trolls, the courts, legislators, and others have attempted to solve the patent troll problem. This section first examines the literature concerning whether a patent troll problem exists and secondly examines and attempts to address the supposed patent troll problem.

Litigation PAE cases involved patents outside of the Other Electrical & Electronic category and the Computers & Communication category.”).

92. *Extreme Value*, *supra* note 66, at 28.

93. Love, *Timing*, *supra* note 54, at 1312. PriceWaterhouseCooper finds that, [T]he overall success rate for practicing entities is 10% higher than that for NPEs over the last 19 years. NPEs are much less successful at the summary judgement stage: winning in only 3% of identified decisions, as opposed to 10% for practicing entities. Conversely, the trial success rate for practicing entities is nearly identical to that for NPEs, at roughly two-thirds.

PWC 2014 PATENT STUDY, *supra* note 86, at 10.

94. See Robin Feldman & Evan Frondorf, *Patent Demands and Initial Public Offerings*, 19 STAN. TECH. L. REV. 52, 54 (2015) (“[R]oughly 60% of information technology respondents reported receiving patent demands in the periods around the company’s IPO.”).

95. Lauren Cohen, Umit G. Gurun & Scott Duke Kominers, *Patent Trolls: Evidence from Targeted Firms 3* (Harvard Bus. Sch., Working Paper No. 15-002, 2014 (Revised Apr. 2017)), <http://www.hbs.edu/faculty/Pages/item.aspx?num=47648> [<https://perma.cc/FNX8-CNJR>] [hereinafter Cohen, Gurun & Kominers]. For a shorter version of the article, please see Lauren Cohen, Umit G. Gurun & Scott Duke Kominers, *The Growing Problem of Patent Trolling: Cash-Hungry Patent Trolls are Squelching Innovation—and Should Be Screened Out*, 352 SCIENCE 521, 521 (2016).

96. For an excellent overview of the literature concerning patent trolls, please see COUNCIL OF ECONOMIC ADVISERS, *supra* note 81, at 1; FTC PAE REPORT, *supra* note 8, at 20–28. PriceWaterhouseCooper also has published numerous yearly studies on patent litigation, which collect statistics concerning patent litigation suits for each year. For example, PriceWaterhouseCooper found that, as of 2014, “[d]amages awards for NPEs averaged more than triple those for practicing entities over the last four years.” PWC 2014 PATENT STUDY, *supra* note 86, at 3.

97. This paper highlights certain patent troll literature, but it does not attempt to address all patent troll literature.

1. A Sample of the Literature

As discussed *supra*, the primary argument against trolls is that they do not contribute to innovation but merely tax or thwart it. The argument in favor of trolls is that they may contribute to innovation by ultimately benefiting inventors through the creation of markets for inventions. Notably, the evidence concerning whether the costs outweigh the benefits of trolls is unclear.⁹⁸ For example, the FTC released a report entitled *Patent Assertion Activity: An FTC Study*, which analyzed non-public evidence collected from Patent Assertion Entities concerning “acquisition, litigation, and licensing practices.”⁹⁹ The FTC report makes numerous helpful findings; however, the FTC “does not address the efficiency of PAE business models” because the data collection procedures of the surveyed PAEs were not uniform.¹⁰⁰ Essentially, the FTC had difficulty ascertaining the amount of licensing revenue that may be returned to independent inventors.¹⁰¹ At the same time, Professors Bessen and Meurer found that the direct cost on practicing entities from NPE litigation was around “\$29 billion in 2011” and “much of this burden falls on small and medium-sized companies.”¹⁰² Bessen and Meurer further state that “publicly traded NPEs likely cost small and medium-sized firms more money than these NPEs transfer to inventors.”¹⁰³ However, Professors Kesan and Schwartz strongly criticize the methodology of Bessen and Meurer’s

98. See Schwartz & Kesan, *supra* note 87, at 451 (“Currently, there is a lack of scientific evidence that widespread and systemic problems exist with NPEs.”). Moreover, the Council of Economic Advisors notes that there is a greater need for more research concerning the effect of trolls on entrepreneurship, as opposed to innovation. See COUNCIL OF ECONOMIC ADVISERS, *supra* note 81, at 5 (discussing a paper “investigat[ing] the link between levels of patent litigation and venture capital (VC) investment in the United States, [as] an indicator of levels of entrepreneurial activity. [The paper] conclude[s] that VC investment initially increases with the number of litigated patents, but that beyond a certain threshold, further increases in litigated patents are associated with decreased VC investment.”); see also Lu, *supra* note 64, at 61 (“Empirically identifying and quantifying the benefits of NPEs are deemed to be challenging.”). Notably, one of the overarching problems in this area of scholarship is that the data underlying studies is often confidential. In a seminal article examining PAE suits between 2010 and 2012, Professor Christopher A. Cotropia, Jay P. Kesan, and David L. Schwartz release the data underlying their paper. See Christopher A. Cotropia, Jay P. Kesan & David L. Schwartz, *Unpacking Patent Assertion Entities (PAES)*, 99 MINN. L. REV. 649, 654–55 (2014). One of the important findings is that an increase in patent filings after 2011 was likely due to the joinder rule changes in the America Invents Act. Cotropia, Kesan & Schwartz, *supra*, at 655.

99. FTC PAE REPORT, *supra* note 8, at 2.

100. *Id.* at 8.

101. *Id.*

102. James Bessen & Michael J. Meurer, *The Direct Costs from NPE Disputes*, 99 CORNELL L. REV. 387, 389 (2014).

103. See *id.* (emphasis added). Professors Fiona M. Scott Morton and Carl Shapiro, relying on Bessen and Meurer’s empirical evidence, find that “additional patent monetization by PAEs is problematic from a public policy perspective.” See Scott Morton & Shapiro, *supra* note 69, at 494. Professors Morton and Shapiro state “[p]atent monetization harms consumers and decreases social welfare if the asserted patents do not create substantial value for the target products or consumers and if the original innovator does not receive a significant fraction of costs imposed by the PAE on its targets.” Scott Morton & Shapiro, *supra* note 69, at 494.

work.¹⁰⁴ In a separate study, Professor Roger Smeets finds that small firms experience a decrease in investment in innovation after patent litigation.¹⁰⁵

Moreover, numerous scholars have attempted to validate whether the arguments for and against trolls are supported empirically. In a published draft paper titled *Patent Trolls: Evidence from Targeted Firms*, Lauren Cohen, Umit G. Gurun, and Scott Duke Kominers state “that the key question for assessing NPEs’ welfare impact concerns lawsuit targeting behavior: *Do NPEs on average police against true infringement, or do they primarily behave opportunistically, bringing lawsuits irrespective of whether infringement has occurred?*”¹⁰⁶ The answer to this question, according to their research, is “that NPEs appear to behave opportunistically.”¹⁰⁷ They make numerous findings that support this conclusion: First, they find that firms with substantial cash resources are often the targets of NPEs, including when compared to practicing entities.¹⁰⁸ Second, they find that “NPEs bring lower-quality lawsuits, and [there is] evidence that NPEs are actively forum shopping.”¹⁰⁹ Third, they find that “NPEs target firms against which they have a higher *ex ante* likelihood of winning . . . [such as] target[ing] firms that are busy dealing with other, non-IP related litigation.”¹¹⁰ Fourth, similar to other authors, they find that “NPEs frequently . . . assert patents that appear to be broader, wordier, and closer to expiry than those asserted by PEs.” Finally, the authors state,

Using a differences-in-differences approach, we find that firms that lose to NPEs (either in court or through settlement) reduce their research and development investment by roughly 20% going forward, relative to *ex ante* identical firms. Thus, our evidence suggests

104. See Schwartz & Kesan, *supra* note 87, at 431–48. Schwartz and Kesan argue that there are at least four problems with the methodology, including “[f]igures [b]ased on [a b]iased [s]ample”; “[l]ack of [b]asis for [c]omparison of [f]igures”; [q]uestionable [d]efinition of NPE”; and “[l]ack of [c]redible [i]nformation on [b]enefits of NPEs.” See *id.* at 433. Professors Kesan and Schwartz conclude that,

[W]e believe that Bessen and Meurer have not provided sufficient valid data to make a full diagnosis of the problem. They have not adequately studied the problem, and therefore we believe that their conclusions are premature and perhaps even unfounded. Currently, there is a lack of scientific evidence that widespread and systematic problems exist with NPEs, and if they do, what the magnitude of the problem is.

Id. at 451.

105. See Roger Smeets, *Does Patent Litigation Reduce Corporate R&D? An Analysis of US Public Firms* 3 (Apr. 2014) (unpublished manuscript), https://www.researchgate.net/publication/272299903_Does_Patent_Litigation_Reduce_Corporate_RD_An_Analysis_of_US_Public_Firms?e=prf_high [Perma link unavailable] (“The reduction in R&D intensity is between 2.6–4.7% [T]he R&D-detering impact of patent litigation is most pronounced when there is technological overlap between the patent(s) asserted in the lawsuit, and the patent portfolio of the defendant.”).

106. Cohen, Gurun & Kominers, *supra* note 95, at 2.

107. *Id.* at 3.

108. *Id.*

109. *Id.*

110. *Id.* at 4.

that NPE litigation causes a real decrease in innovation at targeted firms. Of course, when NPEs win lawsuits, some of the losses to the targeted firms—part of the settlement or damage award, but not the legal costs—should eventually flow back to end inventors. The best available estimates suggest, however, that only a small fraction of the damages won by NPEs are actually paid back to innovators. As our theoretical model illustrates, when only small transfers reach end inventors, NPEs' value in encouraging invention—both directly and indirectly—is significantly dampened. Moreover, we show empirical evidence consistent with this lack of pass-through impact from NPEs on innovation.¹¹¹

On the other hand, Professor Michael Risch finds in an examination of the practices of the ten most litigious NPEs that many beliefs about patent trolls are not supported.¹¹² For example, he finds that (1) “NPEs are not particularly new”; (2) “their patents look like other litigated patents”; (3) the available information implies that NPE patent quality is not drastically lower than other litigated patents'. The same cannot be said for litigation quality; trolls almost never won infringement judgments.”; (4) “productive companies originally obtained most of the patents now asserted by NPEs, and non-productive companies whose only purpose was to obtain and monetize patents originally obtained a few of the patents”; (5) “very few of the companies supplying patents to NPEs are out of business; instead, most patents came from productive companies and most of those continue to operate”; and (6) “[W]hile the timing of lawsuits was not consistently ‘trollish,’ the moniker may be somewhat accurate. The average patent sat on the shelf for more than seven years before being litigated, though several were asserted almost immediately.”¹¹³ Professor Risch also finds that some arguments in support of so-called trolls are not supported by evidence.¹¹⁴ For example, he finds that,

First, the evidence does not support a theory that NPEs incentivize investment by providing a market for patents. A small percentage of

111. *Id.* (footnote omitted) (citations omitted). Importantly, Professor Ted Sichelman has critiqued an August 2014 version of this paper. He states:

In sum, the study does not make well-justified findings and as such should not be relied upon in any fashion for policymaking. First, at least in the current version of the paper, the authors rely on a dataset that is incomplete and very likely unrepresentative. Second, the authors make numerous explicit or implicit assumptions regarding patents and patent litigation that are inaccurate or incomplete—including the nature of patent scope, the drivers of patent infringement, litigation remedies, litigant (especially NPE) types, the role of law firms, and the categorization of case outcomes—that additionally cast doubt on the soundness of their findings. Finally, even if every one of the authors' findings were correct, they draw inferences and make policy prescriptions not supported by their findings.

Ted Sichelman, *Are Patent Trolls “Opportunistic”?* 3 (San Diego Legal Studies Paper, No. 14-175, 2015), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2520125 [https://perma.cc/DZ3M-L47A].

112. See Michael Risch, *Patent Troll Myths*, 42 SETON HALL L. REV. 457, 460 (2012) [hereinafter Risch, *Myths*].

113. *Id.* at 460–61.

114. *Id.* at 461.

the companies that obtained NPE patents received venture capital investment, as did a random group of companies that held patents. While there is a difference between the two, that difference is not clearly attributable to NPE activity. That said, any startup holding a patent is much more likely to receive funding than a company without patents, and it is at least possible that NPEs contribute to this increased probability.

Second, it is unlikely that NPEs are vindicating the rights of small companies forced out of business by infringers. Very few of the initial owners of NPE patents failed, and the patents were held for a long time before they were asserted. Finally, the evidence does support one defense of NPEs: NPEs provide a better way for individual inventors to enforce their patents than bringing lawsuits themselves.¹¹⁵

Professor Risch's overall point is that supposed troll litigation does not look substantially different than litigation involving practicing entities.¹¹⁶

In an important article on measuring patent licensing demands' impact on innovation, Professors Robin Feldman and Mark Lemley find that patent demands do not, in most cases, lead to innovation.¹¹⁷ In fact, the authors find that "very few patent license demands actually lead to new innovation; most demands simply involve payment for the freedom to keep doing what the licensee was already doing."¹¹⁸ As discussed *supra*, one of the arguments in favor of patent trolls is that they serve to facilitate matchmaking between patent holders and commercialization partners. Professors Feldman and Lemley seem to refute that argument; however, as the authors note, there are a small number of respondents to the survey.¹¹⁹ Thus, the authors call for more research.¹²⁰ Importantly, the authors state, "[O]ur results seem to hold regardless of whether the patent owner seeking a license is a patent troll, a product-producing company, or a university."¹²¹ In fact, even demands from universities "were also unlikely to generate technology transfer."¹²² This seems to indicate that those demands merely tax innovation without contributing to it. The FTC found that patent demands tend not to lead to licensing revenue without also filing litigation.¹²³ This leads the FTC to recommend that reforming practices concerning demand letters may not lead to meaningful change.¹²⁴

Commentators have made numerous proposals to address the sup-

115. *Id.*

116. *Id.* at 458.

117. Feldman & Lemley, *Demands*, *supra* note 50, at 137.

118. *Id.*

119. *Id.* at 139.

120. *Id.*

121. *Id.*

122. *Id.* at 160.

123. FTC PAE REPORT, *supra* note 8, at 13.

124. *Id.* at 5.

posed patent troll problem.¹²⁵ For example, Professor Brian J. Love has recommended ending patent terms earlier and increasing maintenance fees to address NPEs that likely assert patents *ex post*.¹²⁶ Professors Lemley and Melamed have suggested reforms, including reducing the costs of discovery to make bottom-feeder activity less profitable.¹²⁷

2. *Some Judicial and Legislative Responses*

Despite the relatively mixed evidence concerning the merits of patent trolls, the U.S. Supreme Court and the U.S. Court of Appeals for the Federal Circuit have issued numerous decisions that arguably are directed at addressing the patent troll phenomena. Each of these decisions attempts to make it more difficult for the patent troll business model to succeed. The U.S. Congress and state legislators have also passed legislation to address the patent troll phenomena.

The first U.S. Supreme Court decision to address patent trolls is likely the *eBay Inc. v. MercExchange, L.L.C.* decision.¹²⁸ In that case, the U.S. Supreme Court directed lower courts to apply the four-factor test for issuing permanent injunctions instead of a modified test that had been applied by the U.S. Court of Appeals for the Federal Circuit.¹²⁹ The Federal Circuit's test made it easier to obtain a permanent injunction. In a concurrence in that case, Justice Kennedy specifically addressed the patent troll issue, stating,

In cases now arising trial courts should bear in mind that in many instances the nature of the patent being enforced and the economic function of the patent holder present considerations quite unlike earlier cases. An industry has developed in which firms use patents not as a basis for producing and selling goods but, instead, primarily for obtaining licensing fees. For these firms, an injunction, and the potentially serious sanctions arising from its violation, can be employed as a bargaining tool to charge exorbitant fees to companies that seek to buy licenses to practice the patent.¹³⁰

This case arguably reduced the leverage possessed by patent trolls by lessening the likelihood of the issuance of a permanent injunction. This results in a lessening of the opportunity of a patent troll to assert an oversized claim.

The U.S. Supreme Court also issued *KSR International Co. v. Teleflex*

125. Patent reform proposals directed to the overall patent system may alleviate some of the issues associated with supposed patent trolls. For example, Professor Lisa Larrimore Ouellette proposed to use peer review to strengthen patent disclosure. See Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information?*, 25 HARV. J.L. & TECH. 545, 590–95 (2012); Lisa Larrimore Ouellette, *Pierson, Peer Review, and Patent Law*, 69 VAND. L. REV. 1825, 1836–48 (2016).

126. Love, *Timing*, *supra* note 54, at 1313–14.

127. Lemley & Melamed, *supra* note 72, at 2177.

128. 547 U.S. 388, 390–91 (2006).

129. *Id.* at 393–94.

130. *Id.* at 396 (Kennedy, J., concurring) (citation omitted).

Inc., which made it easier to find some patented inventions obvious.¹³¹ In that case, the Supreme Court rejected a rigid application of the teaching, suggestion, and motivation test to determine obviousness.¹³² The Supreme Court allowed a flexible application of the test, which makes it more likely that patented combination inventions may be found obvious.¹³³

The U.S. Supreme Court issued the *Octane Fitness, LLC v. Icon Health & Fitness, Inc.* decision¹³⁴ and a companion case, *Highmark Inc. v. All-care Health Management System, Inc.*¹³⁵ The *Octane Fitness* decision makes it easier to obtain attorney's fees against parties bringing exceptional cases.¹³⁶ Thus, a party defending litigation brought by a troll may be more likely to obtain attorney's fees, which may provide a disincentive for trolls to litigate a frivolous suit.¹³⁷ This increases the leverage available to alleged infringers against patent trolls.

In a series of cases restricting the scope of patent eligible subject matter, the U.S. Supreme Court also made it more likely that patents controlled by patent trolls are invalid, particularly in the software space.¹³⁸ Specifically, in *Alice Corp. Pty. Ltd. v. CLS Bank International*, the U.S. Supreme Court applied a test that makes claims on pure software likely invalid.¹³⁹ The Federal Circuit has defined this test in a way to make some software patents valid,¹⁴⁰ but several prominent intellectual property groups are attempting to legislatively overrule *Alice* and recent related cases.¹⁴¹

In *TC Heartland LLC v. Kraft Foods Group Brands LLC*,¹⁴² the U.S.

131. 550 U.S. 398, 419 (2007).

132. *See generally id.*

133. *Id.*

134. 134 S. Ct. 1749 (2014).

135. 134 S. Ct. 1744 (2014).

136. *Octane Fitness*, 134 S. Ct. at 1755–56.

137. Recently, the Federal Circuit decided in *Lumen View Technology LLC v. Findthebest.com, Inc.* that an exceptional case finding was appropriate, but it was improper to double the awarded fees for the purpose of added deterrence against a supposed troll. 811 F.3d 479, 484 (Fed. Cir. 2016). The Federal Circuit does state that the judge can consider deterrence when determining whether to order the fees, but not in assessing the amount of fees. *Id.* at 484–85. The court also indicated that Rule 11 sanctions may be available. *Id.* at 485. This case may not create a sufficient specific and general deterrence effect on trolls.

138. Professor Lisa Larrimore Ouellette states that courts should be comfortable with drawing bright-line PESH tests because there are other incentives to promote invention in certain technological fields such as biotechnology and pharmaceuticals. *See* Lisa Larrimore Ouellette, *Patentable Subject Matter and Nonpatent Innovation Incentives*, 5 U.C. IRVINE L. REV. 1115, 1119–20 (2015).

139. 134 S. Ct. 2347, 2350–51 (2014).

140. *See, e.g.,* *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1339 (Fed. Cir. 2016); *Amdocs (Isr.) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1299–30 (Fed. Cir. 2016).

141. *See, e.g.,* Letter from Mark Whitaker, President, Am. Intellectual Prop. Law Ass'n, to President-Elect Donald J. Trump (Jan. 4, 2017) (on file with the American Intellectual Property Law Association), <http://www.aipla.org/resources2/reports/2017AIPLADirect/Documents/AIPLA%20Letter%20to%20President-Elect%20Donald%20Trump.pdf> [<https://perma.cc/NXH8-G8Q7>].

142. 137 S. Ct. 1514, 1517 (2017).

Supreme Court interpreted 28 U.S.C. § 1400(b), the patent venue statute, to make it more likely that cases will not be brought in the Eastern District of Texas. The Eastern District of Texas is often viewed as a pro-plaintiff and pro-troll venue.¹⁴³

In the 2011 *Uniloc USA, Inc. v. Microsoft Corp.* decision, the U.S. Court of Appeals for the Federal Circuit decided that the twenty-five percent rule for determining damages was inappropriate and that damages awards should take into account the relative contribution of the patent to the alleged infringing product.¹⁴⁴ This decision and others apparently led to lower damages awards.¹⁴⁵

Congress passed The Leahy-Smith America Invents Act (AIA), which contains numerous provisions that may impact patent trolls.¹⁴⁶ First, the Inter Partes Review Proceedings allow parties to quickly and inexpensively challenge patents on specific grounds.¹⁴⁷ This allows parties defending troll suits to invalidate patents held by trolls. Second, there is a specific transitional program allowing for challenging business method patents.¹⁴⁸ Third, the AIA created a post-grant review process to challenge patents based on more grounds than IPRs.¹⁴⁹ The AIA also restricts the number of defendants that can be joined in a single lawsuit, which was directed at patent trolls who frequently joined many defendants.¹⁵⁰ This enactment likely increased the costs of filing for supposed patent trolls. The GAO found that there was a relatively sharp increase in filings immediately prior to the enactment of the AIA.

Congress has also considered numerous legislative proposals to address patent trolls.¹⁵¹ The FTC Report describes two bills that make the following changes: “[g]reater specificity in demand letters”; “[h]eightedened pleading requirements”; “[g]reater transparency of patent ownership”;

143. See Daniel Nazer & Vera Ranieri, *Why Do Patent Trolls Go to Texas? It's Not for the BBQ*, ELECTRONIC FRONTIER FOUND. (July 9, 2014), <https://www.eff.org/deeplinks/2014/07/why-do-patent-trolls-go-texas-its-not-bbq> [<https://perma.cc/Z5M6-2GFQ>]; Adam Liptak, *Supreme Court Considers Why Patent Trolls Love Texas*, N.Y. TIMES (Mar. 27, 2017), https://www.nytimes.com/2017/03/27/business/supreme-court-patent-trolls-tc-heartland-kraft.html?rref=collection%2Fbyline%2Fadam-liptak&action=click&contentCollection=undefined®ion=stream&module=stream_unit&version=latest&contentPlacement=147&pgtype=collection [Perma link unavailable] (“More than 40 percent of patent lawsuits are filed in a federal court in East Texas with a reputation for friendliness to plaintiffs.”).

144. 632 F.3d 1292, 1315–18 (Fed. Cir. 2011).

145. 2013 GAO REPORT, *supra* note 8, at 33–34 (“[S]takeholders noted this 2011 decision and other decisions have had the effect of lowering damage awards to reflect a patent’s value or eliminated the potential for enhanced damages.”).

146. Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (codified as amended in scattered sections of Title 35 of the United States Code).

147. See 35 U.S.C.A. §§ 311–319 (West 2013); 2013 GAO REPORT, *supra* note 8, at 8.

148. 37 C.F.R. § 42.300 (2016); 2013 GAO REPORT, *supra* note 8, at 9.

149. 2013 GAO REPORT, *supra* note 8, at 9.

150. 35 U.S.C.A § 299 (West 2013); 2013 GAO REPORT, *supra* note 8, at 15.

151. See *Patent Progress’s Guide to Federal Patent Reform Legislation*, PAT. PROGRESS, <https://www.patentprogress.org/patent-progress-legislation-guides/patent-progresss-guide-patent-reform-legislation/> [<https://perma.cc/PJ4M-N3D6>] (last visited Feb. 7, 2018) (describing fourteen bills directed at patent reform and trolls).

“[e]nd-user stay of infringement litigation”; “[l]imiting discovery costs”; and “[f]ee-shifting to losing parties.”¹⁵²

In 2015, the United States Supreme Court abrogated the use of Form 18 for complaints, which allowed for very simple pleadings without detail in patent infringement cases.¹⁵³ Notably, patent infringement plaintiffs must now comply with the much higher pleading standards in *Bell Atlantic Corp. v. Twombly*¹⁵⁴ and *Ashcroft v. Iqbal*.¹⁵⁵

Additionally, the U.S. Patent and Trademark Office (USPTO) adopted numerous initiatives to improve patent quality.¹⁵⁶ However, this may not address the patent troll issue as many patents asserted by trolls appear to be valuable patents. While value may not map exactly onto quality, there may be a relationship between the two given the factors used to determine value. For example, more claims may mean that at least one claim will be narrow enough to overcome an obviousness challenge; although, a narrow claim may make infringement less likely. Finally, state legislators have passed legislation designed to confront the patent troll problem.¹⁵⁷

C. THE SNE DATASET¹⁵⁸

The SNE Dataset is an ambitious project conducted at Stanford University Law School reviewing nonpracticing entity litigation activity.¹⁵⁹ As discussed *supra*, one of the most difficult issues concerning analyzing the impact of nonpracticing entity litigation is attempting to categorize those entities by behavior. The researchers at Stanford used the classification system developed by Professors Allison, Lemley, and Walker to categorize thousands of patent litigations filed in U.S. district court from 2000

152. FTC PAE REPORT, *supra* note 8, at 32–33. The FTC also entered into a settlement agreement with a supposed troll. See Press Release, Fed. Trade Comm’n, FTC Settlement Bars Patent Assertion Entity from Using Deceptive Tactics (Nov. 6, 2014), <https://www.ftc.gov/news-events/press-releases/2014/11/ftc-settlement-bars-patent-assertion-entity-using-deceptive> [<https://perma.cc/R8HS-WUGV>]; see also Mike Mireles, *U.S. Federal Trade Commission and NPE Enter Settlement Agreement*, IP FIN. (Nov. 6, 2014, 9:21 PM), <http://www.ip.finance/2014/11/us-federal-trade-commission-and-npe.html> [<https://perma.cc/6YQA-DSB3>].

153. Supreme Court of the United States, Order of April 29, 2015, [https://www.supremecourt.gov/orders/courtorders/frcv15\(update\)_1823.pdf](https://www.supremecourt.gov/orders/courtorders/frcv15(update)_1823.pdf) [<https://perma.cc/LX7T-G54B>] (ordering the 2015 Amendments to the Federal Rules of Civil Procedure).

154. 550 U.S. 544 (2007).

155. 556 U.S. 662 (2009). For additional discussion about the impact of Form 18’s abrogation, see Leeron Morad & Andrew J. Bramhall, *An Early Review of the Impact of Form 18’s Elimination on Pleading Direct Infringement*, PATENTLY-O (Apr. 6, 2016), https://patentlyo.com/patent/2016/04/elimination-pleading-infringement.html#_edn3 [<https://perma.cc/VPP3-6HZG>].

156. For a description of some of these proposals, see 2013 GAO REPORT, *supra* note 8, at 39–44.

157. See Rebecca Schoff Curtin, *Slapping Patent Trolls: What Anti-Trolling Legislation Can Learn from the Anti-SLAPP Movement*, 18 STAN. TECH. L. REV. 39, 52–66 (2014) (discussing state anti-troll legislation).

158. Shawn P. Miller et al., Introduction to the Stanford NPE Litigation Dataset 1 (Oct. 23, 2017 draft), <https://law.stanford.edu/projects/stanford-npe-litigation-dataset/#slsnav-suggested-research-uses> [<https://perma.cc/D3JK-H7FA>].

159. *Id.*

to 2015.¹⁶⁰ The currently released dataset “include[es] a 20% random sample of lawsuits filed between 2000 and 2015”; the dataset covers even years from 2000 through 2014 and essentially every lawsuit filed in 2011, 2012, and 2013.¹⁶¹

The classification system includes the following categories: (1) acquired patents; (2) university heritage or tie; (3) failed startup; (4) corporate heritage; (5) individual-inventor-started company; (6) university/government/non-profit; (7) startup, pre-product; (8) product company; (9) individual; (10) undetermined; (11) industry consortium; (12) IP subsidiary of product company; and (13) corporate-inventor-started company.¹⁶² In categorizing the litigations, the researchers used LexMachina’s database concerning patent litigation as well as categorization information from other researchers. The researchers note that only one type of patent assertor, Category 8 (product company), is a “practicing entit[ly that] actually make[s] products or offer[s] services for sale.” Moreover, “entities . . . [in] Category 1 (acquired patents), Category 4 (corporate heritage), or Category 5 (individual-inventor started company)” are typically known as “patent troll[s]” by “those who use the term.”¹⁶³

The two most important categories that are the subject of this article include category 2, university heritage or tie, and category 6, university/government/non-profit. According to the researchers, “Category 6 includes any patent assertor that is a university, government entity, or a not-for-profit institution.” Additionally, the researchers state, “Category 2 entities are not themselves universities but are rather ‘IP subsidiaries’ of universities or separate licensing firms known to primarily assert patent rights on behalf of universities. Examples include the Wisconsin Alumni Research Foundation, the University of Colorado Foundation, and Competitive Technologies Inc.” The evidence used to categorize entities as Category 2 included “[t]he pleadings, company website, news reports, or other filings indicat[ing] that the company has ties to a university or exists to license university intellectual property [and t]here is no evidence suggesting the entity is actually the university itself or an alias for the university.”¹⁶⁴ The evidence used for Category 6 included evidence that “[t]he pleadings or website of the entity states that it is an institution for higher education, a government body, or a non-profit organization.”¹⁶⁵

III. UNIVERSITY AND NON-PROFIT PATENTING AND LITIGATION

This Part discusses university and non-profit patent litigation. First, it

160. *Id.* at 6.

161. *Id.* at 8.

162. *Id.* at 6.

163. *Id.* at 7.

164. *Id.* at 10–11.

165. *Id.* at 12.

reviews U.S. universities, including the Bayh-Dole Act,¹⁶⁶ prior research concerning university litigation, and additional patent related legislation and case law that privileges many universities in the patent sphere in the United States. This Part also discusses non-profit and foreign university patent litigation. As discussed *infra*, separating out the litigation by these types of entities provides a more nuanced analysis about the litigation itself and the possible implications of that litigation. Finally, there is a discussion of the reasons for concern for the future of university and non-profit litigation.

A. U.S. UNIVERSITIES

U.S. universities are public and private;¹⁶⁷ although, almost all private universities benefit from some public subsidy.¹⁶⁸ U.S. public and private universities also benefit from a charitable tax deduction for donations to universities that may form an endowment, which helps fund the activities of the university.¹⁶⁹ Many public and private universities have substantial endowments.¹⁷⁰ For example, Stanford University's endowment was \$22,398,130,000; the University of California system's was \$8,341,073,000; University of Wisconsin Foundation's was \$2,419,161,000; and the Michigan State University Foundation's was \$361,090,000.¹⁷¹

Importantly, many U.S. universities originated as land-grant colleges.¹⁷² These are colleges that were created for a specific purpose: "to provide instruction in agriculture and the mechanical arts, conduct agricultural research, and deliver knowledge and practical information to

166. University and Small Business Patent Procedures (Bayh-Dole) Act of 1980, Pub. L. No. 96-517, 94 Stat. 3015 (codified as amended at 35 U.S.C. §§ 200-211 (2000)).

167. For a listing of public and land-grant universities, see the members list of the Association of Public & Land-Grant Universities, *Members*, ASS'N PUB. & LAND-GRANT U. <http://www.aplu.org/members/> [<https://perma.cc/N5T7-3RPX>].

168. See M. Douglas, *Public and Private: What's the Difference?*, INSIDE HIGHER ED (Mar. 6, 2006), <https://www.insidehighered.com/views/2006/03/06/lombardi> [<https://perma.cc/DS2Z-F8UC>] (discussing public benefits provided to private universities).

169. See AM. COUNCIL ON EDUC., UNDERSTANDING COLLEGE AND UNIVERSITY ENDOWMENTS (2014), <http://www.acenet.edu/news-room/Documents/Understanding-Endowments-White-Paper.pdf> [<https://perma.cc/MPL5-FV2H>]; ASS'N OF AM. UNIVS., CHARITABLE GIVING AND UNIVERSITIES AND COLLEGES: INTERNAL REVENUE CODE SECTION 170 (2014), <https://www.aau.edu/sites/default/files/AAU%20Files/Key%20Issues/Taxation%20%26%20Finance/Charitable-Gifts-FINAL.pdf> [<https://perma.cc/X5PU-FZX7>] ("As charitable tax-exempt entities, universities and the foundations that support them are among the beneficiaries of individual and corporate giving. . . . [U]niversities and colleges in 2013 received \$33.8 billion in charitable gifts to support their educational missions of teaching, research, and public service.").

170. See NAT'L ASS'N OF COL. AND UNIV. BUS. OFFICERS, U.S. AND CANADIAN INSTITUTIONS LISTED BY FISCAL YEAR (FY) 2016 ENDOWMENT MARKET VALUE AND CHANGE IN ENDOWMENT MARKET VALUE FROM FY2015 TO FY2016 (revised Feb. 2017), <http://www.nacubo.org/Documents/EndowmentFiles/2016-Endowment-Market-Values.pdf> [<https://perma.cc/AJV2-5HT6>] [hereinafter ENDOWMENT VALUE].

171. *Id.* Individual University of California campuses have endowments listed separately as well. See *id.*

172. See generally NAT'L RESEARCH COUNCIL, COLLEGES OF AGRICULTURE AT THE LAND GRANT UNIVERSITIES: A PROFILE 1-2 (1995), <https://www.nap.edu/read/4980/chapter/2> [<https://perma.cc/SA4U-Z6GB>].

farmers and consumers.”¹⁷³ Thus, these universities had a clear mission that was arguably grounded in practical and applied knowledge. Moreover, land-grant universities were funded through an endowment provided to states, created through the sale or use of federal lands for profit.¹⁷⁴ These universities could be private or public.

U.S. universities have been engaged in technology transfer for decades. Indeed, some have argued that the culture in many U.S. universities is suited to encouraging the close collaboration between industry and academia. The primary method of technology transfer is the passage of information from professor to student. Other forms of technology transfer include publications, consulting, patents, and collaborative engagements.

The first part of this section discusses the Bayh-Dole Act, which arguably changed university technology transfer throughout the world by creating incentives for universities, non-profits, and others to commercialize technology through the allocation of ownership of patented government-funded inventions.¹⁷⁵ Many scholars have criticized the Bayh-Dole Act for arguably creating unintended consequences, including shifting norms in academia as well as the development of an anticommons thwarting innovation.¹⁷⁶ However, the Bayh-Dole Act has many supporters, and a version of the Bayh-Dole Act has been adopted in many countries.¹⁷⁷ The second section discusses in detail several prior studies conducted examining university litigation. Finally, there is a discussion of universities as a privileged class of entities in U.S. patent law.

1. *The Bayh-Dole Act*

The Economist has called the Bayh-Dole Act “[p]ossibly the most inspired piece of legislation to be enacted in America over the past half-century.”¹⁷⁸ The impact of the Bayh-Dole Act should not be understated. For example, the Association of University Technology Transfer Managers (AUTM) tracks the number of patents and licensing deals by universities per year in its annual survey.¹⁷⁹ Notably, patenting and licensing has

173. *Id.* at 1.

174. *Id.* at 2–3.

175. See THEODORE M. HAGELIN, *TECHNOLOGY INNOVATION LAW AND PRACTICE: CASES AND MATERIALS* 38–39 (2011) [hereinafter HAGELIN].

176. See generally Arti K. Rai & Rebecca S. Eisenberg, *Bayh-Dole Reform and the Progress of Biomedicine*, 66 *LAW & CONTEMP. PROBS.* 289, 294 (2003); Gary Pulsinelli, *Share and Share Alike: Increasing Access to Government-Funded Inventions Under the Bayh-Dole Act*, 7 *MINN. J.L. SCI. & TECH.* 393, 415–18, 425 (2006).

177. See Michael S. Mireles, *Adoption of the Bayh-Dole Act in Developed Countries: Added Pressure for a Broad Research Exemption in the United States?*, 59 *ME. L. REV.* 259, 260 (2007); Michael S. Mireles, *The Bayh-Dole Act and Incentives for the Commercialization of Government-Funded Invention in Developing Countries*, 76 *UMKC L. REV.* 525, 525 (2007).

178. *Opinion, Innovation's Golden Goose*, *ECONOMIST* (Dec. 12, 2002), <http://www.economist.com/node/1476653> [<https://perma.cc/3GGZ-9SGQ>].

179. *AUTM Licensing Activity Surveys*, ASS'N OF UNIV. TECH. MANAGERS, <https://www.autm.net/resources-surveys/research-reports-databases/licensing-surveys/> [<https://perma.cc/7J7W-3YNN>].

increased substantially since the passage of the Act. The National Academy of Sciences compared AUTM annual surveys from 1996 to 2004 and found that “[n]ew patent applications filed increased from an average of 22.8 per institution [surveyed] . . . to an average of 73.4 per institution in 2004.”¹⁸⁰ This represented a growth of 222% per institution.¹⁸¹ In 2014, 6,363 U.S. patents were issued, representing an 11% increase over the prior year.¹⁸² In 2015, AUTM found that 6,680 U.S. patents were issued to universities, which represented a 5% increase over the prior year.¹⁸³ Despite this increase in patenting by universities post-Bayh-Dole Act, Professor Ted Sichelman points to the undercommercialization of these patented technologies and the difficulties of tailoring patents to encourage commercialization.¹⁸⁴

The Bayh-Dole Act creates incentives for universities to patent and license government-funded inventions.¹⁸⁵ Prior to passage of the Act, each distributor of federal funding for inventions had its own policy concerning the ownership and licensing of government-funded inventions.¹⁸⁶ Arguably, this failure to have a harmonized policy and the allocation of ownership under the prior policies resulted in a tragedy—the undercommercialization of government-funded inventions.¹⁸⁷ This essentially meant that prior to the Bayh-Dole Act many government-funded inventions “languished” on the shelf and were unable to attract the necessary capital and effort to commercialize those inventions for the benefit of the public.¹⁸⁸ The Bayh-Dole Act harmonizes the policies to create a main overarching system for the treatment of government-funded inventions.¹⁸⁹ Importantly, the Bayh-Dole Act creates incentives for universi-

180. NAT'L RESEARCH COUNCIL, *MANAGING UNIVERSITY INTELLECTUAL PROPERTY IN THE PUBLIC INTEREST* 19 (Stephen A. Merrill & Anne-Marie Mazza eds., 2011).

181. *Id.*

182. ASS'N OF UNIV. TECH. MANAGERS, *U.S. LICENSING ACTIVITY SURVEY: FY2014* (2016), <http://www.autm.net/resources-surveys/research-reports-databases/licensing-surveys/fy-2014-licensing-survey/> [<https://perma.cc/6AH7-LM8Q>].

183. ASS'N OF UNIV. TECH. MANAGERS, *U.S. LICENSING ACTIVITY SURVEY: FY2015* (2017), <http://www.autm.net/fy2015-survey> [<https://perma.cc/QLC8-DMRL>].

184. See Ted Sichelman, *Commercializing Patents*, 62 *STAN. L. REV.* 341, 362–88 (2010). Professor Sichelman argues for a “commercialization patent.” *Id.* at 396. One major research institution in the United States has decided to decline to claim intellectual property rights in its research. See Christian A. Angotti, *The Industry Too Big to Fall . . . Stumbling: Evaluating Academia's Use of Patent Rights and Its Consequential Effects on Public-Private Partnership Negotiations with Pharmaceutical Companies*, 18 *DUQ. BUS. L.J.* 219, 220 (2016) (“Penn State’s Office of Technology Management realized ‘[the traditional method] has kept some industry from collaborating with academia.’”).

185. See Robert Hardy, *21 Questions and Answers about University Technology Transfer* 8 (Council on Governmental Relations, 2010), http://www.cogr.edu/sites/default/files/21_Questions_Paper.pdf [<https://perma.cc/6L25-4NQE>].

186. See *id.* at 6.

187. See Rebecca S. Eisenberg, *Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research*, 82 *VA. L. REV.* 1663, 1669–70 (1996).

188. See *id.* at 1702; HAGELIN, *supra* note 175, at 486 (“It was estimated that only 5% of government-owned patents were ever licensed to the private sector.”).

189. See Eisenberg, *supra* note 187, at 1669–70; HAGELIN, *supra* note 175, at 486 (“There were many barriers to licensing government-owned patents, including the length

ties, researchers, and private industry to engage in the commercialization of government-funded inventions.¹⁹⁰ The stated purposes of the Bayh-Dole Act are as follows:

It is the policy and objective of the Congress to use the patent system to promote the utilization of inventions arising from federally supported research or development; to encourage maximum participation of small business firms in federally supported research and development efforts; to promote collaboration between commercial concerns and nonprofit organizations, including universities; to ensure that inventions made by nonprofit organizations and small business firms are used in a manner to promote free competition and enterprise without unduly encumbering future research and discovery; to promote the commercialization and public availability of inventions made in the United States by United States industry and labor; to ensure that the Government obtains sufficient rights in federally supported inventions to meet the needs of the Government and protect the public against nonuse or unreasonable use of inventions; and to minimize the costs of administering policies in this area.¹⁹¹

While not stated in the statute, Professors Ouellette and Hemel have recognized another rationale for the Bayh-Dole Act besides the commercialization justification.¹⁹² Basically, they assert that legislation similar to the Bayh-Dole Act allows countries to internalize the costs of government-funded invention and allows them to recoup those costs—at least when engaging in foreign patenting.¹⁹³ Interestingly, this theory could result in additional patenting and licensing activity, as each country with a Bayh-Dole Act would need to ensure that patenting was global in nature, or at least that major markets were covered. The current costs of patenting may make it unlikely that many entities can cover global patenting; however, certain important inventions may merit those costs.

The main thrust of the Bayh-Dole Act is to allow universities, nonprofits, and other entities to take title to government-funded invention. It

of negotiations with agency bureaucracies, the availability of only non-exclusive licenses and the myriad agency policies regarding licensing; the House Report accompanying the Bayh-Dole Act noted that the 26 federal funding agencies each had its own unique licensing policy.”).

190. See HAGELIN, *supra* note 175, at 486 (“The rationale underlying the Bayh-Dole Act was that, by allowing universities to elect to take title to patents resulting from federally funded research, universities would have a direct incentive to license these patents to the private sector for royalty income.”). See generally, Mireles, *States as Innovation System Laboratories*, *supra* note 3, at 1136. Congress also passed the Stevenson-Wydler Technology Innovation Act in 1980, which directed federal laboratories to make technology transfer a priority. See Eisenberg, *supra* note 187, at 1665. “The Bayh-Dole Act generally applies to all ‘funding agreements,’ which are defined as government contracts, grants, and cooperative agreements . . . ‘for the performance of experimental, developmental, or research work.’” INTELLECTUAL PROPERTY TECHNOLOGY TRANSFER 12 (Aline C. Flower ed., 2006) (quoting 35 U.S.C. § 201(b) (2000)) [hereinafter Flower].

191. 35 U.S.C. § 200 (2000).

192. See Daniel J. Hemel & Lisa Larrimore Ouellette, *Bayh-Dole Beyond Borders*, J.L. & BIOSCIENCES 282, 282 (2017).

193. See *id.* at 285.

is believed that by allowing those entities to take title then there will be a sufficient incentive for them and transferees to invest in the commercialization of those inventions.¹⁹⁴ Thus, even though the acts of invention, including, perhaps, reduction to practice, are paid for by the government, the entity can own the patent and extract a supracompetitive price assuming, for example, the lack of non-infringing substitutes. Notably, universities are perhaps not equipped to commercialize inventions and transferring those inventions to those that can will benefit the public. The transfer often takes the form of a license agreement. There is significant debate as to whether universities should license exclusively or non-exclusively.¹⁹⁵ Some universities have essentially agreed to prefer to license inventions non-exclusively and only do so exclusively when necessary for commercialization. Importantly, a non-exclusive license means that the university may license the technology to others, which may undercut the ability of the licensee to extract a supracompetitive price for the patented technology. Of course, there may be less access to an invention with an exclusive license. Moreover, some university created inventions may not need to be commercialized, such as research tools¹⁹⁶ and, in some cases, software. This may depend on what the definition of commercialization includes.

The Bayh-Dole Act also creates incentives for non-profit and university researchers to disclose potentially patentable inventions by allowing receipt of a portion of potential royalties from commercialized inventions.¹⁹⁷ Thus, non-profit and university researchers have a continued interest in the success of the invention, which encourages their participation in the commercialization of the government-funded invention. Sometimes researchers will team up with other professionals to commercialize an invention through a university spin-off. The Act and regulations also essentially allow the university to receive royalties from licensed inventions that are commercialized.¹⁹⁸ This provides an incentive for the university to ensure that there is a technology transfer office within the university and to create a system to ensure that patentable inventions are disclosed.¹⁹⁹ Ordinarily, universities tend to file provisional patent applications and allow licensees to cover the costs of a full patent application. Additionally, the funding the university or non-profit receives is supposed to be reinvested into research and development.²⁰⁰

194. Mireles, *States as Innovation System Laboratories*, *supra* note 3, at 1136.

195. See generally Ian Ayres & Lisa Larrimore Ouellette, *A Market Test for Bayh-Dole Patents*, 102 CORNELL L. REV. 271, 301–24 (2017) (discussing a market test for determining whether to issue an exclusive or non-exclusive license for a government funded invention).

196. See Michael S. Mireles, *An Examination of Patents, Licensing, Research Tools, and the Tragedy of the Anticommons in Biotechnology Innovation*, 38 U. MICH. J.L. REFORM 141, 147 (2004).

197. See Flower, *supra* note 190, at 29; Mireles, *States as Innovation System Laboratories*, *supra* note 3, at 1145–47.

198. See 35 U.S.C. § 202(c) (2000); 37 C.F.R. § 401.14(k) (2013); Mireles, *States as Innovation System Laboratories*, *supra* note 3, at 1145–46.

199. Mireles, *States as Innovation System Laboratories*, *supra* note 3, 1145–46.

200. See Flower, *supra* note 190, at 29.

The Bayh-Dole Act also contains numerous provisions designed to protect the public interest in government-funded technology. On the front end, the government may deny patent rights in declared situations of “exceptional circumstances.”²⁰¹ The government also retains a non-exclusive license to the patented invention.²⁰² Additionally, the government may exercise “march-in” rights to essentially license the invention.²⁰³ Notably, march-in rights have not been exercised since the passage of the Act.²⁰⁴ The argument against the exercise of march-in rights is that if they are used, private entities are less likely to invest in the commercialization of the invention in the first place, which would thwart one of the purposes of the Act. Interestingly, price controls are believed not to be a valid reason for invoking march-in rights.²⁰⁵ Moreover, an additional “safety valve” in the Bayh-Dole Act may be university choice. For example, a university may choose not to seek patent rights over certain technologies or in particular countries, and the U.S. government may agree.²⁰⁶ Professor Ouellette has cautioned that university licensees may attempt to patent in other countries, which raises a concern about access to inventions in other countries.²⁰⁷ The U.S. government may choose to patent if the university or grant recipient decides not to seek a patent.²⁰⁸

2. Critiques of the Bayh-Dole Act

There are many critiques of the Bayh-Dole Act.²⁰⁹ Two important criti-

201. 35 U.S.C. § 202(a) (2000).

202. *Id.* § 202(c)(4).

203. 35 U.S.C.A. § 203 (West 2011).

204. See Steven Seidenberg, *US Perspectives: March-in Rights: A Lost Opportunity to Lower US Drug Prices*, INTELL. PROP. WATCH (May 18, 2017), <https://www.ip-watch.org/2017/05/18/march-rights-lost-opportunity-lower-us-drug-prices/> [<https://perma.cc/2N5F-EJ5K>].

205. See John H. Raubitschek & Norman J. Latker, *Reasonable Pricing—A New Twist for March-in Rights Under the Bayh-Dole Act*, 22 SANTA CLARA COMPUTER & HIGH TECH. L.J. 149, 167 (2005) (“There is no reasonable pricing requirement under 35 U.S.C. § 203(1)(a)(1), considering the language of this section, the legislative history, and the prior history and practice of march-in rights. Rather, this provision is to assure that the contractor utilizes or commercializes the funded invention. However, that does not mean that the price charged for a drug invented with Government funding is never of concern to the funding agency. There are other mechanisms to address this concern, including the health march-in authority of 35 U.S.C. § 203(1)(a)(2), the Government license in 35 U.S.C. § 202(c)(4), and eminent domain in 28 U.S.C. § 1498(a).” (footnote omitted)).

206. See Flower, *supra* note 190, at 30–31.

207. See Lisa Larrimore Ouellette, *How Many Patents Does It Take to Make a Drug? Follow-on Pharmaceutical Patents and University Licensing*, 17 MICH. TELECOMM. & TECH. L. REV. 299, 321 (2010) (“[P]ublic-sector institutions will need proactive licensing terms to ensure that follow-on patents do not block access to the end products that are needed by patients.”).

208. 35 U.S.C. § 202(c)(2) (2000).

209. For a discussion of the critiques of the Bayh-Dole Act, see generally Mireles, *States as Innovation System Laboratories*, *supra* note 3, at 1147–78. An additional critique is that universities are failing in technology transfer because there are many inventions that are not commercialized. See Liza Vertinsky, *Universities as Guardians of Their Inventions*, 2012 UTAH L. REV. 1949, 1950 (“A growing number of promising university-generated inventions are failing to reach the public in accessible and usable forms.”). Professor Vertinsky also points to the additional problem that, “Even when university inventions reach the

cisms include changing norms and the development of an anticommons. An additional critique includes the compliance failure and the one-size-fits-all nature of the Bayh-Dole Act.

One important criticism includes the shifting norms and research agendas in academia. Some have argued that the Bayh-Dole Act will incentivize researchers to pursue agendas that are directed to applied research instead of basic research.²¹⁰ The evidence of this effect has been relatively inconclusive.²¹¹ However, there has been movement towards further incentivizing researchers to move toward applied research and to at least direct them to commercialization activities. For example, some universities have changed their tenure standards to include commercialization efforts.²¹² The state of Ohio has considered legislation to expressly require universities to consider commercialization activities in the tenure process.²¹³ Importantly, the legislation does not require commercialization activities but considers that along with traditional factors.²¹⁴ A university technology transfer vendor also recently offered a webinar on changing tenure standards at universities to include commercialization activities.²¹⁵ As Professor Mark Lemley has noted, the problem is not necessarily that existing researchers will change their practices but that new hires will

public, many cutting-edge discoveries remain underutilized because of restrictive patenting and licensing practices. Prominent examples include restrictive patenting and licensing practices for blockbuster AIDS drugs, stem cell technologies, and breast cancer genes.” Vertinsky, *supra*, at 1951 (footnote omitted).

210. See WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 316 (2003) (“Being able to earn substantial income from patent licensing has, it appears, induced universities to substitute away from basic research, and the result may have been a net social loss.” (footnote omitted)); Eisenberg, *supra* note 187, at 1726; see also Pierre Azoulay, Waverly Ding & Toby Stuart, *The Impact of Academic Patenting on the Rate, Quality, and Direction of (Public) Research* 1 (Nat’l Bureau of Econ. Research Working Paper Series, Working Paper No. 11917, 2006), <http://www.nber.org/papers/w11917> [<https://perma.cc/28WM-NW5Z>] (“[S]urveys of academic scientists have found that patenting skews scientists’ research agendas towards commercial priorities, causes delay in the public dissemination of research findings, and crowds out effort devoted to producing public research.” (citing David Blumenthal et al., *Relationships Between Academic Institutions and Industry in the Life Sciences—An Industry Survey*, 334 *NEW ENG. J. MED.* 368 (1996); Eric G. Campbell et al., *Data Withholding in Academic Genetics—Evidence from a National Survey*, 287 *J. AM. MED. ASS’N* 473 (2002); SHELDON KRIMSKY, *SCIENCE IN THE PRIVATE INTEREST: HAS THE LURE OF PROFITS CORRUPTED BIOMEDICAL RESEARCH?* (2003))).

211. Mireles, *States as Innovation System Laboratories*, *supra* note 3, at 1168–69.

212. Paul R. Sanberg, Morteza Gharib, Patrick T. Harker, Eric W. Kaler, Richard B. Marchase, Timothy D. Sands, Nasser Arshadi & Sudeep Sarkar, *Changing the Academic Culture: Valuing Patents and Commercialization Toward Tenure and Career Advancement*, 111 *PROC. NAT’L ACAD. SCI.* 6542, 6544 (2014) (“[Sixteen] United States and Canadian universities . . . consider patents and commercialization in tenure and career advancement decisions.”).

213. Rachel Abbey McCafferty, *State Is Pushing Universities to Bring Research to Market*, *CRAIN’S CLEVELAND BUS.* (Mar. 5, 2017, 1:30 AM), <http://www.craincleveland.com/article/20170305/NEWS/170309909/state-is-pushing-universities-to-bring-research-to-market?X-IgnoreUserAgent=1> [<https://perma.cc/25U7-QN8A>].

214. *Id.*

215. Mike Mireles, *Basic Research—Soon to Be a Thing of the Past?*, *IP FIN.* (Feb. 5, 2013), <http://www.ip.finance/2013/02/basic-research-soon-to-be-thing-of-past.html?m=0> [<https://perma.cc/G5Z6-VSUA>].

shift their agendas.²¹⁶ Notably, combining changed tenure standards with new hires could result in a culture shift that could shift agendas and result in more commercialization activities.

The second critique includes the development of an anticommons or patent thicket.²¹⁷ Both theories essentially involve the problem of underuse because of too many property rights and transaction costs.²¹⁸ The anticommons theory states that excessive property rights and high transaction costs may lead to the inability to combine rights to produce a particular product.²¹⁹ The patent thicket is a similar theory that involves a similar problem, also combined with overlapping rights.²²⁰ Both of these problems could exist, for example, in biotechnology or software.

The evidence of the anticommons in biotechnology has been mixed; although, there was some evidence of licensing hold-up with respect to diagnostics.²²¹ With respect to diagnostics, this has likely been resolved by U.S. Supreme Court precedent concerning the patentability of some diagnostics.²²² Professor Mark Lemley has theorized that the field of nanotechnology may experience underdevelopment because of early patents—many of them Bayh-Dole patents—on foundational technologies in that area.²²³ Professor Emily Michiko Morris has argued that any slowdown in development in nanotechnology should not be attributed to those patents or an anticommons type problem but rather is because of numerous factors, including issues concerning regulation for health and safety, lack of expertise, and problems generating investment.²²⁴

A third possible critique concerns the Bayh-Dole Act's one-size-fits-all approach. In *Policy Levers in Patent Law*, Professors Dan Burk and Mark Lemley essentially argue that because invention and innovation happen differently in disparate industries, courts should adjust policy levers to take into account those differences.²²⁵ Notably, the Bayh-Dole Act adopts, for the most part, a one-size-fits-all approach to the patenting and

216. Lemley, *Trolls*, *supra* note 5, at 620–21.

217. See Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 *SCI.* 698, 698 (1998). For a critique of the theory, see Bruce N. Kuhlik & Richard A. Epstein, *Navigating the Anticommons for Pharmaceutical Patents: Steady the Course on Hatch-Waxman* (Univ. of Chi. Law Sch., Chi. Unbound Coase-Sandor Inst. for Law and Econ., Working Paper No. 209, 2004), https://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1330&context=law_and_economics [Perma link unavailable].

218. See Heller & Eisenberg, *supra* note 217, at 698.

219. *Id.*

220. See generally Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, in 1 *INNOVATION POLICY AND THE ECONOMY* 119 (Adam B. Jaffe et al. eds., 2001).

221. See Mireles, *States as Innovation System Laboratories*, *supra* note 3, at 1177.

222. See *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66 (2012).

223. See Mark A. Lemley, *Patenting Nanotechnology*, 58 *STAN. L. REV.* 601, 601 (2005).

224. See Emily Michiko Morris, *The Irrelevance of Nanotechnology Patents*, 49 *CONN. L. REV.* 499, 502–508 (2016).

225. Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 *VA. L. REV.* 1575 (2003); DAN L. BURK & MARK A. LEMLEY, *THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT* (2009).

licensing of government-funded invention. However, as noted by Professors Burk and Lemley, patents may be more important to invention and innovation in industries such as pharmaceuticals, while in some industries, such as information technology and software, patents are not as important and may hinder innovation. Importantly, most patenting under the Bayh-Dole Act occurred in the biopharmaceutical industry where patents may provide a helpful incentive to commercialize by allowing the recoupment of expensive costs such as paying to complete clinical testing for efficacy and safety. Software, on the other hand, may not be well-suited for patenting in the same way, particularly when involving multicomponent products. Indeed, the Bayh-Dole Act may not graft well onto software and the commercialization rationale may be less important. However, that may depend on how broadly commercialization is defined. Under a broad definition that may include marketing, for example, the Bayh-Dole Act may play a role. However, many software inventions may cover just a part of an eventual invention and may not need additional expenses such as marketing. Indeed, this is where patent trolls may provide a problem—when patents on software are used to “hold-up” an entity that may have independently developed the invention. Arguably, the approach of the licensor and licensee may result in terms that can be tailored to a particular industry’s patent and commercialization needs. However, as Professor Lisa Larrimore Ouellette has pointed out, a patent may not be necessary under the Bayh-Dole Act for non-exclusively licensed inventions in the first place.²²⁶ Essentially, evidence that the entity chose to non-exclusively license means that a patent is not necessary for commercialization.²²⁷

In *Do University Patents Pay Off? Evidence from a Survey of University Inventors in Computer Science and Electrical Engineering*, Professor Love surveyed “2,387 tenured and tenure-track faculty members affiliated with the nation’s top twenty [electrical and computer engineering] and [computer science] departments.”²²⁸ He received “a sample of 269 responses, for an overall response rate of 11.3%.”²²⁹ He states that, “If university tech transfer programs fail to successfully carry out their mission at these [top] schools, they very likely also fail to do so at lower-ranked schools.”²³⁰ It would be helpful for additional research to be conducted with a larger sample of schools with different rankings. Indeed, the shifting state of patent eligible subject matter in the United States may have resulted in fewer resources dedicated toward patenting and licensing in this field. While the response rate was relatively low, the over-

226. Ian Ayres & Lisa Larrimore Ouellette, *A Market Test for Bayh-Dole Patents*, 102 CORNELL L. REV. 271, 275 (2017).

227. *Id.*

228. Brian J. Love, *Do University Patents Pay Off? Evidence from a Survey of University Inventors in Computer Science and Electrical Engineering*, 16 YALE J.L. & TECH. 285, 296 (2014) (footnote omitted).

229. *Id.* at 299.

230. *Id.* at 297.

all finding appears to be that, instead of furthering innovation, “patenting high-tech university research may fail a cost-benefit analysis.”²³¹ In particular, he notes that universities are garnering “a negative rate of return . . . on funds invested in high-tech patenting.”²³² Unfortunately, this finding seems to be generally aligned with research showing that technology transfer offices tend to not make enough funds to sustain themselves. Additionally, “[e]ighty-five percent of professors report” that they are not considering patents when deciding and considering research.²³³ As patenting is relatively new in the software and telecommunications area in academia, faculty in that field may not have been well-educated about patents and licensing. However, only “13.7% of respondents reported that they did not know whether their home institutions have a policy of sharing royalties with faculty.”²³⁴ Moreover, Professor Love points to a finding that 50% of respondents who knew of the policy did not know the share amount.²³⁵ This seems to demonstrate that the respondents do not know the exact amount, but they may understand that the possibility of royalties exists.

Professor Love further states that, “University patent programs may, instead, actually reduce the quantity and quality of university research in high-tech fields by harming professors’ ability to obtain research funding, to collaborate with faculty from other institutions, and to disseminate their work to colleagues.”²³⁶ Older studies seem to indicate that issues with respect to collaboration and dissemination may not exist; however, those studies were mostly focused on the biotechnology field.²³⁷ Finally, he reports that “[e]ntrepreneurial professors report that these programs hinder their ability to work as consultants with companies that show interest in their research, and fewer than half of university spin-off founders report that the ability to patent their research affirmatively helped their commercialization efforts.”²³⁸ The latter response may be explained based on the fact that the academics were questioned rather than more business-oriented members of a spin-off.

A final critique of the Bayh-Dole Act includes a compliance failure by

231. *Id.* at 294.

232. *Id.* at 294–95.

233. *Id.* at 295. This response may evolve as norms change.

234. *Id.* at 317.

235. *Id.*

236. *Id.* at 286. Notably, he states,

Among respondents who had founded a startup, presumably those who had “benefited” the most from university patent rights, thirty-four percent indicated that patents harmed their ability to obtain research funding, thirty-four percent indicated that patents hindered their ability to collaborate with other researchers, and twenty-nine percent indicated that patents harmed their ability to disseminate their ideas, compared to just twenty-two, four, and twelve percent, respectively, who indicated that patents helped in each category.

Id. at 320.

237. *Id.* at 287–89.

238. *Id.* at 286.

grantees of research funding.²³⁹ The Bayh-Dole Act includes many reporting and tracking requirements by grant recipients, including requiring a statement of government interest in patents of government-funded invention.²⁴⁰ However, the Government Accounting Office (GAO) has stated that universities and other recipients of funding are underreporting at a relatively high rate.²⁴¹ This makes tracking the number of publicly-funded patented inventions difficult. Moreover, as discussed *supra*, this means that our reporting on government-funded inventions is likely less than what actually exists. Recently, the National Institutes of Health, following recent regulatory changes, has led a movement to ensure that grant recipients are complying with the Bayh-Dole Act requirements and regulations.²⁴²

3. *University Patent Litigation: Prior Research and Self-Regulation*

Several studies concerning university patent litigation exist. This section describes some of those studies. Professor Jacob Rooksby has authored several studies concerning university patent litigation. Professors Scott Shane and Deepak Somaya have also authored an article concerning the effects of patent litigation. Professor Rai provided a first look at litigation involving software. Additionally, several studies discuss university patent litigation in the context of patent litigation generally. For example, the PriceWaterhouseCooper Patent Litigation Studies present numerous findings that compare general NPE patent litigation to university and non-profit litigation. Furthermore, academia and universities have attempted to regulate and limit patent litigation by universities.

a. *University Patent Litigation Generally*

Professor Rooksby's 2011 paper *University Initiation of Patent Infringement Litigation* examines "every patent infringement lawsuit and associated complaint filed by universities in the two-year period from January 1, 2009 through December 31, 2010."²⁴³ Professor Rooksby searched the

239. Arti K. Rai & Bhaven N. Sampat, *Accountability in Patenting of Federally Funded Research*, 30 NATURE BIOTECHNOLOGY 953, 954 (2012) (discussing the significant failure to comply with reporting requirements).

240. 35 U.S.C.A. § 202(c)(6) (West 2011); 37 C.F.R. § 401.14(f)(4) (2013).

241. U.S. GEN. ACCOUNTING OFFICE, GAO 99-242, TECHNOLOGY TRANSFER: REPORTING REQUIREMENTS FOR FEDERALLY SPONSORED INVENTIONS NEED REVISION 2-14 (1999).

242. See NAT'L INSTS. OF HEALTH, NOT-OD-16-066, REMINDER: ALL SUBJECT INVENTIONS MUST BE REPORTED ON THE HHS 568-FINAL INVENTION STATEMENT AND CERTIFICATION (FOR GRANT OR AWARD) AND IN iEDISON (2016), <https://archives.nih.gov/asites/grants/01-17-2017/grants/guide/notice-files/NOT-OD-16-066.html> [<https://perma.cc/Q872-V9GD>]; see also GOODWIN, CHANGES TO BAYH-DOLE ACT REGULATIONS IMPACTING OWNERSHIP OF PATENT RIGHTS (2017), http://www.goodwinlaw.com/publications/2017/04/04_10_17-changes-to-bayh-dole-act-regulations-imp [Perma link unavailable] (discussing changes to Bayh-Dole Act regulations that place potential cloud over title to government funded inventions).

243. Jacob H. Rooksby, *University Initiation of Patent Infringement Litigation*, 10 J. MARSHALL REV. INTELL. PROP. L. 623, 625 (2011).

Derwent LitAlert database.²⁴⁴ Notably, Professor Rooksby states that the results of the search could be underinclusive because of limitations with the Derwent LitAlert database, which contains self-reported cases by district court clerks.²⁴⁵ Professor Rooksby then used PACER and “the LexMachina database maintained by the Intellectual Property Litigation Clearinghouse” to pull the complaints from each case.²⁴⁶ Professor Rooksby identified fifty-seven complaints meeting the criteria of a university initiated patent infringement law suit.²⁴⁷ He collected the following information:

case number; the jurisdiction in which the lawsuit was filed; the name of the lead plaintiff; the names and total number of any co-plaintiffs; the names and total number of all defendants; the number of patents alleged in the complaint; the general type of technology covered by the patents in suit; the specific type of technology covered by the patents in suit; the name of any lead outside counsel firm listed on the complaint as representing the university; whether the plaintiff(s) had demanded that the case be tried to a jury; whether the plaintiff(s) sought monetary damages; [whether there was an exclusive license or nonexclusive license;] and whether the lawsuit appeared to have been filed in a strategic venue.²⁴⁸

Some of Professor Rooksby’s findings include that “universities asserted 125 different patents in 57 patent infringement lawsuits”; “pharmaceutical and medical devices were the most frequently litigated patents, having been litigated in over 50% of the cases”; litigation was filed in the District of Delaware in “nearly a third of the located lawsuits”; and 75% of the cases involved an exclusive license.²⁴⁹ Professor Rooksby also drew the following conclusions from the data: “some universities are repeat initiators of patent infringement litigation,” and “universities’ behavior in patent infringement litigation mimics the strategic behavior of for-profit actors involved in such litigation.”²⁵⁰ He also notes that in at least six cases the university strategically selected the venue and that some universities were joined as plaintiffs even though it appeared unnecessary for their joinder.²⁵¹

In *Innovation and Litigation: Tensions Between Universities and Patents and How to Fix Them*, Professor Rooksby expands his review of university initiated patent litigation from 1973 to 2012.²⁵² He follows a similar research approach to that described above: review of the Derwent LitAlert and an accompanying analysis of the complaints via LexMachina

244. *Id.* at 650.

245. *Id.* at 651.

246. *Id.* at 650–52.

247. *Id.* at 652.

248. *Id.* at 653 (footnote omitted).

249. *Id.* at 660.

250. *Id.* at 661.

251. *Id.* at 663–65.

252. Jacob H. Rooksby, *Innovation and Litigation: Tensions Between Universities and Patents and How to Fix Them*, 15 *YALE J.L. & TECH.* 312, 335–40 (2013).

and PACER.²⁵³ He identified 284 cases of university initiated patent infringement lawsuits.²⁵⁴ While the number of universities participating and initiating lawsuits did not rise year by year, Professor Rooksby notes that “both metrics are trending upward, with significant growth noted beginning in the year 2000.”²⁵⁵ Professor Rooksby also conducted a qualitative study surveying university chief research officers concerning their decision-making in initiating patent infringement lawsuits.²⁵⁶

In a qualitative study, *When Tigers Bare Teeth: A Qualitative Study of University Patent Enforcement*, Professor Rooksby again examines decision-making in initiating patent infringement lawsuits.²⁵⁷ He collected data from five high-level technology transfer professionals at public universities through interviews and relied on informal interviews and observations from meetings at an AUTM meeting.²⁵⁸ Professor Rooksby noted several “revelations and suggestions” from his data gathering process:

Litigation As Mission-Enhancing: Some universities view participation as plaintiffs in patent infringement litigation as condoned or even mandated by their research and commercialization missions, despite what some critics view as the activity’s incompatibility with the notion of a university’s public-serving mission.

Money As Motivator: Revenue generation is often a principal motivator for universities that choose to enforce their patents through infringement litigation, even though industry literature only indirectly touts litigation’s revenue-generating potential.

Structural Deterrents: The high cost of legal fees, concern for being viewed as overly litigious, and reputational risks related to contingency fee arrangements with outside law firms provide disincentives for some universities contemplating pursuit of patent infringers.

Fear of Retribution: The identity of would-be defendants may cause some institutions to abandon pursuit of their infringement claims out of concern for retribution to the university, particularly with respect to sponsored research funding.

Litigation Realities Driving Licensing Decisions: Concern for the responsibility and costs involved in litigating non-exclusively licensed patents may lead some institutions to favor an exclusive licensing strategy for their patents, on the belief that doing so will save them

253. *Id.* at 336.

254. *Id.* at 337. Notably, Professor Rooksby limited inclusion by two additional criteria: (1) “[he] excluded any case where a university was added as a plaintiff after commencement of the action”; and (2) “[he] excluded cases in which universities levied infringement allegations from a defensive posture (such as in response to a declaratory judgment action).” *Id.* at 337. He added these criteria because he desired to err on the side of underreporting “the number of universities that have litigated patents and the number of patent infringement lawsuits with universities as plaintiffs.” *Id.*

255. *Id.* at 339–40.

256. *Id.* at 341–43.

257. Jacob H. Rooksby, *When Tigers Bare Teeth: A Qualitative Study of University Patent Enforcement*, 46 AKRON L. REV. 169, 171–72 (2013).

258. *Id.*

money and may even spare their involvement as a plaintiff in any infringement action.

Litigating Unlicensed Patents: Although many universities may be hesitant to litigate unlicensed patents, shrewd companies have devised a way for them to turn unlicensed patents into putatively licensed ones, thereby contravening the Bayh-Dole Act's purposes and masking the character of what some may view as speculative enforcement activity.

Some of Professor Rooksby's findings are further supported by the analysis of Professor Jay Kesan. In 2009, Professor Kesan essentially concluded that "university technology transfer activities continue to be predominantly patent-centric and revenue-driven with a single-minded focus on generating licensing income and obtaining reimbursement for legal expenses."²⁵⁹

In *The Effects of Patent Litigation on University Licensing Efforts*, Professors Scott Shane and Deepak Somaya examine the impact of patent litigation on university licensing of "116 leading U.S. research universities from 1991 through 2000."²⁶⁰ The study uses information from "interviews with the directors of technology licensing offices at 13 Carnegie I research universities to understand what effect patent litigation has on technology licensing office operations."²⁶¹ The study also "analyze[s] quantitative data from an annual survey of university TLOs . . . combine[d] with a dataset of university patent litigation."²⁶² The authors find that,

[Their] interviews and statistical analyses show consistent patterns. Patent litigation imposes important costs on university licensing activity and significantly reduces the number of new licenses executed. [Their] interviews suggest that this is because litigation disrupts TLO activity and reduces the time and resource available to market technologies and form licensing agreements. . . .

The TLO directors were unanimous that university-led patent litigation caused a significant dislocation in the operation of the technology licensing office. . . . Licensing officers must typically collect and organize records so that they may be made available during the discovery phase of litigation. They must coordinate between the inventor, university administration, and legal counsel (both in house and external). They must provide depositions and answer interrogatories. This highlights an important aspect of the cost of patent litigation: it draws upon the time and attention of licensing officers, who are a

259. See Jay P. Kesan, *Transferring Innovation*, 77 *FORDHAM L. REV.* 2169, 2169 (2009). While some universities may have moved from innovators to rent-seeking, Professor Robert Merges cautions that an "overreaction," such as banning university licensing, may be worse overall than "no reaction . . . because universities continue to generate important, horizon-stretching technologies." See Merges, *Trouble with Trolls*, *supra* note 5, at 1611.

260. See Scott Shane & Deepak Somaya, *The Effects of Patent Litigation on University Licensing Efforts*, 63 *J. ECON. BEHAV. & ORG.* 739, 740 (2007).

261. *Id.*

262. *Id.*

key resource in university technology licensing offices.²⁶³

Notably, the authors state “that the reduction in licensing that occurs in response to university patent litigation stems primarily from exclusive licenses, which are disproportionately signed with new and small firms.”²⁶⁴ The authors conclude that this may thwart part of the Bayh-Dole Act’s purpose in aiding small and new firms.²⁶⁵

b. Literature on University Software Patents and Litigation

In an example of a study on university software patents and litigation, Professor Arti K. Rai, John R. Allison, and Bhaven N. Sampat “re-veal[ed] that software patents represent a significant and growing proportion of university patent holdings.”²⁶⁶ The authors found that,

First, software patents represent a significant and growing percentage of university patent holdings. Second, university software patenting practices tend to mimic their nonssoftware patenting practices. The data suggests that those universities that have a higher patent propensity in general are also more likely to obtain software patents. Similarly, our interviews show that some universities view software as similar to other, more physical inventions. The difficulty with this view is that software is likely to follow a different commercialization path than other inventions. Thus, it is perhaps not surprising that we see a fair number of litigated cases involving software patents, and that almost all of these appear to represent situations where the university and/or its exclusive licensee is asserting the patent against an entity that has successfully commercialized software independent of the patent. Notably, in the majority of these cases, the university’s argument has lost on grounds of either patent invalidity or noninfringement.²⁶⁷

In looking forward, the authors point to the fact that some universities will take an open source approach to licensing software or will forgo entering into exclusive licenses for software, particularly pure software.²⁶⁸ The authors apparently believed that licensing allowing more access and legal developments may mitigate some of the harm from university software patenting.²⁶⁹

c. General Studies Partially Covering University Patent Litigation

Several general studies of patent litigation present information concerning university patent litigation. For example, Price-WaterhouseCooper has conducted numerous studies concerning patent

263. *Id.* at 740–41, 746.

264. *Id.* at 754.

265. *Id.*

266. Arti K. Rai, John R. Allison & Bhaven N. Sampat, *University Software Ownership and Litigation: A First Examination*, 87 N.C. L. REV. 1519, 1519–26 (2009).

267. *Id.* at 1525.

268. *Id.* at 1557–65.

269. *See id.*

litigation, including NPE litigation. In its 2014 Patent Litigation Study, PriceWaterhouseCooper found that “[w]hile company NPEs are awarded higher damages, university/nonprofit NPEs have by far the highest success rate among NPEs [45%].”²⁷⁰ In its 2016 Patent Litigation Study, it found that “[u]niversities/non-profits do *not* litigate *as often* as other NPE types; however, when they *do*, they have *both higher success rates and median damages*.”²⁷¹ Out of nineteen cases, universities and non-profits prevailed in nine cases for a forty-seven percent success rate.²⁷² The median damages awarded from 1996 to 2015 for universities and non-profits was \$16.3 million.²⁷³

d. Self-Regulation by Universities

There are several examples of how universities have attempted to self-regulate and control licensing and litigation conduct.²⁷⁴ One example is the *In the Public Interest: Nine Points to Consider in Licensing University Technology (Nine Points to Consider)* document.²⁷⁵ Additionally, Christopher Larus, John K. Harting, and Sharon Roberg-Perez authored a paper explaining how university licensors can control litigation decisions in the future through licensing and assignment terms.²⁷⁶ Universities may adopt similar approaches to those described in the article to reduce the likelihood of troll-like enforcement efforts.

The *Nine Points to Consider* document was drafted by twelve leading academic institutions and has been adopted by over seventy academic institutions from around the world.²⁷⁷ Some of those institutions include Northwestern University, University of New Hampshire, University of Delaware, The University of Texas at Austin, University of Nebraska, University of Pennsylvania, University of Southern California, Boston University, University of Florida, University of California, Wisconsin

270. See PWC 2014 PATENT STUDY, *supra* note 86, at 20.

271. See PRICEWATERHOUSECOOPER, 2016 PATENT LITIGATION STUDY 11 (2016), <https://www.pwc.com/us/en/forensic-services/publications/assets/2016-pwc-patent-litigation-study.pdf> [<https://perma.cc/6WUF-2X8Q>] [hereinafter PWC 2016 PATENT STUDY].

272. *Id.*

273. *Id.*

274. Professor David E. Winickoff discusses how efforts such as the *Nine Points to Consider* document—attempting to make university generated innovations available to developing countries—and the collection of data to demonstrate the impact of university technology transfer are welcome moves to recognize the public nature of university technology transfer. See David E. Winickoff, *Private Assets, Public Mission: The Politics of Technology Transfer and the New American University*, 54 JURIMETRICS J. 1, 30–42 (2013).

275. See ASS’N UNIV. TECH. MANAGERS, IN THE PUBLIC INTEREST: NINE POINTS TO CONSIDER IN LICENSING UNIVERSITY TECHNOLOGY (2007), https://www.autm.net/AUTM-Main/media/Advocacy/Documents/Points_to_Consider.pdf [<https://perma.cc/5NB4-FTQN>] [hereinafter NINE POINTS TO CONSIDER].

276. Christopher Larus, John K. Harting & Sharon Roberg-Perez, *Patent Licensing and Assignment with an Eye Toward Enforcement: Tips for University Patent Owners*, 48 LES NOUVELLES 13, 13 (2013) [hereinafter *Tips for University*].

277. See *Nine Points to Consider*, ASS’N U. TECH. MANAGERS, <https://www.autm.net/advocacy-topics/government-issues/principles-and-guidelines/nine-points-to-consider-when-licensing-university/#> [<https://perma.cc/7Z8N-NJGX>].

Alumni Research Foundation, California Institute of Technology, Massachusetts Institute of Technology, and Stanford University.²⁷⁸ Notably, signatories include universities outside the United States such as Australian National University, University of Ottawa, Dublin Institute of Technology–Hothouse, Tokyo University of Science, Universidad Nacional Autonoma de Mexico, and University of Copenhagen.²⁷⁹ Several major “umbrella” organizations purportedly representing numerous institutions and entities are also signatories: Association of Public and Land-grant Universities, Biotechnology Industry Organization, Association of American Medical Colleges, Association of University Technology Managers, and Association of American Universities.²⁸⁰

The *Nine Points to Consider* document attempts to balance the public interest and role of the university in licensing university generated technology.²⁸¹ The Nine Points include:

- Point 1: Universities should reserve the right to practice licensed inventions and to allow other non-profit and governmental organizations to do so
- Point 2: Exclusive licenses should be structured in a manner that encourages technology development and use
- Point 3: Strive to minimize the licensing of “future improvements”
- Point 4: Universities should anticipate and help to manage technology transfer related conflicts of interest
- Point 5: Ensure broad access to research tools
- Point 6: Enforcement action should be carefully considered
- Point 7: Be mindful of export regulations
- Point 8: Be mindful of the implications of working with patent aggregators
- Point 9: Consider including provisions that address unmet needs, such as those of neglected patient populations or geographic areas, giving particular attention to improved therapeutics, diagnostics and agricultural technologies for the developing world²⁸²

For the purposes of this article, Point 6, concerning enforcement, and Point 8, relating to working with patent aggregators, are particularly important.²⁸³ Point 6 specifically reminds universities to tread carefully when making decisions to enforce their rights through litigation brought by the institution as well as in influencing the decisions of licensees.²⁸⁴ Universities should keep in mind their missions as well as the public interest.²⁸⁵ The *Nine Points to Consider* document provides examples of when litigation may be appropriate, but it specifically cautions that

278. *Id.*

279. *Id.*

280. *Id.*

281. NINE POINTS TO CONSIDER, *supra* note 275, at 1.

282. *Id.* at 2–8.

283. *Id.* at 6–8.

284. *Id.* at 6.

285. *Id.*

“[u]nder all circumstances, it reflects poorly on universities to be involved in ‘nuisance suits.’”²⁸⁶ Moreover, “[e]xclusive licensees should be encouraged to approach patent enforcement in a manner that is consistent with the philosophy described in this Point 6.”²⁸⁷

Point 8 concerns universities and their potential relationship with patent aggregators.²⁸⁸ Point 8 makes a distinction between two types of aggregators.²⁸⁹ First, there are the aggregators who operate by “adding value” through combining numerous patents in portfolios for licensing a packaged technology.²⁹⁰ Second, there are aggregators specifically referred to as patent trolls “who acquire rights that cut broadly across one or more technological fields with no real intention of commercializing the technologies.”²⁹¹ The *Nine Points to Consider* document specifically states,

In the extreme case, this kind of aggregator approaches companies with a large bundle of patent rights with the expectation that they license the entire package on the theory that any company that operates in the relevant field(s) must be infringing at least one of the hundreds, or even thousands, of included patents. Daunted by the prospect of committing the human and financial resources needed to perform due diligence sufficient to establish their freedom to operate under each of the bundled patents, many companies in this situation will conclude that they must pay for a license that they may not need. Unlike the original patent owner, who has created the technology and so is reasonably entitled to some economic benefit in recognition for its innovative contribution, the commercial licensee who advances the technology prior to sublicensing, or the added value aggregator who helps overcome legal barriers to product development, the kind of aggregator described in this paragraph typically extracts payments in the absence of any enhancement to the licensed technology. Without delving more deeply into the very real issues of patent misuse and bad-faith dealing by such aggregators, suffice it to say that universities would better serve the public interest by ensuring appropriate use of their technology by requiring their licensees to operate under a business model that encourages commercialization and does not rely primarily on threats of infringement litigation to generate revenue.²⁹²

Notably, several of the institutions that have signed the *Nine Points to Consider* document have also supposedly entered into agreements with Intellectual Ventures, as discussed by Professors Robin Feldman and Tom Ewing.²⁹³ Intellectual Ventures must be considered an “added-value” patent aggregator as opposed to a troll by those institutions. Indeed, In-

286. *Id.*

287. *Id.*

288. *Id.* at 7.

289. *Id.*

290. *Id.*

291. *Id.*

292. *Id.* at 7–8.

293. Feldman & Ewing, *Giants*, *supra* note 50, at 13–36.

tellectual Ventures in some ways resembles a university because it hires scientists to engage in research leading to patents.

Universities can also adopt licensing terms that give them more control over downstream litigation decisions. For example, Christopher Larus, John K. Harting, and Sharon Roberg-Perez have provided numerous recommendations for retaining the ability to control or influence litigation decisions by licensees.²⁹⁴ Importantly, the authors highlight the importance of making the decision to control or not control litigation initially.²⁹⁵ Moreover, the key to retaining the ability to control litigation depends on the rights retained by the licensor university.²⁹⁶ Universities can make the decision to retain substantial rights enabling them to control or be involved in litigation involving patents covering technology developed at their institutions.²⁹⁷

4. *Universities as the Privileged Class in U.S. Patent Litigation*

In recent scholarship, Professors Shubha Ghosh and Peter Lee have pointed to the privileged status of universities under U.S. patent law, particularly legislation.²⁹⁸ There are several statutory advantages that have been provided to universities. And, indeed, universities and AUTM have lobbied for specific protections for university patents.²⁹⁹ Moreover, a recent Patent Trial and Appeals Board decision grants public universities immunity from inter partes review proceedings.

The Bayh-Dole Act is an example of how patent-related legislation has shifted toward favoring universities.³⁰⁰ As discussed *supra*, the Bayh-Dole Act allows patenting even when research for invention has been paid for by the government. This upends the traditional and primary rationale for patents, which is the inventive to invent theory. The Bayh-Dole Act, for the most part, relies upon the commercialization theory to justify allowing patents on government-funded invention. Moreover, universities receive “micro entity” status.³⁰¹ This allows universities to pay significantly lower fees, which incentivizes them to take advantage of patenting. Additionally, the AIA retains the grace period, which benefits academic researchers who publish their work by not allowing it to serve as prior art.³⁰²

Professor Lee also points to the Cooperative Research and Technology Enhancement Act of 2004, which was designed to facilitate collaborations between the industry and universities by modifying the law of nonobvi-

294. *Tips for University*, *supra* note 276, at 13–21.

295. *Id.* at 15–20.

296. *Id.* at 15–16.

297. *Id.*

298. See Peter Lee, *Patents and the University*, 63 DUKE L.J. 1, 1 (2013). Professor Lee analyzes how patent case law has not recognized “academic exceptionalism.” *Id.* at 51–63; Shubha Ghosh, *Are Universities Special?*, 49 AKRON L. REV. 671, 671 (2016).

299. See Lee, *supra* note 298, at 63–75.

300. *Id.* at 64–66.

301. See 35 U.S.C.A. § 123(d) (West 2013); see also Lee, *supra* note 298, at 74–75.

302. Lee, *supra* note 298, at 69–71.

ousness.³⁰³ Additionally, the AIA includes expanded prior user rights, which provide a defense to a patent infringement cause of action.³⁰⁴ Importantly, the defense also applies to “[a] use of subject matter by a non-profit research laboratory or other nonprofit entity, . . . for which the public is the intended beneficiary, shall be deemed to be a commercial use.”³⁰⁵ Not only are certain uses by non-profits included within the defense, there is a specific “university exception.”³⁰⁶ The university exception does not allow the defense to apply to commercial uses by a person who “at the time the invention was made, owned or subject to an obligation of assignment to either an institution of higher education . . . or a technology transfer organization whose primary purpose is to facilitate the commercialization of technologies developed by one or more such institutions of higher education.”³⁰⁷ This privileges universities and non-profits by removing the prior commercial use defense against patent infringement. Notably, this is particularly troubling in the following narrative: Company A independently develops technology and uses it commercially in a secret way. University develops the same technology and patents it. University brings an action against Company A. Company A cannot raise prior user rights under the statute.

Professor Ghosh points to proposed legislation directed at patent trolls that “protects universities as patent enforcers.”³⁰⁸ For example, Professor Ghosh states,

Proposed patent reform seeks to punish entities that simply accumulate patent portfolios with no intent to commercialize or practice the patented technologies, but instead have the intent to initiate patent infringement suits that will result in settlements. Proposals for curbing these frivolous lawsuits include heightened pleading standards, automatically awarding attorney’s fees if the non-practicing entity loses the lawsuit, and requirements of specificity in both pleading and in any cease and desist letters sent prior to initiation of litigation. Advocates for universities have sought a carve-out for these proposed reforms on the theory that while universities may not commercialize patents, their intent in acquiring a patent portfolio is not to bring frivolous litigation. The advocates’ implied argument is even stronger: that patent litigation brought by universities would almost certainly not be frivolous and pursued solely for settlement value. Consequently, patent reform would inappropriately characterize universities as patent trolls and unfairly increase their burden for pro-

303. *Id.* at 65–67.

304. *See* 35 U.S.C.A. § 273 (West 2011).

305. *Id.* § 273(c)(2); *see* Lee, *supra* note 298, at 71–73; Ghosh, *supra* note 298, at 689–91.

306. *See* Lee, *supra* note 298, at 71–73.

307. 35 U.S.C.A. § 273(e)(5)(A) (West 2011) (footnote omitted). This provision is subject to an exception: the university exemption will “not apply if any of the activities required to reduce to practice the subject matter of the claimed invention could not have been undertaken using funds provided by the Federal Government.” *Id.* § 273(e)(5)(B).

308. *See* Ghosh, *supra* note 298, at 692 (citing Innovation Act, H.R. 9, 114th Cong. (2015)).

tecting legitimate patent rights as compared to commercial patent owners.³⁰⁹

In recent decisions, the Patent Trial and Appeal Board (PTAB) extended 11th Amendment constitutional immunity to public universities from inter partes review. In *Covidien LP v. University of Florida Research Foundation Inc.*, the PTAB analogized inter partes review to patent infringement and essentially decided that entities cannot bring actions against universities to have their patents invalidated in an inter partes proceeding.³¹⁰

B. NON-PROFITS

The Bayh-Dole Act applies to non-profits. Notably, non-profits who are not universities, such as foundations, are licensing and litigating patents. This category does not include universities or non-profits formed by universities to license and enforce patents. An example of an entity not covered by our definition of non-profits includes the Wisconsin Alumni Research Foundation.

C. FOREIGN UNIVERSITIES

As discussed *supra*, the Bayh-Dole Act has been adopted throughout the world. Indeed, countries from the EU to India to China have adopted legislation similar to Bayh-Dole. It is unclear whether the same impact in the United States will be experienced in other countries. At least one study finds relatively substantial patenting by academic institutions outside the United States in their home countries.³¹¹ However, foreign universities are also likely obtaining patent rights in the United States given the size of the U.S. market; and, those universities will likely enforce those patents. Indeed, the National Academy of Inventors and the Intellectual Property Owners Association released the *Top 100 Worldwide Universities Granted U.S. Utility Patents 2016*, which lists around 30 non-U.S.-based universities in the top 100 patenting universities in the

309. *Id.* at 692–93 (footnotes omitted).

310. See No. IPR2016-01274, 2017 WL 4015009, at *7 (P.T.A.B. Jan. 25, 2017). However, a PTAB split of decisions appears to minimize the ability of licensees of university patents to avoid an IPR challenge in cases with co-owners. See *Reactive Surfaces Ltd., LLP v. Toyota Motor Corp.*, No. IPR2017-00572, 2017 WL 2992435, at *5 (P.T.A.B. July 13, 2017); see also Lucas Dahlin, *Sovereign Immunity Cannot Protect Patent Co-Owned by Private Party*, MONDAQ, <http://www.mondaq.com/unitedstates/x/626756/Patent/Sovereign+Immunity+Cannot+Protect+Patent+CoOwned+y+Private+Party> [https://perma.cc/U47S-Q7SB] (last updated Sept. 7, 2017) (“Universities and other state actors should be aware that co-owning a patent with a private party leaves the patent susceptible to IPR challenges. It may behoove such state actors to completely own their patents to protect against post-grant challenges.”).

311. For an example of a study concerning academic patenting in other countries, see Pluvia Zuniga, *The State of Patenting at Research Institutions in Developing Countries: Policy Approaches and Practices* (World Intellectual Prop. Org. Econ. Research Working Papers, Working Paper No. 4, 2011), http://www.wipo.int/edocs/pubdocs/en/wipo_pub_econstat_wp_4.pdf [https://perma.cc/B5Y8-ZBVH].

United States.³¹² The top 10 non-U.S.-based universities include Tsinghua University/Graduate School at Shenzhen, Tsinghua University (181 patents); Korea Institute of Science and Technology (100 patents); King Fahd University of Petroleum and Minerals (90 patents); National Tsing Hua University (80 patents); Korea Advanced Institute of Science and Technology (77 patents); National Taiwan University/National Taiwan University Hospital (65 patents); King Saud University (58 patents); Industry-Academic Cooperation at Yonsei University (57 patents); Ramot at Tel Aviv University LTD (54 patents); and National Chiao Tung University (53 patents).³¹³ For some context, the entire University of California system had 505 patents.³¹⁴ Harvard College, President and Fellows had 104 patents.³¹⁵ Duke University had 60 patents.³¹⁶ The University of Southern California had 51 patents.³¹⁷ Carnegie-Mellon University had 31 patents and Texas A&M had 35 patents.³¹⁸

Notably, those patents will likely not be covered by similar exemptions allowing potential use such as march-in rights exercisable by the United States government. However, all U.S. patents are subject to a “takings” type clause.³¹⁹ Moreover, the above-listed foreign universities have not signed the *Nine Points to Consider* document.

IV. REASONS FOR CONCERN, THE EFF, AND RICHARD EPSTEIN

This Part discusses the reasons for concern for the future of university patenting, licensing, and litigation. This Part also reviews the controversy between the EFF and Professor Richard Epstein.

A. REASONS FOR CONCERN

The main factor preventing additional litigation by universities and non-profits is likely reputational. Universities serve multiple constituencies and are likely to be concerned with aggravating potential donors, alumni, students, and the general public. An example of university and non-profit concern with reputation includes the public outcry involving the University of California system enrolling many foreign students and out-of-state students to increase revenue instead of admitting additional

312. See NAT'L ACAD. OF INV'RS, TOP 100 WORLDWIDE UNIVERSITIES GRANTED U.S. UTILITY PATENTS 2016 (2017), www.academyofinventors.com/pdf/top-100-universities-2016.pdf [<https://perma.cc/83TK-99JM>].

313. *Id.*

314. *Id.*

315. *Id.*

316. *Id.*

317. *Id.*

318. *Id.*

319. See 28 U.S.C. § 1498 (2012) (“(a) Whenever an invention described in and covered by a patent of the United States is used or manufactured by or for the United States without license of the owner thereof or lawful right to use or manufacture the same, the owner’s remedy shall be by action against the United States . . . for the recovery of his reasonable and entire compensation for such use and manufacture.”).

in-state residents.³²⁰ Specifically, with respect to intellectual property, Yale University made the decision to alter its approach to licensing and access to a particular type of pharmaceutical.³²¹ Indeed, as found by Professor Rooksby, universities are concerned with reputation in making the decision to litigate patents.³²² Indeed, the EFF has attempted to use university concern with reputation to shame universities who license patents to trolls.³²³ However, there is a movement—intentional or not—to revise the way academia has generally operated to accommodate technology transfer, increase public/private collaboration, and move toward universities acting more in line with for-profit corporations. Indeed, Professor Brian L. Frye and Christopher J. Ryan, Jr. find that universities are behaving similarly to private firms in response to legislative changes concerning patents.³²⁴ Shaming may not be enough.

There is some cause for concern for the future. For example, there are several factors that make it likely that universities will engage in even more litigation in the future and may seek to license to so-called patent trolls. Moreover, the complicated and continuing evolution of the role of the university raises broader concerns. Additionally, the campaign by the EFF and debate with Professor Richard Epstein bring these concerns into sharp relief. This debate will likely lead to an attempt to reshape the larger debate about the role of universities.³²⁵ Essentially, the argument may become that public universities entrusted with public funding must bring research to the public, and patent litigation is one way to ensure recoument of public monies.

Some factors may lead to an increase in patent litigation: First, the U.S. federal government could substantially decrease funding for university research. Indeed, the Trump Administration's budget includes cutbacks

320. See Teresa Watanabe, *UC Proposes Its First Enrollment Cap—20%—on out-of-State Students*, L.A. TIMES (Mar. 6, 2017, 11:15 AM), <http://www.latimes.com/local/lanow/la-me-ln-uc-limit-nonresident-students-20170306-story.html> [<https://perma.cc/TMS7-MUYU>] (“A scathing state audit . . . found that UC was hurting California students by admitting too many out-of-state applicants.”).

321. See Timothy B. Lee, *University Patents Limit Access to Medicine. These Students Want to Change That.*, WASH. POST (Nov. 22, 2013), https://www.washingtonpost.com/news/the-switch/wp/2013/11/22/university-patents-limit-access-to-medicine-these-students-want-to-change-that/?utm_term=.5f251ca586fc [<https://perma.cc/GG6N-L8R7>]; see generally Amy Kapczynski, Samantha Chaifetz, Zachary Katz & Yochai Benkler, *Addressing Global Health Inequities: An Open Licensing Approach for University Innovation*, 20 BERKELEY TECH. L.J. 1031, 1034–37 (2005).

322. See *infra* Part III.

323. See Daniel Nazer, *Stupid Patent of the Month: Storing Files in Folders*, ELECTRONIC FRONTIER FOUND.: DEEPLINKS BLOG (Mar. 31, 2017), <https://www.eff.org/deeplinks/2017/03/stupid-patent-month-storing-files-folders> [<https://perma.cc/2GLG-LKM7>] (“Louisiana Tech [University] sold the ‘532 patent to Micoba LLC, a company that has all the indicia of a classic patent troll.”).

324. Christopher J. Ryan, Jr. & Brian L. Frye, *An Empirical Study of University Patent Activity*, 7 N.Y.U. J. INTELL. PROP. & ENTER. L. 51, 51 (2017).

325. Scholars are already calling for more discretion on the part of universities on how inventions are utilized. See, e.g., Vertinsky, *supra* note 209, at 2021 (“These changes are directed at increasing the discretion, responsibility, and accountability of universities in selecting and managing post-discovery development choices for their inventions.”).

in research funding, including funding for the National Institutes of Health.³²⁶ Thus, there is increased pressure on universities to find alternative funding sources. Second, most technology transfer offices are not making enough money to sustain themselves.³²⁷ It is likely that they will continue to push for more patenting and look to increased licensing to raise revenue. Third, the norms in academia could be shifting because of the generational change in researchers. As Professor Mark Lemley noted, the real danger with a change in norms is not that existing scientists' norms will change but that the new hires will have different norms.³²⁸ Indeed, those norms can shape apparent changing tenure standards, which consider or encourage commercialization activities by researchers. Indeed, Professor Brian Love found that,

[F]ifty-one percent of respondents believe that patenting activities are taken into account in tenure decisions, as well as in decisions to promote faculty members to the rank of full professor or to an endowed chair. Another thirty-eight percent report that they believe patent activities are taken into account by university administrators when determining professors' annual raises. In narrative responses, several respondents additionally reported that university administrators award professors who patent often with the best lab space and extended periods of paid leave.

As a result, relatively junior professors have a strong incentive to file patent applications, regardless of their personal views on whether doing so would otherwise be in their own or society's best interest.³²⁹

These factors could all lead to increased patenting and licensing and an incentive to either engage in more litigation or license to those who are more willing to litigate.

B. CONTROVERSY BETWEEN THE EFF AND RICHARD EPSTEIN

In late 2016, the Electronic Frontier Foundation (EFF) started its Reclaim Invention program.³³⁰ The Reclaim Invention program is primarily directed at prohibiting universities from licensing inventions, particularly publicly funded inventions, to patent trolls.³³¹ The EFF basically defines

326. Joel Achenbach & Lena H. Sun, *Trump Budget Seeks Huge Cuts to Science and Medical Research, Disease Prevention*, WASH. POST (May 23, 2017), https://www.washingtonpost.com/news/to-your-health/wp/2017/05/22/trump-budget-seeks-huge-cuts-to-disease-prevention-and-medical-research-departments/?utm_term=.1d7a49d97b58 [<https://perma.cc/G46X-H45M>].

327. WALTER D. VALDIVIA, *UNIVERSITY START-UPS: CRITICAL FOR IMPROVING TECHNOLOGY TRANSFER* 9 (2013), https://www.brookings.edu/wp-content/uploads/2016/06/Valdivia_Tech-Transfer_v29_No-Embargo.pdf [<https://perma.cc/TL53-BXRR>] (“[W]ith 84% [of] universities operating technology transfer in the red, 2012 was a good year because over the last 20 years, on average, 87% did not break even.”).

328. Lemley, *Trolls*, *supra* note 5, at 620–21.

329. Love, *supra* note 228, at 330–31 (footnotes omitted).

330. *About Reclaim Invention*, ELECTRONIC FRONTIER FOUND., <https://www.eff.org/reclaim-invention/about> [<https://perma.cc/KR84-FK3M>] (last visited Mar. 5, 2018).

331. *Id.*

trolls as non-practicing entities, which definitely includes patent assertion entities; however, it appears that they would not include universities within the group of so-called trolls.³³² The Reclaim Invention program has two prongs.³³³ The first prong is an attempt to get stakeholders at universities to sign a patent pledge to essentially pressure universities not to license to trolls.³³⁴ The Public Interest Patent Pledge provides,

[School name] pledges not to knowingly license or sell the rights of inventions, research, or innovation made possible by this institution to patent assertion entities, or patent trolls.

When determining what parties to sell or license patents to, *[School name]* will take appropriate steps to research the past practices of potential buyers or licensees and favor parties whose business practices are designed to benefit society through commercialization and invention. We will strive to ensure that any company we sell or license patents to does not have a history of litigation that resembles patent trolling. Instead, we will partner with those who are actively working to bring new technologies and ideas to market, particularly in the areas of technology that those patents inhabit.³³⁵

The Public Interest Patent Pledge covers not only entities that may fall within the category of “patent assertion entities[] or patent trolls,” but it also includes those that “have a history of litigation that resembles patent trolling.”³³⁶ The latter broadly encompasses entities that may engage in some invention or commercialization but who also litigate patents.³³⁷

The second prong concerns an attempt to persuade state legislatures to adopt model state legislation that basically “[r]equire[s] state-funded universities to adopt a policy not to license or sell patents to trolls . . . [and] [v]oid[s] the sale of any university patent to a troll.”³³⁸ The model legislation states, in relevant part:

(b) In order to be eligible to receive student financial assistance or state research funding, [State-funded university system(s)] must—

332. *Id.*

333. *Id.*

334. *Id.*

335. *Public Interest Patent Pledge*, ELECTRONIC FRONTIER FOUND., <https://www.eff.org/reclaim-invention/pledge> [<https://perma.cc/V283-38F9>] (last visited Mar. 3, 2018).

336. *Id.*

337. *Id.*

338. *Legislation: Reclaim Invention Act*, ELECTRONIC FRONTIER FOUND., <https://www.eff.org/reclaim-invention/legislation> [<https://perma.cc/VT6A-PBKA>] (last visited Feb. 14, 2018). The Model Act contains a preamble that states:

The inventions developed at publicly funded universities represent the trust of the public in the form of donations, grants, government funding, and tuition fees. Public universities should ensure that their patent assets are managed in a way that serves their educational and public interest missions. University research should fuel the creation of new products, new services, and new jobs. It should never become a tax on the innovation and investment of others.

See *Reclaim Invention Act (Model Act, 2016)*, <https://www.eff.org/files/2016/09/19/reclaiminventionact-091.txt> [<https://perma.cc/E9HL-AMXX>].

(1) adopt a policy relating to inventions, patents, patent assertion, and technology transfer that demonstrates that the university is committed to ensuring that patent assets are managed in a way that serves the public interest. To further this goal, the policy must require the university to:

(A) determine whether a patent is the most effective way to bring a new invention to a broad user base before filing for a patent that covers that invention; (B) research the past practices of potential patent buyers or licensees; (C) prioritize technology transfer that develops its inventions and scales their potential user base; (D) endeavor to nurture startups that will create new jobs, products, and services; (E) endeavor to assign and license patents only to entities that require such licenses for active commercialization efforts or further research and development; (F) foster agreements and relationships that include the sharing of know-how and practical experience to maximize the value of the assignment or license of the corresponding patents; and (G) prioritize the public interest in all patent assertions and patent transactions.

(2) not assign or exclusively license any Patent to any Patent Assertion Entity; and

(3) any assignment of a Patent from [State-funded university system] to a Patent Assertion Entity shall be considered void and unenforceable.³³⁹

Notably, the model legislation includes definitions of “patent,” “patent assertion,” and “patent assertion entity.”³⁴⁰ A “patent assertion entity” means any entity whose primary business model is based on patent assertion or otherwise using patents to obtain licensing fees from practicing companies.³⁴¹ Notably, the legislation includes a provision preventing the university from receiving financial assistance for students. It is not tied only to government funding for research. Moreover, while the legislation seems to be directed at “state-funded university system,” it conceivably could be read to include a university that receives some state funding. A legislator in the state of Maryland has introduced the model act in the Maryland legislature.³⁴² The Act appears to have been

339. Reclaim Invention Act, *supra* note 338.

340. The definition of “Patent” includes any issued patent or patent application, including but not limited to a design patent or design registration, from any jurisdiction.” *Id.* The definition of

“Patent Assertion” means either: (i) asserting (including but not limited to via a written or oral demand) a claim of Infringement of a Patent for the primary purpose of deriving royalties or other monetary compensation under such Patent, or (ii) the commencement or subsequent pursuit of a claim, action or proceeding in a judicial, administrative or other governmental body based on a claim of Infringement of such Patent.

Id.

341. *Id.*

342. Kerry Sheehan, *One Step Closer to Reclaiming University Innovation from Trolls*, ELECTRONIC FRONTIER FOUND.: DEEPLINKS BLOG (Mar. 17, 2017), <https://www.eff.org/deeplinks/2017/03/were-one-step-closer-reclaiming-university-innovation-trolls> [https://perma.cc/F7AP-3F3K].

withdrawn.³⁴³

The EFF's Reclaim Invention program has been critiqued by noted property rights scholar Richard Epstein.³⁴⁴ In an article in *Forbes*, Professor Epstein critiques the EFF for failing to cite any empirical evidence that universities are "misbehaving" with respect to managing their patent portfolios and faults the EFF for not analyzing how current university patent policies are problematic.³⁴⁵ Notably, the EFF cited Professor Feldman and Ewing's study cited *infra* for support that universities are engaged in some relationship with patent trolls. Importantly, Professor Epstein points to the benefits of technology transfer in producing new innovations and jobs.³⁴⁶ Professor Epstein makes several additional critiques. First, he takes issue with the EFF's failure to define who exactly is a troll by stating that the EFF conflates all NPEs with patent trolls.³⁴⁷ Second, he makes a specialization argument.³⁴⁸ He points out that universities may not have expertise in licensing patents and NPEs may assist them.³⁴⁹ In particular, he points to the benefits of bundling patents with unclear boundaries in portfolios.³⁵⁰ Third, he makes the argument that the EFF has erred by essentially stating all patent enforcement is negative in this context.³⁵¹ Particularly, he points to the benefit of enforcement of patents that make them more valuable to universities, which leads to increased "willingness of universities to invest in innovative technology [and t]hat higher productivity in turn increases the return to the public funders, to students and to private donors, all of whom benefit from this situation."³⁵² He finally states that, if anything, patents are too weak.³⁵³

Professor Feldman and Tom Ewing, whose paper was cited by the EFF, have studied mass aggregators, such as Intellectual Ventures, who some label as a patent troll.³⁵⁴ Notably, Intellectual Ventures licenses inventions from universities.³⁵⁵ For example, "[t]he company has announced that it has relationships with some 400 universities."³⁵⁶ The identity of those institutions is unclear because "the company may simply receive an exclusive license to commercialize the intellectual property involved,

343. H.B. 1357, Gen. Assemb. (Md. 2017), <http://mgaleg.maryland.gov/webmga/frmMain.aspx?pid=billpage&stab=01&id=hb1357&tab=subject3&ys=2017RS> [https://perma.cc/FV2K-8N4Z].

344. Richard Epstein, *The Electronic Frontier Foundation Misfires on University Patents*, *FORBES* (Nov. 4, 2016, 10:34 AM), www.forbes.com/sites/richardepstein/2016/11/04/the-electronic-frontier-foundation-misfires-on-university-patents/amp/ [https://perma.cc/B6N9-2SKX].

345. *Id.*

346. *Id.*

347. *Id.*

348. *Id.*

349. *Id.*

350. *Id.*

351. *Id.*

352. *Id.*

353. *Id.*

354. Feldman & Ewing, *Giants*, *supra* note 50, at 14–71.

355. *Id.* at 38.

356. *Id.*

which would not necessarily appear as a recorded transfer of ownership.”³⁵⁷ The authors also note that recording of ownership may be delayed for strategic reasons.³⁵⁸ However, almost 50 universities appear to have some “deal” with Intellectual Ventures.³⁵⁹ Notably, the authors state that Intellectual Ventures appears to have entered into deals with universities in developing countries providing Intellectual Ventures with the rights to file Patent Cooperation Treaty patent applications outside the home country of the university in exchange for revenue sharing.³⁶⁰ Notably, funding sources for Intellectual Ventures include “the William and Flora Hewlett Foundation, the University of Pennsylvania, the University of Notre Dame, [and] Grinnell College.”³⁶¹ Moreover, Intellectual Ventures uses third parties to litigate patent cases, a practice known as privateering.³⁶² These third parties tend to be “more aggressive” litigators.³⁶³ It is unclear whether Intellectual Ventures is using these third parties to litigate portfolios or patents that include university patents or government-funded patents. Professor Feldman and Ewing state that, “By signing up universities, research labs, and inventors, Intellectual Ventures has optioned future patentable ideas prior to their conception.”³⁶⁴ Additionally, the GAO reported that “[s]ome [surveyed patent monetization entities] told us that they acquired patents from a variety of sellers, such as universities [and others].”³⁶⁵

The evolving role of the university in the context of changing norms also raises greater concerns about the future of litigation as universities move closer to for-profit corporations. Professor Lee points to the overarching public purpose of universities to explain their special treatment under laws principally designed for for-profit corporations operating in markets. Professor Ghosh explains the “challenges as the [American university] navigates the pulls of commercialization and the demands of the many constituencies it serves.”³⁶⁶ He points to the range of goals a university may attempt to serve from those that are “purely private” to “purely public.”³⁶⁷ Moreover, he presents several idealized versions of the university while noting the development of land-grant institutions, which had a focus on “practical training for citizens of the newly recognized states.”³⁶⁸ His principle insight is that “[t]he special rules for universities represent legislative compromises that rest in part on an idealized view of universities and on the real politics of law-making in a

357. *Id.*

358. *Id.* at 22.

359. *Id.* at 38.

360. *Id.* at 39–40.

361. *Id.* at 44.

362. *Id.* at 62.

363. *Id.* at 63.

364. *Id.* at 113.

365. 2013 GAO REPORT, *supra* note 8, at 19.

366. Ghosh, *supra* note 298, at 673.

367. *Id.*

368. *Id.* at 674–75.

world of university-industry collaboration.”³⁶⁹ Importantly, the interests that represent the technology transfer community, as well as the industry, are powerful lobbyists when joined with universities. Notably, the concern with funding will continue to drive universities toward seeking either new revenue sources or revitalizing existing funding sources. This will drive them closer to the industry by aligning their interests and may result in more overall litigation and perhaps less reticence to engage in litigation.

V. THE DATA AND EMPIRICAL ANALYSIS

We construct our dataset from a number of sources. The first, and most important, is the Stanford Nonpracticing Entity (SNE) dataset described above, which contains data on 10,820 cases and the 21,497 patents associated with them (although there are many duplicates for patents associated with several cases). It also contains data on where and when the cases were filed, the patent owner at the time of litigation, and the relevant dates and docket entries, as well as other information associated with the cases.

The SNE allows us to look at cases and patents associated with universities, foundations, non-profits, or government agencies because it provides a categorization as described above. It also provides crucial data on the nature of these cases, which we use to pursue our analysis. Moreover, we match this dataset with other publicly available data from the USPTO, especially as it relates to government interests in the patent and the names of original and current assignees (when different from patent owners at time of litigation). However, the USPTO data is, in certain places, incomplete. We therefore further match the previous two data sources with data from Google Patents. Google has made available on its website a collection of useful data on most U.S. patents, including the number of claims and citation to and by the patent, among others. To obtain this data, we scrape the Google Patents website using patent numbers to automatically extract data on assignees (original and “current,” where available), patent grant dates, number of claims, and citations to and from the patent, as well as government interest in the patent. The latter is possible because by law patents that benefitted from government funding must state the public investment in the description of the patent.³⁷⁰ Finally, we complement all this data with publicly available information on which universities are private and land-grant colleges, as well as the size of their endowment.

The procedure for matching the data is described below. The following sections describe the data and the findings.

369. *Id.* at 673.

370. 35 U.S.C. § 202(c)(6) (2012); 37 C.F.R. § 401.14(f)(4).

A. METHODOLOGY

For the purposes of this study, we create two separate datasets: one for patents and one for cases. This is because some of the variables of interest relate to the patents (e.g., number of claims, citations, and the type of university or foundation), while others are specific to the cases (such as venue where the case was filed or number of patents asserted). Many patents will appear in more than one case so we keep our analysis separate for clarity.

1. *Patents Dataset*

In order to match the data and arrive at our dataset of interest, we give priority to the SNE dataset, followed then by the USPTO and other data sources. This is because neither source is complete—there are a few observations missing in each case; we strive, however, to maintain the original categorization of the data done by Stanford.

We begin with the SNE data for patents and exclude all patents that do not fit under categories two (university heritage or tie) and six (university, government, or non-profit). There are 334 patents in this category. Some of these patents are not associated with a university or foundation; rather, they were asserted together with one or more university- or foundation-related patents. We identify 52 patents that were in fact owned by another type of organization classified as co-plaintiffs in a case also involving a university or foundation. We remove these cases from the dataset, leaving us with 282 patents.

Furthermore, this does not include all university-related patents in the dataset; the original categorization had, in some instances, missed some of the patents. For instance, patent US5281731 was involved in a case in the SNE sample; it is categorized as relating to a product company (category eight). However, according to our additional datasets the patent is associated with the Wisconsin Alumni Research Foundation, which was both the original assignee and the owner at the time the case was filed (2009), before expiring in 2012.³⁷¹

We therefore complement the SNE dataset with two other sources of data on patent assignees, using the name to look for universities, foundations, and nonprofits. From the USPTO we obtain a dataset on original assignees, which contains all U.S. patents since 1976. However, for some patents (2,631) the data on assignees is missing; in order to look for these cases, we scrape Google Patents for the remaining observations. We also scrape Google Patents for data on “current assignees.” A list of name tags we search for can be found in the Appendix; these were chosen from a list of universities and foundations from the World Intellectual Property

371. There are a number of reasons for the few discrepancies in the SNE Dataset on the one hand and USPTO and Google Patent Dataset on the other, including subsequent changes. It is important to note that the Stanford researchers did an exemplary job in categorizing a significant amount of data. We are in no way criticizing their excellent work.

Organization.³⁷² Following this procedure, we identify 256 patents from the USPTO assignee dataset, 6 additional patents from the “original assignee” data from Google Patents, and 19 additional patents from the current assignee data on Google Patents. Merging these datasets with the 282 observations from the SNE dataset, and removing duplicates, we obtained a total sample of 381 patents.

2. Cases Dataset

Our second dataset is comprised of all the cases involving one of the 381 patents identified above. The SNE dataset contains 585 such cases.³⁷³ It contains information on patent owners, venue of the filing, the number of alleged infringers, relevant dates, and docket entries.

For both of these datasets, we add a number of patent-specific information. We use USPTO data on government interest in the development of the patent to categorize each patent and each case associated with it as “with government interest” or “without government interest.” Furthermore, we categorize universities as public or private and land-grant versus non-land-grant.³⁷⁴ We also subdivide them into four categories based on the type of organization: U.S.-based university organization, which includes both universities and their affiliated organizations; foreign-based university organization; U.S. government agency; and foreign government agency. Finally, we collect data on university endowment size, when available.³⁷⁵

B. DESCRIPTIVE STATISTICS

The majority of the patents in our sample are associated with U.S.-based universities (see Table 1); there are also a large number of foreign foundations, non-profits, and research centers (non-university related). The average patent was involved in 4.5 cases; this is slightly lower than the overall average for the SNE dataset, which was 4.97 cases. However, when looking exclusively at U.S.-based universities, the average is almost the same (4.96).

We define patent “age” as the years since it was granted as of May 2017. The average patent in our sample is 14.6 years old (see Table 1 for a breakdown). On average, patents were 7.5 years old at the time of litigation.³⁷⁶ Thus, the average patent in the dataset is relatively young, which may demonstrate that, on average, there is less likely an *ex post* situation

372. WORLD INTELLECTUAL PROP. ORG., PCT ANNEX INFORMATION, http://www.wipo.int/export/sites/www/pressroom/en/documents/pr_2015_774_annexes.pdf#page=3 [<https://perma.cc/54G5-34AZ>] (last visited Feb. 15, 2018).

373. The number of cases may change because of changes concerning joinder under the America Invents Act.

374. See *Members*, *supra* note 167.

375. See *ENDOWMENT VALUE*, *supra* note 170.

376. In some cases (around ten), patents were litigated before grant date (usually between filing and grant). In these cases we categorized them as zeros.

where a university may be asserting a patent against a technology that has been commercialized. However, on closer examination beyond the average, there seem to be some patents that are being asserted relatively late in their term in individual cases.

FIGURE 1

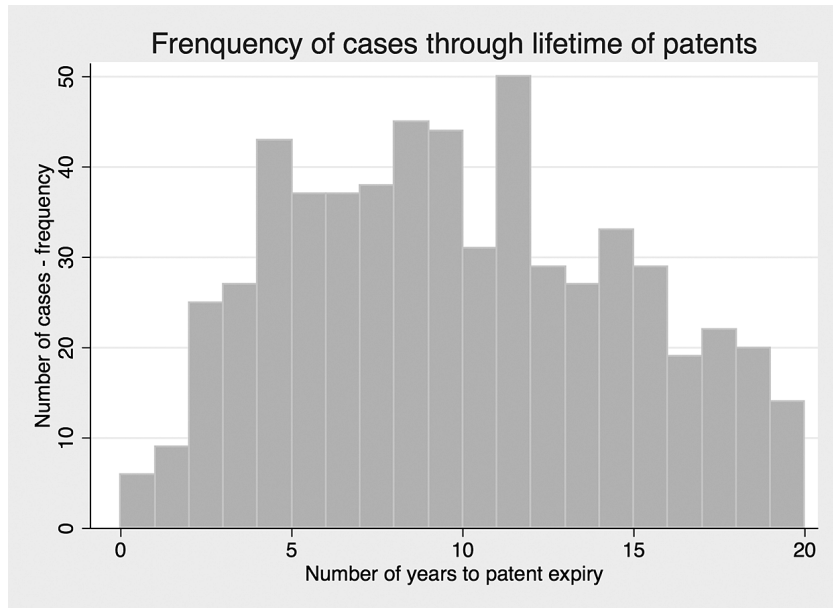


FIGURE 2

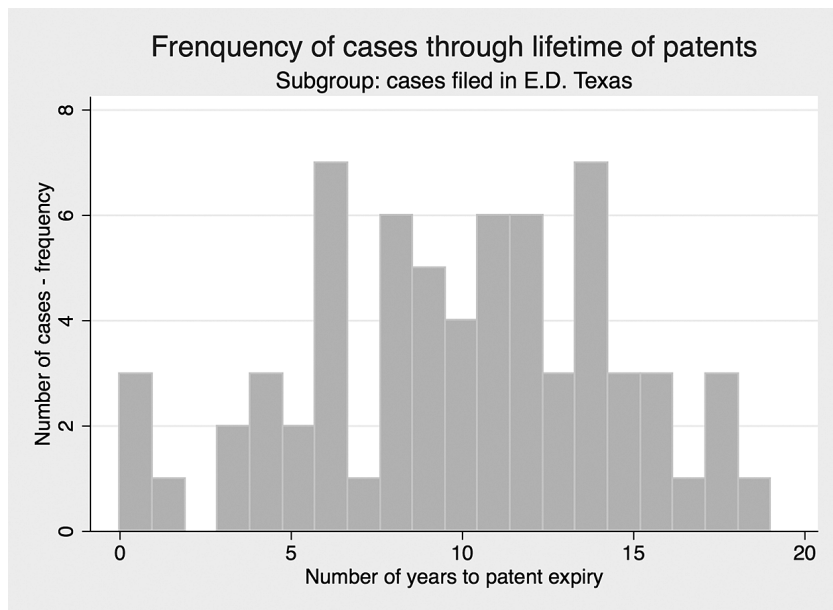
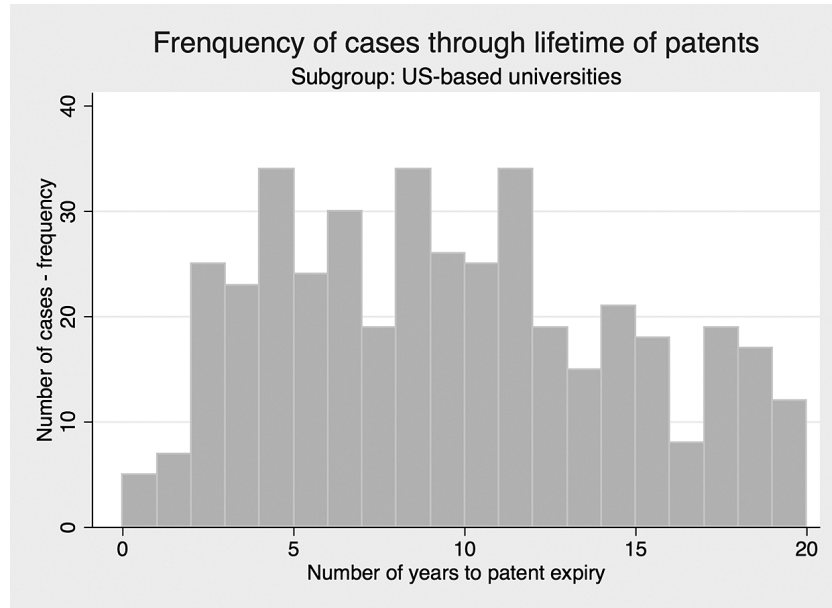


FIGURE 3



As demonstrated by Figure 3 above, there are numerous patents litigated by U.S.-based universities that are in the final few years of term. This is similar to the results recognized by Professor Love. However, there is only slight overlap between cases filed by universities in the Eastern District of Texas and our “late-term patents.”

Table 1—Patent characteristics

	Number of patents	Average number of cases	Average patent age
U.S.-based university	252 (66%)	4.96	15.0
Foreign university	33 (9%)	3.39	12.8
U.S.-based foundation	35 (9%)	4.34	13.7
Foreign foundation	58 (15%)	3.29	13.9
U.S. gov't agency	1 (0%)	1	19.3
Foreign gov't agency	2 (1%)	5	18.0

The majority of patents associated with universities relate to private institutions (56%), while about 11% relate to foreign universities. Among patents associated with U.S.-based institutions, over a third are land-grant universities (see Table 3). Interestingly, 26% of all cases filed in this jurisdiction are U.S.-based foundations or non-profits, followed by foreign universities (25%), foreign foundations (15%), and only 7% among U.S.-based universities.

Table 2—Private vs public university-related patents

	Absolute number	Percentage
Private university	158	56%
Public university	94	33%
Foreign university	31	11%

Table 3—Land-grant institutions

	Absolute number (patents)	Percentage
Land grant	93	37%
Not land grant	159	63%

Table 4—Government interest (U.S. Based)

	Absolute number	Percentage
Government interest	129	45%
No government interest	158	55%

Among U.S.-based patents, almost half have a government interest. This is spread across several agencies, including the National Institutes of Health (33% of the total), NASA (23%), the National Science Foundation (6%), and DARPA (4%).

Another important variable is the venue in which the case was filed. The four venues with the most cases are the United States District Court for the District of Delaware (D. Del.) (15% of all cases), the United States District Court for the Southern District of California (S.D. Cal.) (13.2%), the United States District Court for the Eastern District of Texas (E.D. Texas) (11.5%), and the United States District Court for the Central District of California (C.D. Cal.) (10.3%). The cases filed in the Eastern District of Texas are especially interesting given that, as indicated *supra*, filing in this jurisdiction might be an indicator of troll-like behavior. The percentage in our sample filing in the Eastern District of Texas is slightly lower than in the overall SNE sample where that number is 16.5%. Almost half the cases (46%) filing in that jurisdiction were U.S.-based universities (with one-third of those being cases filed by the California Institute of Technology), followed by foreign universities (22%). Prior studies focused on university litigation have also found a large number of cases filed in the Eastern District of Texas.

In terms of the length of litigation, the average case in our sample lasted about 2.3 years. Interestingly, the length is shorter for U.S.-based universities (2.2 years) and foreign foundations or non-profits (1.6 years) but longer for foreign universities (2.5 years) and U.S.-based foundations and non-profits (3.4 years). For comparison, the length of litigation

among patents filing in the Eastern District of Texas is 1.8 years. Thus, by average, the length of cases is somewhat similar between our dataset and those cases filed in the Eastern District of Texas.

C. ANALYSIS OF THE RESULTS

In this section, we focus on what our data tells us about the behavior of universities and foundations vis-à-vis litigation; in particular, we investigate whether the characteristics of the patents and the cases they are involved in are suggestive of more aggressive patent assertion often associated with NPEs.

We approach this question from two angles: first, by looking at measures of patent “value”; then, we explore variables pertaining to the litigation cases to explore evidence of strategic behavior. There is strong evidence that patent characteristics are associated with higher litigation rates and might therefore be categorized as NPEs. We use our dataset to compare our results to previous work and better understand what kinds of organizations are associated with higher value patents. We begin by looking at each patent’s number of claims, forward citations (citations made to the patent by subsequent patents referring to it as prior art), and “backward citations” (citations made to prior patents). We compare our findings to the analysis carried out by Allison, Lemley, and Walker in 2009.³⁷⁷ These authors compared the value measures described above between a sample of patents that have been litigated eight or more times in the period between 2000 and 2007, which they call “Most Litigated Patents,” and another sample of patents with some similar characteristics that have only been litigated once (“Once litigated patents”).³⁷⁸ They find statistically significant differences in the number of claims and citations between the two samples, suggesting these measures can be predictive of aggressive patent assertion behavior.³⁷⁹ The values for these three variables in our sample are presented below and compared to the values obtained by Allison, Lemley, and Walker.³⁸⁰

377. *Extreme Value*, *supra* note 66, at 12.

378. *See generally id.*

379. *Id.*

380. Allison, Lemley, and Walker also looked at other factors, including number of continuations. *Id.* at 13.

Table 5—Comparison to Most Litigated Patents
(Allison, Lemley, and Walker 2009)

	Average number of claims	Average number of forward citations	Average number of backward citations
University and foundation/non-profits sample			
Mean	34.4	100.3	42.8
Median	29	101	43
Standard deviation	22.4	59.7	25.4
Allison, Lemley, and Walker (2009) Most Litigated Patents			
Mean	39.3	32.3	61.5
Median	22.5	15.5	12
Standard deviation	44.7	42.4	109.31
Bivariate comparison			
Significant difference?	No	Yes	Yes

We estimate whether there are statistically significant differences between these figures between the two samples. Finding no statistically significant difference would indicate that the patents in our sample have a similar value to the most litigated patents studied by Allison, Lemley, and Walker. We find mixed results: there is no statistically significant difference in the number of claims; if anything, the median (the value that characterizes the middle of the distribution such that half of all values lie under it) is higher in our sample. When it comes to forward citations, the number is much higher for our patents than for the Most Litigated Patents, and the difference is statistically significant; however, this is probably a misleading statistic given that the data come from different sources (our source is Google Patents, which might be presenting information differently than the traditional USPTO service).³⁸¹ Finally, backward citations, that is, citations made by the patent to other patents as prior art, is higher in the Most Litigated Patents compared to those in our sample, and this difference is statistically significant. However, when compared to the Once Litigated Patents in Allison, Lemley, and Walker, the number of backward citations is also higher in a statistically significant way. In other words, when it comes to backward citations, the average patent in our sample is below the Most Litigated Patents but above the Once Litigated Patents, which Allison, Lemley, and Walker consider “‘ordinary’ litigated patents.” In sum, there is some evidence that the patents in our sample share some of the value attributes that

381. Another point raised by Allison et al. is that this kind of forward citation should be normalized to account for patent age (since older patents would naturally tend to have been cited more), following Hall, Jaffe, and Tajtenmberg. However, since it is not clear we are comparing similar measures, we do not present this normalized version.

characterize highly litigated patents.³⁸²

In some ways, this should not be surprising. Notably, at least with universities, the patents at issue were likely vetted substantially. A faculty researcher likely obtained a research grant based on a proposal investigating the state of the art reviewed by knowledgeable researchers. The faculty researcher likely recognized the state of the art and filed an invention disclosure for an invention that the faculty researcher believed was novel and nonobvious. The invention disclosure may be reviewed by an internal committee in the university to determine whether to seek a patent. The technology transfer office may review the patent as well. An attorney will be selected to work on the patent application. Finally, the decision to litigate may be based on an evaluation of the likelihood of success. Thus, the patented technology may be well-researched and deserving of a patent.

Table 6—Comparison with non-university patents filed in E.D. Texas

	Average number of claims	Average number of forward citations	Average number of backward citations
University and foundation/non-profits sample			
Mean	34.4	100.3	42.8
Median	29	101	43
Standard deviation	22.4	59.7	25.4
Patents filed in E.D. Texas*			
Mean	30.1	114.0	58.3
Median	22	46	18
Standard deviation	31.6	203.2	129.4
Bivariate comparison			
Significant difference?	Yes	No	Yes

* Excluding those coded as 2 and 6 in the SNE.

We further analyze the value of the patents in our data by comparing them to a subset of the patents in the full SNE dataset, namely those filed in the Eastern District of Texas. As described *supra*, these patents are likely to have been the subjects of troll-like behavior. We therefore select all patents associated with a case filed in that jurisdiction and, after removing the patents coded as two (university heritage or tie) and six (foundation, NGO, government), match them to Google Patent data on the above measures of patent value. This comparison sample contains 1,631 patents; 93 of these cases are coded as one (acquired patents), four

382. It should be noted that while we report here “statistical significance,” this does not say much about whether the differences, or lack thereof, are “significant” in practice; in other words, the statistical tests cannot tell us whether the difference of 18.7 backward citations between our two samples means that the patents associated with universities/NGOs/governments are indeed much less valuable than the Most Litigated Patents studied by Allison, Lemley, and Walker.

(corporate heritage), or five (individual investor-started company), which the Stanford Project indicates are typically known as patent-trolls by those who use the term. Table 6 above presents the comparison for the values of claims and total number of backward citations. The total number of claims is slightly higher in the universities/NGOs/governments sample; this is significant at the 95% confidence level. The opposite is true for the number of backward citations, with patents filed in the Eastern District of Texas having on average 15.5 more backward citations (again significant at the 95% confidence level). Finally, although the number of forward citations is slightly higher among patents filed in the Eastern District of Texas, the difference is not statistically significant. We take this as evidence that the value of patents associated with universities, foundations, and governments is somewhat similar to that of patents that have a higher likelihood of belonging to entities with the most litigated patents in the Allison, Lemley, and Walker study.

How do these values break down by type of organization and patent? There are small differences; however, none of them are statistically significant, as shown in Table 7.

Table 7—Patent value by organization type*

	Average number of claims	Average number of forward citations	Average number of backward citations
U.S.-based universities	36.4 (22.0)	99.5 (60.0)	41.5 (25.7)
Foreign universities	35.0 (20.0)	90.7 (62.6)	43.2 (21.9)
U.S. foundation	37.0 (24.3)	106.6 (57.4)	48.4 (32.1)
Foreign foundation	30.1 (21.8)	105.9 (63.0)	41.8 (27.5)
Total	34.4 (22.4)	100.3 (60.0)	42.8 (25.4)

* In parentheses we report the standard deviations. None of the differences between types are statistically significant.

Finally, the measures of patent values are remarkably similar across different types of universities (excluding ANDA cases, looking only at U.S.-based universities and land-grant or private institutions).

Table 8—Patent value by university type*

	Average number of claims	Average number of forward citations	Average number of backward citations
All universities	36.3 (21.8)	97.4 (59.8)	41.5 (25.7)
Without ANDA cases	36.5 (27.2)	98.8 (59.1)	42.1 (25.6)
U.S.-based universities	36.4 (22.1)	99.5 (59.7)	41.6 (25.7)
Land-grant universities	36.2 (24.0)	101.5 (59.0)	36.6 (25.6)
Private universities	36.7 (21.0)	97.4 (59.8)	42.8 (25.4)

* In parentheses we report the standard deviations. None of the differences between types are statistically significant.

Furthermore, we explore what measures relating to the cases can tell us about the different types of patents in our sample. A variable of interest is the length of litigation, as shorter lengths might indicate lawsuits that are designed to settle for less than the amount to bring the case to trial, a proxy for troll-like behavior. We find strong differences in case length between organizational types (see Table 9), with foreign foundations demonstrating a much shorter average length for cases (593.1) versus, for instance, U.S.-based universities (800.1) or, especially, U.S.-based foundations (1261.7).³⁸³ This might be an indication that foreign foundations were conducting more aggressive patent enforcement compared to, for instance, U.S.-based universities.

Another valuable indicator in the cases dataset is the number of alleged infringers; like length of litigation, it is a proxy for strategic behavior on the part of the patent assertion entities seeking to cash out from the litigation by suing a large number of alleged infringers. The higher the number, the more likely the PAE was acting like a patent-troll. Once again, we find strong differences in the average numbers between different types of organizations; however, despite the suggestive nature of these differences, they do not appear to be statistically significant due to a large variance in the numbers. For comparison, among the sample of non-university related cases filed in the Eastern District of Texas described above, the average number of alleged infringers is 3.91—0.9 less than for U.S.-based universities in our sample (a statistically significant difference at the 95% confidence level).

383. This difference is statistically significant at the 95% confidence level. Notice that the figures for government agencies, both U.S. and foreign, are based on too few cases to be informative.

Table 9—Length of litigation (in days)

	Average length	Median length	Standard deviation	Number of cases
U.S.-based university	800.1	714	681.3	415
Foreign university	931.3	717	1057.1	40
U.S.-based foundation	1261.7	600	1311.0	48
Foreign foundation	593.1	519	478.9	74
U.S. government agency	296	296	*	1
Foreign government agency	1399.7	1034	924.8	7
Total	827.1	651	779.5	585

* The standard deviation cannot be calculated as there is only one observation

Table 10—Number of alleged infringers

	Average number	Median number	Standard deviation	Number of cases
U.S.-based university	4.8	2	14.8	415
Foreign university	2.3	2	2.1	40
U.S.-based foundation	2.1	2	1.3	48
Foreign foundation	3.3	3	2.5	74
U.S. government agency	4	4	*	1
Foreign government agency	4.6	1	5.2	7
Total	4.2	2	12.5	585

* The standard deviation cannot be calculated as there is only one observation

Our belief is that it is relatively dangerous to draw drastic conclusions concerning the behavior of universities and other non-profits based on these data. Some of this behavior could be categorized as strategic behavior taken by a rational patent litigator. However, the data seems to indicate that universities and non-profits are exhibiting some similar behavior to certain categories of entities that are considered so-called patent trolls. For the reasons given *supra*, we believe that universities and other entities should continue to be carefully monitored to determine whether they are acting similar to trolls, particularly those patents that are publicly funded. U.S. universities, in particular, receive substantial public benefits, whether land-grant institutions and public or not, and should continue to act in the public interest. This monitoring and reporting will at least make universities and other non-profits think carefully about what decisions they make about litigating patents. At the very least, perhaps universities and non-profits will avoid licensing to those entities commonly believed to be trolls or bottom-feeders. Indeed, as discussed *supra*, some universities have made that poor choice. Importantly, we also found that there was very little overlap between the litigated patents in our sample and the publicly available data released by Intellectual Ventures concerning universities' patents licensed by it.

Another area of specific concern involves foreign universities litigating in the United States. As discussed *supra*, there are a significant number of

these universities litigating in the United States. Notably, there is also substantial patenting conducted by foreign universities as compared to patenting by U.S. universities in 2016. This trend may continue. Importantly, foreign universities may not be able to take advantage of 11th Amendment immunity; however, they also may not be limited by the recent *TC Heartland* decision concerning venue. This may allow them to continue to file in the Eastern District of Texas. They are likely not subject to the same limitations, such as march-in rights, in the United States as U.S. universities. It is important to note that the earlier critiques may not apply to foreign universities though. They are unlikely to receive the same benefits under U.S. law that U.S. universities receive. For example, they may not receive U.S. public funding at the same level and are likely not land-grant institutions. However, the litigation and patenting behavior of foreign universities should be monitored and may highlight problems in the overall U.S. patent system, as noted by scholars.

VI. CONCLUSION

In examining the confluence of two important issues, the so-called patent troll issue and university patent litigation, this paper proposes that academics and policy makers carefully monitor the patenting behavior of universities and other non-profits. For sure, the public has invested heavily in universities through various subsidies and in specific inventions. On one hand, an argument can be made that universities, acting as private firms in lobbying and litigation choices, are protecting those interests. On the other hand, universities are arguably rent-seeking, which will drive costs up for consumers and deprive them of useful innovations. We caution that universities and non-profits should exercise care in how they litigate and should be carefully monitored. Pressure to perform as well as dwindling resources may push some actors to behave like so-called trolls. As discussed *supra*, universities should reserve the right to control the decision to litigate. This paper provides some evidence that universities may be acting somewhat similarly to so-called trolls. However, more research is needed to evaluate the benefits and costs of non-practicing entities, including universities. Indeed, in the context of universities, those entities are at least developing the invention and, through operation of the Bayh-Dole Act, the inventor will receive some revenue from commercialization of that invention.

APPENDIX

Table 11–Name tags for patent assignees*

1.	“University” / “university” / “UNIVERSITY”
2.	“California Institute of Technology” / “CALIFORNIA INSTITUTE OF TECHNOLOGY”
3.	“Massachusetts Institute of Technology”
4.	“College” / “COLLEGE”
5.	“Trustees” / “TRUSTEES”
6.	“DANMARKS TEKNISE UNIVERSITET”
7.	“ISIS Innovation Limited” / “Isis Innovation”
8.	“Imperial Innovations” / “IMPERIAL INNOVATIONS”
9.	“Georgia Tech Research”
10.	“Wisconsin Alumni Research”
11.	“Cornell Research Foundation”
12.	“MUSC Foundation” / “Medical University of South Carolina Foundation”
13.	“Yeda Research” / “YEDA Research”
14.	“South Alabama Medical Science”
15.	“Yarbrough William M Foundation”
16.	“Mayo Foundation”
17.	“EIDGENOSSISCHE”
18.	“Sloan-Kettering Institute”
19.	“St Jude Children’s Research”
20.	“Commonwealth Scientific and Industrial”

*The name tags are not the complete names of the organizations. This is to avoid failure to match with correct names because of slight changes in the presentation of the name, e.g., “The Yarbrough William M Foundation” as opposed to “Yarbrough William M Foundation.”

Table 12–Venues

Venue	Percent
D. Del.	15.04%
S.D. Cal.	13.16%
E.D. Tex.	11.45%
C.D. Cal.	10.26%
N.D. Cal.	6.5%
D.N.J.	5.3%
S.D.N.Y.	4.62%
D. Mass.	4.1%
E.D.N.C.	2.39%
N.D. Ga.	2.39%
W.D. Ark.	2.39%
W.D. Wis.	2.05%
D. Minn.	1.71%
S.D. Iowa	1.71%

W.D. Tex.	1.54%
M.D.N.C.	1.37%
E.D. Va.	1.2%
D. Utah	1.03%
N.D.W. Va.	1.03%
D. Md.	0.85%
M.D. Fla.	0.68%
N.D. Ill.	0.68%
W.D. Mich.	0.68%
D.N.D.	0.51%
D. Neb.	0.51%
E.D. Mich.	0.51%
E.D. Pa.	0.51%
W.D. Okla.	0.51%
D.S.C.	0.34%
E.D. Mo.	0.34%
E.D.N.Y.	0.34%
N.D. Ohio	0.34%
N.D. Tex.	0.34%
S.D. Fla.	0.34%
W.D. Pa.	0.34%
W.D. Tenn.	0.34%
D. Conn.	0.17%
D.D.C.	0.17%
D. Me.	0.17%
E.D. Ark.	0.17%
M.D. Ala.	0.17%
M.D. Pa.	0.17%
M.D. Tenn.	0.17%
N.D. Ala.	0.17%
N.D. Fla.	0.17%
N.D. Miss.	0.17%
N.D.N.Y.	0.17%
S.D. Ind.	0.17%
W.D. La.	0.17%
W.D. Va.	0.17%
W.D. Wash.	0.17%

