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Invalidated Patents and Associated Patent Examiners

Shine Tu*

ABSTRACT

This study attempts to determine whether there are common characteristics between examiners who issue invalidated patents. This study uses two new patent databases that code for nearly 1.7 million patents and approximately one thousand patents that were litigated to a “final” judgment between 2010 and 2011. This study finds that approximately one-third of patents that are litigated to final judgment are found invalid. Most invalidated patents are found in technology centers 1600, 2600, and 2700,¹ which correspond to biotechnology and organic chemistry, communications, and computer science, respectively. Most patents are invalidated on prior art-type novelty and obviousness grounds. This study also determined that: (1) litigated patents mainly come from primary examiners (those examiners with more experience), and (2) primary examiners that grant between thirty and sixty patents per year are issuing a higher number of invalidated patents. Interestingly, the highest volume primary examiners (examiners who on average grant more than one hundred patents per year and have more than seven years of experience) issue very few litigated patents that are later found invalid. Most of the patents that were invalidated in this data set were done so via the prior art language of 35 U.S.C.

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1. In 2000, technology center 2700 (computers, communication and e-commerce) was split into 2100 (computer architecture, software and information security) and 2600 (communications). See also *Office of the Chief Communications Officer, UNITED STATES PATENT AND TRADEMARK OFFICE*, <http://www.uspto.gov/web/offices/ac/ahrpa/opa/ptotoday/ptotoday11.pdf> [<http://perma.cc/37NH-S33W>].

§§ 102–103. *Approximately 77 percent of the prior art references used to invalidate patents were not found by the US Patent and Trademark Office (USPTO) during examination. Additionally, 38 percent of the prior art references used to invalidate patents were US patents or US patent applications. Of those invalidating references that were US patents or patent applications, approximately 89 percent were not found by the examiner. These data imply that improving PTO searching could improve patent quality.*

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I. INTRODUCTION

Preventing examination errors should always be an aspiration for all examiners at the US Patent and Trademark Office (USPTO). Patent examination is not a homogenous process and can vary dramatically depending on the examiner.² The variation in

2. Ian M. Cockburn, Samuel Kortum & Scott Stern, *Are All Patent Examiners Equal? Examiners, Patent Characteristics, and Litigation Outcomes*, in PATENTS IN THE KNOWLEDGE-BASED ECONOMY 20 (W.M. Cohen & S.A. Merrill, eds., 2003); Mark A. Lemley & Bhaven Sampat, *Examining Patent Examination*, 2010 STAN. TECH. L. REV. 2 (2010); Mark A. Lemley & Bhaven

examination quality is so great that some commentators argue that there may be as many patent offices as patent examiners.³ Building on two previous studies,⁴ this study collects and analyzes a novel dataset on patent examiners and patent outcomes. This dataset is based on 2,152 patents associated with a final decision issued on validity between 2010 and 2012. Of these 2,152 patents, examiner data and prosecution histories were available for 622 patents. Of these 622 patents, 216 were found invalid. For each of the 622 patents, this study identifies a USPTO working examiner and collects statistics derived from his or her patent examination history between 2000 and 2012. This study then attempts to determine if there are common characteristics among examiners who issue invalidated patents.

Some commentators argue that there has been a dramatic increase in patent litigation in recent years.⁵ Indeed, 5,189 patent actions were filed in 2012, which represents the highest number of patent litigation actions ever recorded.⁶ The number of patents granted by the USPTO has also steadily increased. From 2011 to 2012, the number of patents granted by the USPTO increased by 11 percent to 270,258.⁷ Adjusting for inflation, the median damages award ranged from \$1.9 million in 1995 to \$16.5 million in 2015, with an overall median award of \$5.5 million over the last eighteen years.⁸

Sampat, *Is the Patent Office a Rubber Stamp?* 58 EMORY L.J. 181 (2008); Sean Tu, *Luck/Unluck of the Draw: An Empirical Study of Examiner Allowance Rates*, 2012 STAN. TECH. L. REV. 10 (2012).

3. Cockburn, Kortum & Stern, *supra* note 2, at 28. Note that as of February 2013, there were 7,865 patent examiners. *Data Visualization Center*, UNITED STATES PATENT AND TRADEMARK OFFICE, <http://www.uspto.gov/dashboards/patents/main.dashxml> [<http://perma.cc/7K3E-Y755>] (download .xls spreadsheet at the bottom of the webpage for historical PTO staffing data).

4. Tu, *supra* note 2; Shine Tu, *Patent Examiners and Litigation Outcomes*, 17 STAN. TECH. L. REV. 507 (2014).

5. James Bessen & Michael J. Meurer, *The Direct Costs from NPE Disputes*, 99 CORNELL L. REV. 387, 388 (2014); *see also* Christopher A. Cotropia, Jay P. Kesan & David L. Schwartz, *Patent Assertion Entities (PAEs) Under the Microscope: An Empirical Investigation of Patent Holders as Litigants*, 99 CORNELL L. REV. 425 (2014) (showing that the raw number of patent lawsuits filed by non-operating companies substantially increased from 2010 to 2012, but this phenomenon is likely driven by procedural rule changes relating to joinder passed with the 2011 patent reform).

6. PRICEWATERHOUSECOOPERS, 2013 PATENT LITIGATION STUDY 6 fig. 1 (2013), <https://www.pwc.com/us/en/forensic-services/publications/assets/2013-patent-litigation-study.pdf> [<https://perma.cc/2JB5-VXTN>] (based on USPTO: Performance and Accountability Report and US Courts: Judicial Facts & Figures). Note that some of this increase is due to the changes in the anti-joinder provision of the American Invents Act (AIA).

7. *Id.*

8. *Id.* at 7.

Accordingly, errors that could be prevented at the USPTO would save litigants and consumers millions of dollars.

This Article attempts to identify commonalities between examiners who issue invalidated patents. Part II discusses patent office procedure and the patent examination process. Part III surveys previous empirical studies designed to evaluate patent litigation. Part IV explores the novel dataset and the methodology used to evaluate this dataset. Part V presents the results of this evaluation by examiner characteristics, and Part VI presents the results by invalidity type. Part VII presents a solution to some of the major issues facing examiners. Finally, Part VIII summarizes the findings. This study finds that most utility patents are invalidated via novelty and obviousness type grounds, and much of the prior art that is used to invalidate patents are US patents or US patent applications. Finally, our findings show that examiners are not finding the prior art correctly instead of simply misinterpreting prior art that was previously found in their search.

II. BACKGROUND

The USPTO employs some 7,800 patent examiners⁹ and manages a budget of approximately \$3 billion dollars. Many scholars argue that not only is litigation a tax on innovation but also that the USPTO increases the amount of litigation by granting low-quality patents.¹⁰ However, patent examiners could play an important role in

9. As of February 2013, there were 7,865 patent examiners. *Data Visualization Center, supra* note 3.

10. John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185 (1998); John R. Allison, Mark A. Lemley, Kimberly A. Moore & R. Derek Trunkey, *Valuable Patents*, 92 GEO. L.J. 435 (2004); 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 (2009); Colleen V. Chien, *Predicting Patent Litigation*, 90 TEX. L. REV. 283 (2011); Jean O. Lanjouw & Mark Schankerman, *Patent Quality and Research Productivity: Measuring Innovation with Multiple Indicators*, 114 ECON. J. 441 (2004); Jean O. Lanjouw & Mark Schankerman, *Protecting Intellectual Property Rights: Are Small Firms Handicapped?* 47 J.L. & ECON. 45 (2004); Jean O. Lanjouw & Mark Schankerman, *Characteristics of Patent Litigation: A Window on Competition*, 32 RAND J. ECON. 129 (2001); Kimberly A. Moore, *Worthless Patents*, 20 BERKELEY TECH. L. J. 1521 (2005); see also Donald R. Dunner & Gerald Mossinghoff, *Increasing the Certainty in Patent Litigation: The Need for Federal Circuit Approved Pattern Jury Instructions*, 83 J. PAT. & TRADEMARK OFF. SOC'Y 431, 432-33 (2001); Paul M. Janicke, *On the Causes of Unpredictability of Federal Circuit Decisions in Patent Cases*, 3 NW. J. TECH. & INTELL. PROP. 93, 93-94 (2005); Jay P. Kesau, David L. Schwartz & Ted Sichelman, *Paving the Path to Accurately Predicting Legal Outcomes: A Comment on Professor Chien's Predicting Patent Litigation*, 90 TEX. L. REV. 97 (2012); see also Lee Petherbridge, *On Predicting Patent Litigation*, 90 TEX. L. REV. 75 (2012). See Ted Sichelman, *Myths of (Un)certainty at the Federal Circuit*, 43 LOY. L.A. L. REV. 1161, 1188-89 (2010), for a competing opinion.

reducing litigation by acting as a gatekeeper to stronger patents through quality examination.

According to a recent Government Accountability Office (GAO) report on patent litigation and patent quality, the number of patent infringement lawsuits from 2010 to 2011 has increased by about one third.¹¹ Stakeholders in patent litigation identified three key observations that account for the trend.¹² First, stakeholders were concerned about both patents with unclear property rights and patents with overly broad or unclear claims. This lack of clarity may be the result of, for example, patent holders' use of vague terminology and a lack of common vocabularies for describing concepts, innovations, or ideas.¹³ Second, stakeholders are concerned with damages, specifically large monetary awards for patents that make only a small contribution to an overall product. Disproportionately large damage awards can also incentivize patent owners to file lawsuits in the hope that the accused infringer will settle to avoid going to court. Some stakeholders also argue that damage awards were outsized and did not reflect the value of the patent or the patent's contribution to the product at issue.¹⁴ Third, stakeholders have become more aware that patents are a valuable asset that can be asserted against competitors.¹⁵

In order to address patent quality, the USPTO has implemented several programs directed towards patent quality and patent search.¹⁶ For example, the USPTO issued supplemental guidelines for the examination of the definiteness and functional language in computer-implemented claims. According to USPTO officials, these supplemental guidelines attempt to make the examination of applications consistent and the resulting patents clearer across all technologies.¹⁷ Additionally, the USPTO implemented the Cooperative Patent Classification (CPC) in 2013 to help companies and patent applicants conduct more effective searches for patents that may pose infringement issues.¹⁸ The CPC improved

11. U.S. GOV'T ACCOUNTABILITY OFF., GAO-13-465, INTELLECTUAL PROPERTY: ASSESSING FACTORS THAT AFFECT PATENT INFRINGEMENT LITIGATION COULD HELP IMPROVE PATENT QUALITY 1 (2013).

12. *Id.*

13. *Id.* at 28.

14. *Id.* at 33.

15. *Id.* at 28.

16. Patent searching includes finding the most appropriate and closest related prior art references both in the patent and non-patent literature.

17. GAO-13-465, *supra* note 11, at 39.

18. GAO-13-465, *supra* note 11, at 40–41.

searching by enabling more frequent updates of patent classes so that similar technologies can be more effectively grouped together.¹⁹

The high cost of patent litigation has spurred judicial changes to the handling of patent cases. First, high discovery costs contribute to these excessive legal costs, with a median legal cost at \$700,000 when less than \$1 million is at stake.²⁰ Next, some courts have recently introduced a patent pilot program that assigns patent cases to district court judges who have expertise in patent cases, and other courts are experimenting with new rules designed to streamline and reduce the expense of patent litigation.²¹

The USPTO can correct errors in prosecution after the patent has issued. The remedies available to the applicant vary depending on the severity of the error. For example, if the error is minor or clerical, the USPTO can issue a certificate of correction. If the error is substantive, the applicant can start the reissue or the *ex parte* reexamination process. Third parties can also challenge the patent using either the *ex parte* or *inter partes*²² reexamination process, or new Leahy-Smith America Invents Act (AIA) proceedings such as post-grant review and *inter partes* review. Importantly, once a patent is in litigation, the USPTO has limited involvement.²³ Accordingly, the biggest impact that the USPTO can have on litigation may be to make sure patent quality is strong by searching, finding, and considering the relevant prior art before the patent application matures to an issued patent.

III. CURRENT LITERATURE

Several empirical studies have been conducted regarding patents and patent examination. The most relevant are outlined below. First, Cockburn, Kortum, and Stern (2003) correlated the effects of specific examiner characteristics (such as tenure at the USPTO, the number of patents they have examined, and the degree to which the patents they examine are later cited by other patents) and

19. GAO-13-465, *supra* note 11, at 41.

20. The American Intellectual Property Law Association (AIPLA) found that for a claim that is less than \$1 million, the median legal costs are \$700,000. When \$10 million to \$25 million is considered "at risk," median litigation costs can hit \$3.3 million. For a claim over \$25 million, median legal costs are \$5.5 million. AM. INTELL. PROP. L. ASS'N., REPORT OF THE ECONOMIC SURVEY I-129-I-131.

21. Pub. L. No. 111-349, 124 Stat. 3674 (2011).

22. Leahy-Smith America Invents Act, ch. 31, Pub. L. No. 112-29. *Inter partes* reexamination was phased out by the AIA and replaced by *inter partes* review. *Ex parte* reexamination continues to be available post-AIA. *Id.*

23. A court can stay litigation if there is a pending *inter partes* review. *See id.*

how their issued patents fared in litigation.²⁴ Cockburn et al. found that examiner fixed effects²⁵ can explain the variation in the characteristics of issued patents. Specifically, they found that there is no evidence that examiner experience or workload at the time a patent is issued affected the probability that the Court of Appeals for the Federal Circuit (CAFC) would find that patent invalid, and examiners whose patents tended to be more frequently cited often have a higher probability of a CAFC invalidity ruling.²⁶ The dataset that Cockburn et al. used was based on only 182 patents for which the CAFC ruled on validity between 1997 and 2000.²⁷ In contrast, this study is more comprehensive because it includes all litigation proceedings where there is a final ruling on validity. This study is also broader because it includes final judgments not only from the CAFC, but also from all district courts between 2010 and 2012.

Allison and Lemley (the “AL study”) also previously scrutinized examiners and patent quality using a very similar method.²⁸ Allison et al. reviewed 299 patents associated with 239 different cases in either district courts or the Federal Circuit between 1989 and 1996.²⁹ Similar to this study, the dataset used by Allison et al. did not include appeals from the rejection of a patent application by the USPTO Board of Patent Appeals and Interferences³⁰ or appeals from the US International Trade Commission (USITC). The AL study found several interesting trends: (1) approximately 54 percent of all litigated patents were held valid, (2) novelty arguments based on prior art and statutory bars³¹ fared better than obviousness arguments,³² (3) there was virtually no difference between the validity rates of patents in different fields of invention, and (4) uncited prior art was more likely to invalidate a patent than previously cited art.³³ The AL study, however, was limited because it was based only on patent validity decisions that finally resolved the case on the merits and reported

24. Cockburn, Kortum & Stern, *supra* note 2, 21.

25. *Id.* at 22 (defining “examiner fixed effects” as effects that are significant even after controlling for the patent’s technology field. These effects include number and pattern of citations received, the number and pattern of citations made, and the approval time.)

26. *Id.* at 20, 22.

27. *Id.* at 21.

28. Allison & Lemley, *supra* note 10, at 194, 201.

29. *Id.* at 194.

30. The Board of Patent Appeals and Interferences is now called the Patent Trial and Appeal Board. See Leahy-Smith America Invents Act, sec. 7, Pub. L. No. 112–29.

31. 35 U.S.C. § 102 (2015).

32. 35 U.S.C. § 103 (2015).

33. Allison & Lemley, *supra* note 10, at 231–34; see also Allison, Lemley, & Schwartz, *supra* note 10, at 1782.

decisions available in the United States Patent Quarterly. Accordingly, many decisions in this study were appellate decisions.³⁴

Allison, Lemley, and Schwartz (the “ALS study”) updated and expanded the previous AL study with a new hand-coded data set.³⁵ The ALS study found that: (1) the single largest category of adjudicated challenges was for indefiniteness,³⁶ (2) patentees only won 26 percent of the time (but if the case reached the trial stage, patentees won 60.7 percent of the trials),³⁷ (3) several districts were correlated with higher win rates for either the accused infringer or patentee,³⁸ (4) if the patentee asserts more than one patent, then the patentee was more likely to win,³⁹ (5) foreign litigants were much more likely to prevail in court in a merits decision compared to domestic litigants,⁴⁰ and (6) observable characteristics of the patents do not seem to have much influence on the outcome of the cases.⁴¹ What makes the present study unique is that it links the patent litigation data to the specific examiners that issued the patent. Accordingly, this study is able to determine if there are any common characteristics between those examiners who issue litigated patents that are later found invalid.

Lemley and Sampat concluded that more experienced examiners were less active in searching for prior art and had a much higher grant rate.⁴² Additionally, they found that most examiners cited to patented prior art references and not publications.⁴³ From these data, Lemley inferred that senior examiners are doing less work—rather than merely getting it right—more often than junior examiners.⁴⁴ Previous studies have also shown that senior examiners allow a higher percentage of applications compared to their junior counterparts.⁴⁵ In contrast to the Lemley study, this study attempts

34. Allison & Lemley, *supra* note 10, at 240 (“[A]pproximately one-half of the cases in the population are appellate decisions (146 out of 299).”); *see also* Allison, Lemley, & Schwartz, *supra* note 10, at 1769.

35. Allison, Lemley, & Schwartz, *supra* note 10, at 1769.

36. *Id.* at 1782.

37. *Id.* at 1790.

38. *Id.* at 1791.

39. *Id.* at 1796.

40. *Id.* at 1797.

41. *Id.* at 1798–99.

42. Mark A. Lemley & Bhaven Sampat, *Examiner Characteristics and Patent Office Outcomes*, 94 REV. ECON. & STAT. 817, 817 (2012); *see also*, Tu, *supra* note 2, at tbl. 1 (showing that primary examiners comprise a smaller percentage of examiners but issue the majority of patents in most technology centers).

43. Lemley & Sampat, *supra* note 42, at 817.

44. *Id.* at 822.

45. Tu, *supra* note 2, at 50.

to test the inference regarding patent quality by using litigation as a proxy for quality. Invalidated patents are patents that should not have been issued usually because of some patentability problem. By focusing on invalidated patents, this study attempts to measure poor examination because many of these issues could have been prevented during the USPTO examination process. Accordingly, this study determines if senior examiners are not only doing less work but also doing a poor job by allowing the creation of invalid patents.

Finally, Janicke and Ren created a database of 262 cases from all dispositive decisions of the Federal Circuit from 2002 to 2004.⁴⁶ Janicke and Ren found that approximately 25 percent of the 262 dispositive cases were won by the patent owner.⁴⁷ Additionally, Janicke and Ren found that only three factors were statistically significant to case outcomes: patentee financial strength, jury verdict, and the type of law firm (intellectual property boutique or general firm) chosen by the winning side.⁴⁸ Surprisingly, the type of technology in the patent was only marginally significant.⁴⁹ Finally, Janicke and Ren confirmed that foreign companies win as patentees at a slightly higher rate than the patentees overall.⁵⁰

IV. DESCRIPTION OF STUDY

*A. Litigation Population*⁵¹

As an initial matter, many of the 622 cases analyzed by this study were complex. These sophisticated cases had long procedural histories and complex opinions. Thus, each case was hand coded by the author, and student coders were not used. Relying on a single coder enhanced internal consistency.

The study's population consists of 2,152 patents litigated in 771 different cases. Each of these cases represents a written, final validity

46. Paul M. Janicke & LiLan Ren, *Who Wins Patent Infringement Cases?* 34 AIPLA Q.J. 1, 4 (2006) (defining "dispositive" as cases where at least one claim of one patent is finally adjudicated to have been infringed and not invalid or unenforceable (patentee wins), or in which it has been finally determined that no claim has these characteristics (accused infringer wins)).

47. *Id.* at 5.

48. *Id.* at 12.

49. *Id.* at 12, 18 (showing only marginal effects for area of technology, but this could be due to the relative imbalance of data associated with the area of technology).

50. *Id.* at 22.

51. This study is a population study and not a sample study. Although I am using a population, I am able to perform statistical testing. As discussed in more detail in Part IV, one can perform hypothesis testing and prediction from a population by treating the population as a subset of the greater population (for example, a hypothetical population of all past and future validity opinions.) See M.E. Thompson, *Superpopulation Models*, in 9 ENCYCLOPEDIA OF STATISTICAL SCIENCES 93, 93–99 (1988).

decision by either district courts or the Federal Circuit between 2010 and 2012. The dataset also includes all patent lawsuits filed in a federal district court that terminated between January 1, 2010 and December 31, 2012.

This study used several sources to generate this dataset: (1) a LexisNexis-based patent search, (2) the Lex Machina⁵² database to validate and supplement the data source, and (3) the patstats.org⁵³ and (4) PricewaterhouseCoopers litigation dataset⁵⁴ to capture any possible missing cases. All datasets were merged, and duplicate cases were removed. The final data set comprised all patent litigation that reached a final decision. Once the dataset was complete, docket reports were reviewed. Docket reports included all relevant orders, opinions, motions, verdicts, appellate rulings, and other miscellaneous court documents needed to code the litigation outcomes.

The population only includes validity decisions on issued US utility patents. This includes reexaminations and reissued patents. Additionally, this study includes decisions on unenforceability due to misuse, inequitable conduct, estoppel, and other similar bases.⁵⁵

Only cases with reported, written decisions are included in the population. This includes cases denominated “not for publication” by the Federal Circuit, as well as district court opinions that are not included in the Federal Supplement. This study includes cases in which it could be determined from the opinion that a final decision had been reached in favor of the patentee on at least one claim of at least one patent, or that a final decision had been reached in favor of the accused infringer. However, this study excludes decisions that only include jury verdicts or opinions that do not include rationales on the validity of a patent by the district court judge. These data were excluded because they would create a subset of cases that could not be compared to the larger dataset. Thus, this study excludes cases without an explanation of invalidation because it would be difficult to determine if the issue could have been prevented at the USPTO level.

This study uses patents as the unit of analysis. Thus, for each case, the outcome was separately coded for each asserted patent. For example, if an opinion was rendered on three patents in one case, then an outcome was recorded separately for each patent. Additionally, if

52. LEX MACHINA, <https://lexmachina.com/> [<http://perma.cc/XX98-H8XU>].

53. Patstats.org is a resource for patent litigation statistics posted by the University of Houston Law Center Institute for Intellectual Property and Information Law. PATSTATS.ORG, <http://patstats.org/> [<http://perma.cc/D3M3-QVU8>].

54. The author obtained a private copy of this dataset from PriceWaterhouseCooper for academic purposes. It is not a publicly available dataset.

55. However, these legal rationales for invalidity were excluded in the analysis because they are not preventable by the examiner during prosecution.

multiple claims were in question within a single patent, the patent was recorded as “invalid” if any one claim was found invalid. This, of course, biases the population towards invalidation. Because this study focuses mainly on preventative measures that could have been taken at the USPTO level, preventative measures most likely could have been taken at the USPTO level—even if a patent had valid claims—so long as there was one invalid claim.

Summary judgment opinions were coded only if they resulted in a final resolution with a corresponding rationale. The denial of summary judgment does not always result in a final solution but can mean that there is an unresolved disputed issue of material fact. Accordingly, summary judgments that did not result in a final ruling in either direction were not recorded. However, if a summary judgment ruling resulted in a final ruling, then the summary judgment ruling was coded.

B. Examiner Population and Corresponding Patents

The population of examiners includes every examiner who issued any patent between 2001 and 2011 in every active art unit,⁵⁶ sorted by art unit, application filing date, issue date, primary examiner, or secondary examiner. These data include only utility patents and are unfiltered for reexamination patents, reissue patents, continuations, continuations in part, divisional applications, and applications directed at foreign filings. Plant and design patents are not included in this data set. This database allows us to determine the type of examiner (primary or secondary) and the rate at which each examiner type issues patents. A detailed description of the collection and analysis for the examiner database has been previously published and is summarized below.⁵⁷ The collection, limitations, and interpretation of this database have also previously been described.⁵⁸

A previous study audited those examiners who were approving patents to determine if there were common characteristics between examiners who allowed cases. Accordingly, this study coded for every patent issued between January 2001 and June 2011 (approximately

56. “When an application is sent to the PTO, it is reviewed to make sure all procedural requirements are met for a filing date. Applications are then sorted for examination by ‘technology center’ and ‘art unit.’ Each technology center represents a broad technology type, for example, technology center 1600 represents ‘biochemistry and organic chemistry.’ Within each technology center are many ‘art units.’ Each art unit represents a narrower group of technology within the technology center, for example, 1642 represents ‘Antibody Engineering and Cancer Immunology.’” Tu, *supra* note 2, at 12.

57. See generally Tu, *supra* note 2.

58. See *id.* at 54–63.

1.7 million patents). Each patent was matched with a specific “working” examiner.⁵⁹ An average number of patents issued per year could be calculated for each examiner by simply summing the “number of patents issued”⁶⁰ divided by the “years of service” as an examiner.⁶¹ The previous study found that more experienced primary examiners (those examiners with more than five years of experience) were allowing cases at a much higher rate than less experienced secondary examiners (usually those examiners with fewer than three years of experience).⁶²

In this study, each patent that was litigated to a final decision was matched with the examiner database. Accordingly, the database used in this study contains a profile of examiners associated with issued patents that later underwent litigation.

C. Data Assembled

The data set assembled for the present study includes information about: (1) the litigation, (2) the patent, and (3) the examiner(s) associated with the litigated patent. The following data were collected from litigation records:

1. Case name, citation, and termination date;
2. Whether the patent was held valid or invalid;
3. Whether the patent was infringed or non-infringed;
4. Whether the court decided litigated validity issues based on:
 - a. Enablement;
 - b. Written description;
 - c. Best mode;
 - d. Claim indefiniteness;
 - e. Patentable subject matter;
 - f. Utility;

59. See *id.* at 58 (“The ‘working examiner’ is the examiner who did the most direct work on that application. This is the secondary examiner (if present) or the primary examiner if there was no secondary examiner.”).

60. See *id.* at 39. (“The ‘number of patents’ issued includes all patents issued by the specific examiner between January 2001 and July 2011.”).

61. See *id.* at 20. The “years of service” figure does not include those years where the examiner issued only one patent. This was done to remove examiners who fell within particular categories: (1) those examiners who were only briefly at the USPTO, but left before issuing more than one patent, (2) those examiners who are primary examiners who mainly review the work of secondary examiners but issued one patent by themselves, (3) those examiners who have issued one patent, but have not issued any since, (4) those examiners hired at the end of the year, who may have issued only one patent due to the ramp up time, and (5) examiners who came back to the USPTO and needed time to ramp up during their return year.

62. Tu, *supra* note 2, at 49 (referring to the Lemley and Sampat 2011 studies).

- g. Section 102 prior art;⁶³
 - h. Section 102 non-prior art;⁶⁴
 - i. Obviousness;
 - j. Double-patenting;
 - k. Incorrect inventorship; or
 - l. Inequitable conduct or latches;
5. If a prior art reference was cited in a 35 U.S.C. §§ 102 or 103 rejection, what type of reference was cited (US patent, US published patent application, foreign patent, foreign published patent application, non-patent literature, or foreign non-patent literature);
 6. If a prior art reference was cited in a 35 U.S.C. §§ 102 or 103 rejection, whether the prior art reference was cited in the prosecution history; and
 7. If the prior art reference was cited in the prosecution history, whether the prior art was interpreted differently by the court.

As an initial matter, it is important to note that the examiner data covers only the years from 2001 to 2012. Accordingly, if an examiner had years of experience prior to 2001, it is not captured by this dataset. Thus, if an examiner had more than eleven years of experience, the data could only capture the examiner's work history between 2001 and 2011. Information regarding the examiners includes:

1. Patent numbers, technology center, and art unit;
2. Primary examiner name;
3. Secondary examiner name (if applicable);
4. File date;
5. Issue date;
6. Number of years as a patent examiner as of date when invalidated patent was issued (covers 2001 to 2011 only, so if the patent was issued in 2006 and the litigation, involving the decision of an examiner who joined the USPTO in 2002, did not conclude until 2010, the examiner was coded as having four years of experience);
7. Number of patents issued during the year that invalidated patent was issued;
8. Total number of years as a patent examiner during the 2001 to 2011 period;
9. Average number of patents issued per year (sum total of all patents issued between 2001 and 2012, divided by the number of years examiner was at the office between 2001 and 2011).⁶⁵

63. See 35 U.S.C. § 102 (2012) (defining "prior art" as prior art references such as patents, patent applications, or any printed publications).

64. See *id.* (defining "non-prior art" as including things such as the on-sale bar, public use, or otherwise available to the public).

65. I did not count those years in which an examiner issues one and only one patent. Accordingly, the data set is right censored in that I removed many of the examiners with the

In a previous study, I created a database of every patent issued between 2001 and 2011.⁶⁶ Although both the primary and the secondary examiner (if applicable) were coded for, the examiner linked with the litigation is the “working” examiner.⁶⁷ The working examiner is the examiner who did the most direct work on that application.⁶⁸ Thus, the working examiner would be the secondary examiner (if present) or the primary examiner if there was no secondary examiner.

D. Limitations

A primary limitation of this study stems from the unavailability of the application data categorized by art unit. Thus, these data suffer from a “denominator” limitation because it is unknown how many applications were filed and then reviewed by any specific examiner per year. Accordingly, this study does not capture those applications that were filed and abandoned by the applicant or those applications that are still currently under review by the examiner. As a result, I cannot determine the percentage of allowed patents per year per art unit.

A secondary limitation stems from the timeframe of the population selected. On September 16, 2011, the AIA created a new joinder statute in 35 U.S.C. § 299. This provision was intended to “address problems occasioned by the joinder of defendants (sometimes numbering in the dozens) who have tenuous connections to the underlying disputes in patent infringement suits.”⁶⁹ The joinder statute forces plaintiffs to file multiple lawsuits against multiple defendants instead of filing a single suit that names multiple defendants. Cotropia et al. have shown that the changes to the AIA have created a dramatic increase in the raw number of patent lawsuits filed, but this increase is driven almost entirely by the new

lowest allowance rates. Accordingly, I have removed examiners who could fall within these categories: (1) those examiners who were only briefly at the USPTO, but left before issuing more than one patent, (2) those examiners who are primary examiners who mainly review the work of secondary examiners but issued one patent by themselves, (3) those examiners who have issued one patent, but have not issued any since, (4) those examiners hired in December who may have issued only one patent because of the ramp up time, and (5) examiners who came back to the USPTO and needed time to ramp up during their return year. Additionally, these data do not capture those examiners who truly have a zero allowance rate, since this data set only records those examiners who have issued at least one patent.

66. Tu, *supra* note 2, at 10.

67. *Id.* at 58.

68. Morrison & Foerster LLP, *Behind the Scenes at the USPTO: Accounting for the Supervisory Patent Examiner*, LEXOLOGY, <http://www.lexology.com/library/detail.aspx?g=ef96f684-f70e-4860-8bbd-84300761e3a6> [https://perma.cc/JQP4-UAGN] (defining “assistant examiner” as a “junior” or “secondary” examiner).

69. H.R. REP. NO. 112-98, at 54 (2011).

joinder rule.⁷⁰ Because this dataset only includes lawsuits that have terminated between 2010 and 2012, many of these new non-joinder lawsuits are not included in the dataset. Because I code for each patent associated with a lawsuit, if multiple lawsuits are associated with the same patent, this study could have a disproportionately high number of valid patents found.⁷¹

Another limitation is that while I use a broad database, it suffers from some selection bias due to the examiner-matching step. Specifically, temporal selection bias occurs in the database since the examiner database contains only those patents that were issued between 2001 and 2012. Accordingly, litigation dealing with older patents (i.e., those patents issued before 2001) are not included in our database. Additionally, there may be a “left justification” issue because the dataset begins in 2001, so examiners who have worked prior to 2001 (inclusive) will be coded as working fewer years than they actually worked. For example, if an examiner started working in 1998 and quit in 2003, our database would code the examiner as working for three years, while in actuality the examiner was at the office for six years. Thus, these data may be slightly positively skewed. One of the reasons why this study focuses on lawsuits that terminated in 2010 to 2012 was to abate this factor.⁷² Specifically, most of the litigated patents examined were issued between 2001 and 2009.⁷³

Because this study focuses on common characteristics of patent examiners who issue invalid patents, these data are slightly biased. Specifically, when coding, this study selects for invalid cases. For example, if any one claim in the patent was held invalid, the entire patent was coded as invalid, even if other claims in the patent were held valid. Accordingly, the dataset is biased towards a higher invalidation rate. Because this study is interested in characteristics of those examiners who issue any invalid claim, this is a fair selection method.

70. Christopher A. Cotropia, Jay P. Kesan & David L. Schwartz, *Patent Assertion Entities (PAEs) Under the Microscope: An Empirical Investigation of Patent Holders as Litigants*, 99 MINN. L. REV. 649, 662 (2014).

71. This is a one-directional result because once a patent is found invalid in one lawsuit, it is invalid with respect to the world. The asymmetric, mutually exclusive effects of collateral estoppel would only affect patents that were found valid in multiple lawsuits.

72. Choosing a later litigation date allows better matching of examiners to the litigation because it is more likely that the examiner will have a fuller employment history (between 2001 and 2011) when using a later litigation date.

73. Invalidated patents include: 1990—3 patents; 1991—10 patents; 1992—8 patents; 1993—13 patents; 1994—13 patents; 1995—21 patents; 1996—14 patents; 1997—11 patents; 1998—37 patents; 1999—27 patents; 2000—29 patents; 2001—23 patents; 2002—29 patents; 2003—28 patents; 2004—28 patents; 2005—19 patents; 2006—25 patents; 2007—24 patents; 2008—14 patents; and 2009—5 patents.

A weakness with all descriptive historical models is that they are limited by the factors that the study has analyzed. Thus, there may be an omitted or confounding variable that accounts for the observed outcomes. Without a study with controlled variables, this study cannot determine whether the factors analyzed were the definitive causes of the ultimate outcomes. For example, this study assumes that the strength of the parties' legal positions was equal in all cases, which may not be the case. Additionally, this study assumes that the parties' legal counsel are equally skilled, which Janicke et al. has found to be an important factor in determining outcomes.⁷⁴ There is some selection bias based on the fact that this study has only included final decisions on validity. Specifically, there are a number of inherent confounding variables that are associated with cases that go to final judgment such as complexity of the technology, skill of lawyers on each side, jury composition, judicial experience with patent cases or patented technology, quality of expert witnesses, and the financial resources of both parties. Thus, as with any litigation dataset, this has selected a population that is highly abnormal just by virtue of being litigated to final judgment.

V. RESULTS: EXAMINER CATEGORIZATION

In this Section, this study analyzes the characteristics of patent examiners who issue patents that go to litigation that results in a final disposition of the patent. This study segments the data both by years of examiner service at the USPTO and by average volume of patents issued per year. Years of service was determined by number of years at the USPTO between the years of 2001 and 2012. Average number of patents issued was determined by summing all patents issued by the examiner between 2001 and 2012 and dividing by the number of years at the USPTO between the years of 2001 and 2012.⁷⁵

74. Janicke and Ren, *supra* note 46, at 16 (showing the regression with patentee as winner); *id.* at 18 (showing the regression with the accused infringer as winner).

75. I did not count those years in which an examiner issues one and only one patent. Accordingly, the data set is right censored in that I removed many of the examiners with the lowest allowance rates. Additionally, I have removed examiners that could fall within these categories: (1) those examiners who were only briefly at the USPTO, but left before issuing more than one patent; (2) those examiners who are primary examiners who mainly review the work of secondary examiners but issued one patent by themselves; (3) those examiners who have issued one patent, but have not issued any since; (4) those examiners hired in December who may have issued only one patent because of the ramp up time; and (5) examiners who came back to the USPTO and needed time to ramp up during their return year. Additionally, these data do not capture those examiners who truly have a zero allowance rate, since this data set only records those examiners who have issued at least one patent.

Briefly, most invalidated patents come from primary examiners, which is unsurprising because they are the examiners who are issuing most of the patents. Technology centers 1600, 2600, and 2800, which correspond to biotechnology, communications, and semiconductors respectively, experience a higher invalidation rate than other technology centers. Novelty (35 U.S.C. § 102) and obviousness (35 U.S.C. § 103) rejections were the most common means for invalidating patents. Most references used to invalidate patents were not cited at the USPTO (only 22.8 percent of the references were cited at the USPTO). If the invalidating reference was a US patent, the reference was found and considered only 32 percent of the time. These data suggest that patent examiners are neither searching for nor finding relevant prior art references.

A. General Statistics

As a preliminary matter, this study determined the percentage of invalidated versus validated patents in our dataset. This study found that approximately 35 percent of the patents in our data set were found invalid (Figure 1). Furthermore, this study segmented the validated patents into two groups: (1) infringed (approximately 41 percent) and (2) non-infringed (approximately 23 percent) (Figure 2).

Figure 1. Invalidated versus Validated Patents.

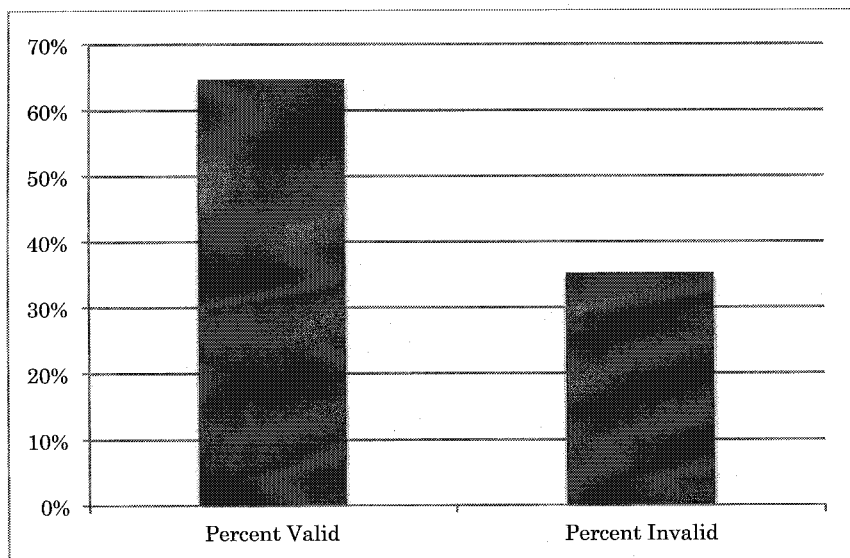
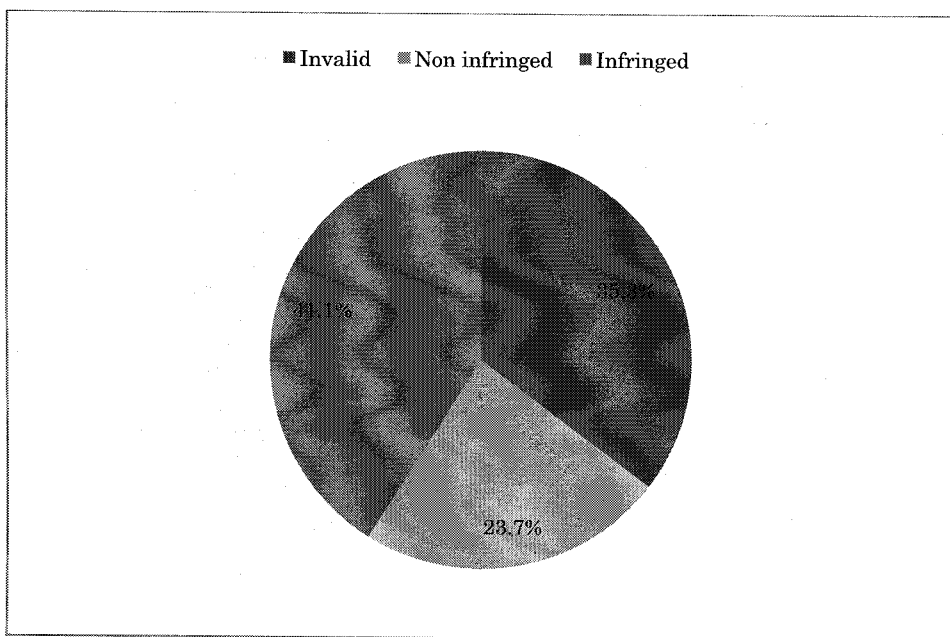


Figure 2. Validated Patents: Infringed versus Non Infringed.*B. Segmentation by Technology Center*

This study segmented the data by technology center to determine which technology centers experience the most invalidated patents. As shown in Figure 3, technology centers 1600, 2600, and 2800, which correspond to biotechnology, communications, and semiconductors, respectively, experience a higher invalidation rate than other technology centers. This is unsurprising since these technology centers also experience the highest rates of litigation. The technology centers are coded as follows⁷⁶:

Technology Center	Technology Type
Technology Center 1600	Biotechnology and Organic Chemistry
Technology Center 1700	Chemical and Materials Engineering
Technology Center 2100	Computer Architecture, Software, and Information Security
Technology Center 2400	Computer Networks, Mutliple Communication, Video Distribution and Security

76. Patent Technology Centers, UPSTO, http://www.uspto.gov/about/contacts/phone_directory/pat_tech/ [<https://perma.cc/W9QM-Y6A9>].

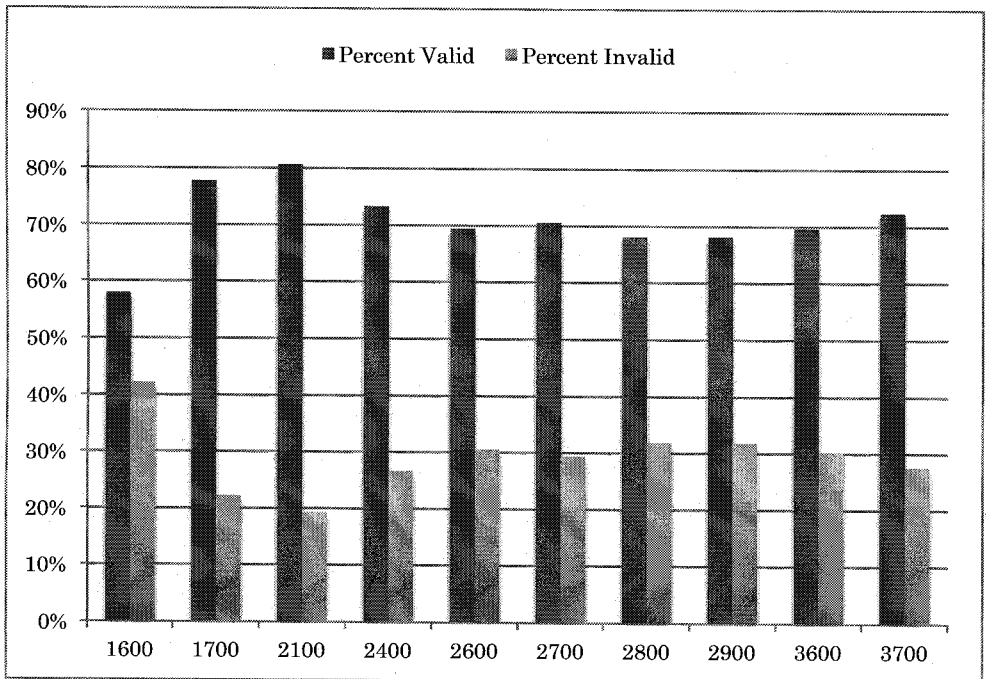
Technology Center 2600	Communications
Technology Center 2700	Old computer related technology center that was divided into technology centers 2100 and 2600 ⁷⁷
Technology Center 2800	Semiconductors, Electrical, and Optical Systems and Components
Technology Center 2900	Designs
Technology Center 3600	Transportation, Construction, Electronic Commerce, Agriculture, National Security, and License & Review
Technology Center 3700	Mechanical Engineering, Manufacturing, Products

Interestingly, technology center 1600 (biotechnology) experiences the highest percentage of invalidated patents (42 percent invalidated), in contrast to technology centers 1700 (chemical and materials engineering) and 2100 (computer architecture, software, and information security), which experience the lowest percentage of invalidated patents (22 percent and 19 percent invalidated, respectively). This study notes that valid patents include patents that were found valid and non-infringed as well as patents that were found valid and infringed. Similar to the 1998 Allison study,⁷⁸ this study finds that there is virtually no difference between the validity rates of patents in different fields of invention. Biotechnology patents may be an exception because they suffer from a slightly higher invalidation rate (approximately 42 percent) than the average invalidation rate (approximately 29 percent).

77. Note that technology center 2700 was subdivided into technology centers 2100 and 2600 to accommodate growth in computer related applications. See Wynn Coggins, *Technology Center 2700 Splits to Accommodate Growth in Computer-Related Applications*, USPTO TODAY, Nov. 2000, at 12.

78. Allison & Lemley, *supra* note 10, at 251–52.

Figure 3. Percent Valid versus Invalid Patents by Technology Center.



C. Segmentation by Examiner Type

Next, this study segmented the litigation data into three categories: (1) invalidated patents, (2) patents found valid and infringed, and (3) patents found valid but non-infringed. It was then determined which type of examiner issued each category of litigated patent (Figures 4a and 4b). Unsurprisingly, primary examiners issued the majority of both invalidated as well as valid patents (both infringed and non-infringed). This is unsurprising because primary examiners issue most of the patents at the USPTO.⁷⁹

79. Tu, *supra* note 2, at 16–20.

Figure 4a. Number of Invalidated Patents by Examiner Type.

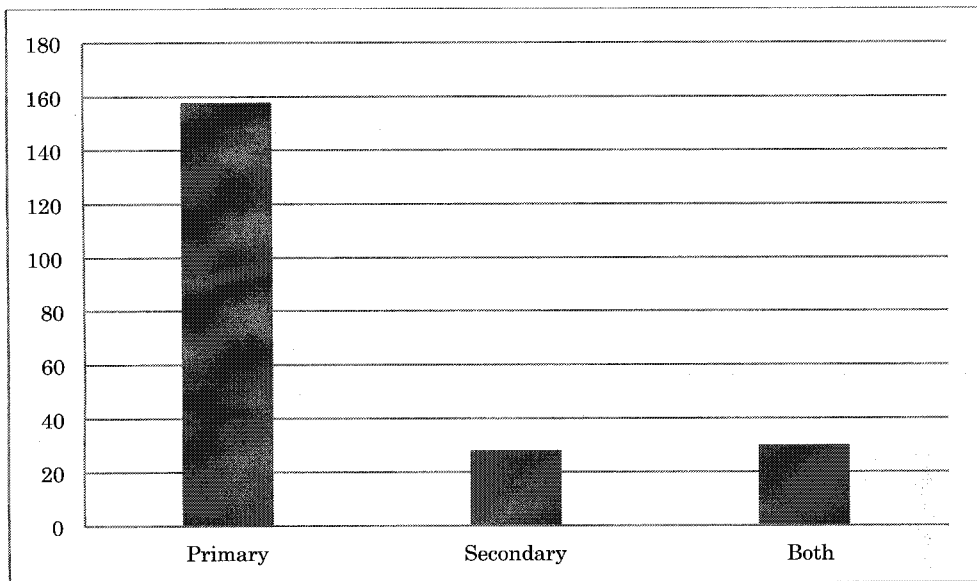
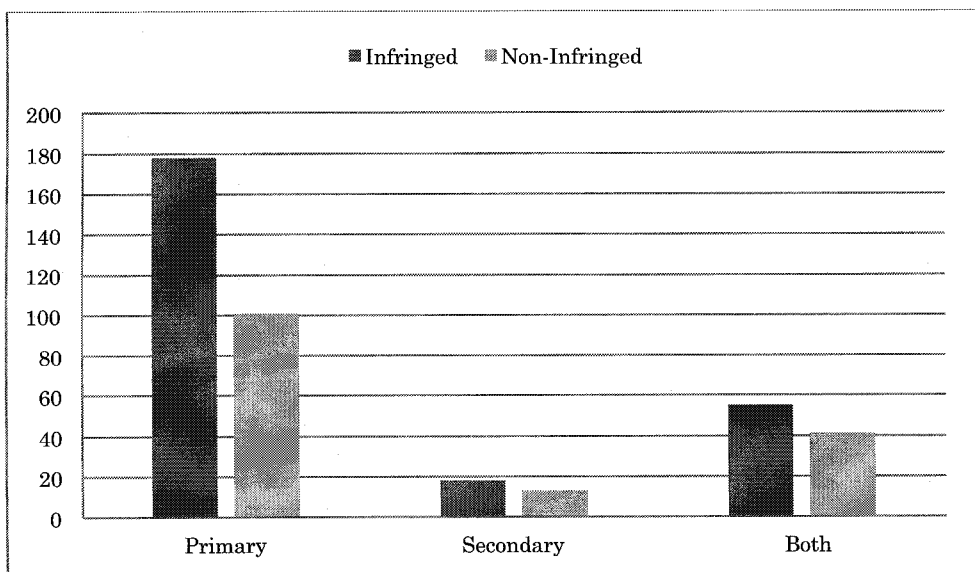


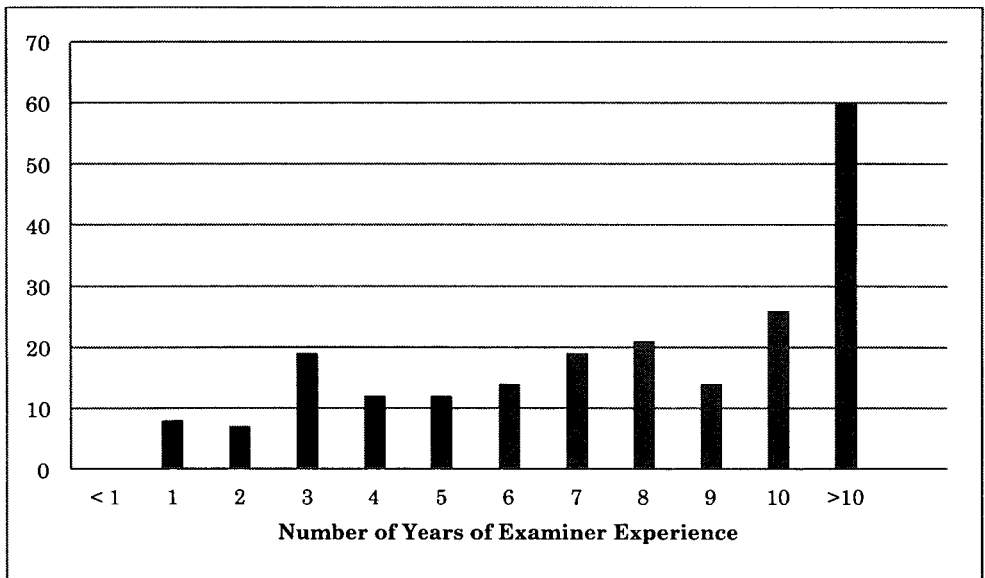
Figure 4b. Number of Infringed versus Non-Infringed Validated Patents by Examiner Type.



D. Segmentation by Examiner Years of Experience and Volume of Patents Issued

Next, the data was segmented by the number of years of experience the examiner had at the USPTO (Figure 5a). Interestingly, those examiners who are issuing the most litigated patents (examiners with four to six years of experience)⁸⁰ are actually not issuing a higher-than-expected number of invalidated patents.⁸¹ However, similar to what a previous study found with the total number of litigated patents, primary examiners with only one or two years of experience issue litigated patents at a lower than expected rate.⁸²

Figure 5a. Number of Invalidated Patents by Examiner Years of Experience.



This study also tracked the number of patents found valid when adjudicated to final judgment (Figure 5b). This figure shows the increase of litigated patents between years four and seven. This figure supports our previous finding that patent examiners with four

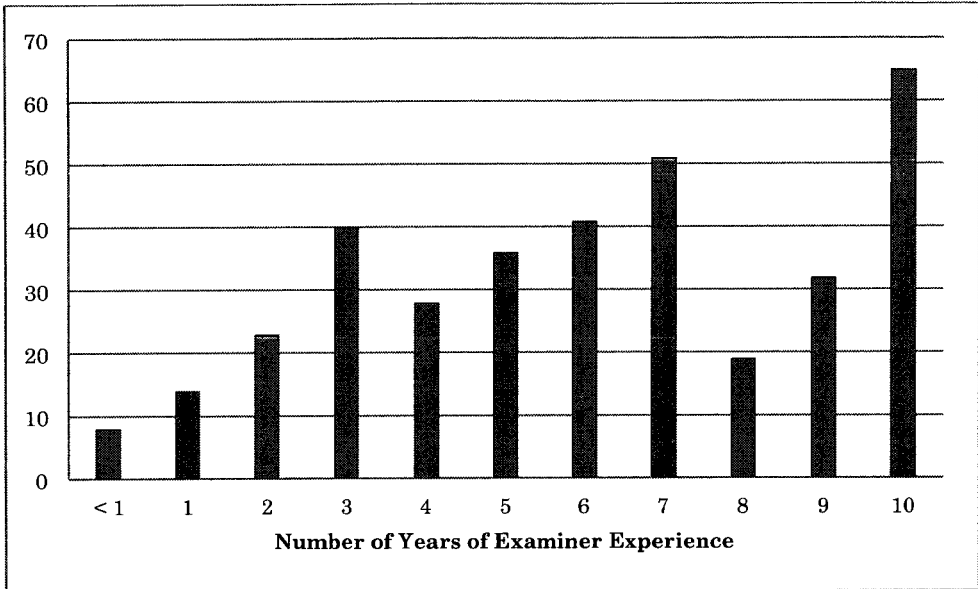
80. Tu, *supra* note 4, at 535.

81. Expected invalidation rates were calculated by multiplying the total number of invalidated patents by the percentage of patents issued by the specific population of examiners. For a full description of expected rates, see also *id.* at 529 (2014).

82. *Id.* at 535.

to six years of experience issue litigated patents at a higher than expected rate.⁸³ These data, taken together, suggest that examiners with four to six years of experience issue more litigated patents, but do not issue more invalidated patents.

Figure 5b. Number of Validated Patents by Examiner Years of Experience.



E. Segmentation by Examiner Output

Finally, this study segments the invalidated patents by examiner output—the average number of patents issued per year (Figure 6a). Examiner output is an overall grant rate for the examiner comprising all years of the examiner’s tenure at the USPTO. Average grant rate is determined by summing all patents issued by an examiner between 2001 and 2012 and dividing by the number of years at the USPTO between 2001 and 2012. Here, examiners who issue between thirty-one and fifty patents per year on average are issuing invalidated patents at a higher rate. This roughly corresponds to what was previously found, where patent examiners who issue between forty-five and sixty patents per year on average were issuing litigated patents at a higher than expected rate.⁸⁴ Correspondingly,

83. *Id.* at 535.

84. *Id.* at 529.

this study segmented the validated patents by examiner output, further breaking down the validated patents by both validated patents that were infringed and non-infringed (Figure 6b).

Figure 6a. Number of Invalidated Patents by Examiner Output.

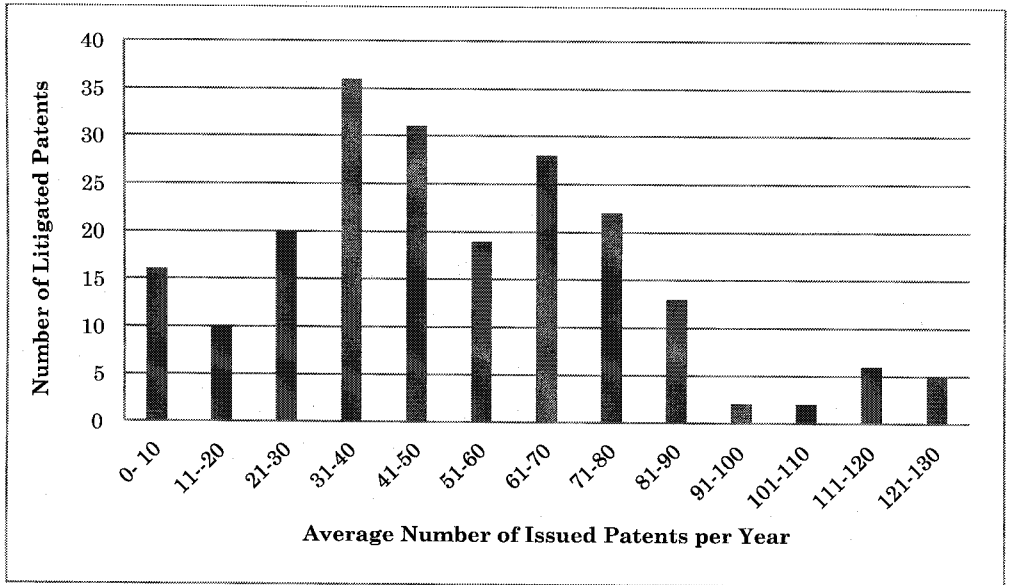
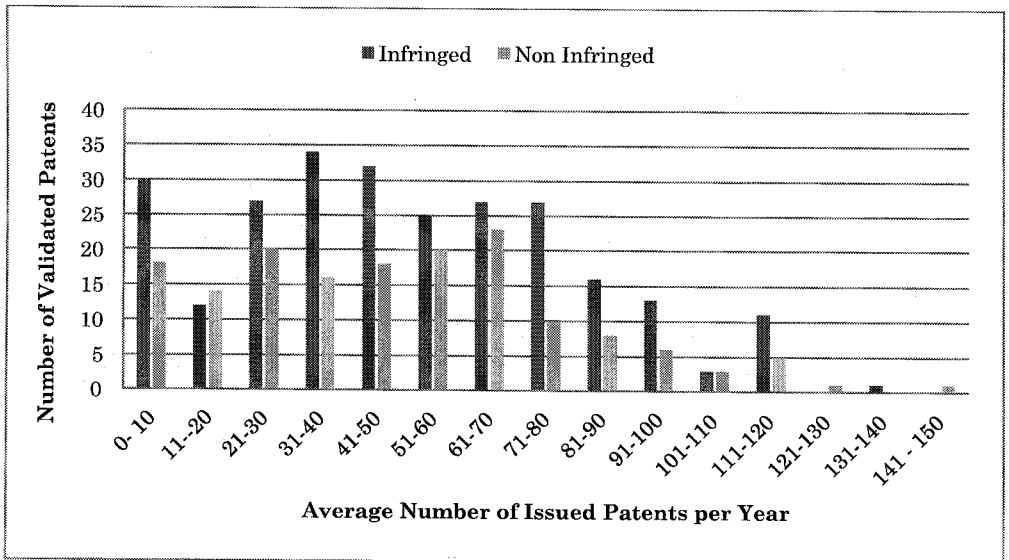


Figure 6b. Number of Validated Patents by Examiner Output.



VI. RESULTS: INVALIDATION ANALYSIS

This Section focuses on the invalidated patents and analyzes the legal theories used to invalidate those patents. This study also analyzes the prior art type, which includes US patents, foreign patents, or non-patent references. This study also looked at whether the prior art was cited during the prosecution history.

35 U.S.C. §§ 102 and 103 prior art references are the most common invalidation bases used by accused infringers. US patents comprise approximately 46 percent of the prior art that is used to invalidate patents. In 77 percent of the cases reviewed, the examiner did not find the invalidating prior art. If the prior art was a US patent, the prior art was not found in 51.8 percent of the cases examined. These data imply that examiner searching—as opposed to misinterpretation of the prior art—is the primary cause of error at the USPTO.

A. Segmentation by Invalidation Type

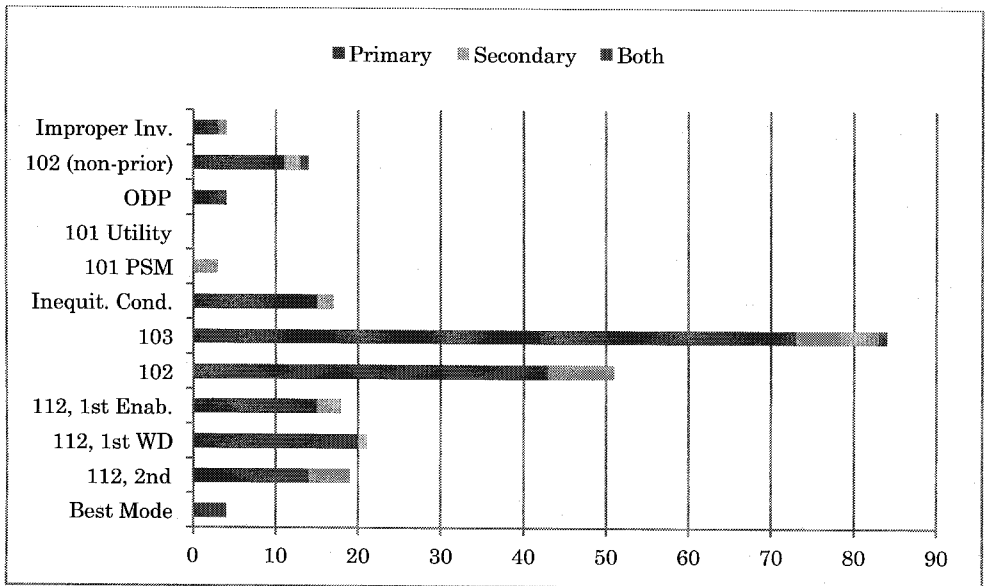
First, this study focused on which legal theories were used to invalidate patents. If multiple rationales were used to invalidate a patent, I coded each rationale as an independent method for invalidation. Additionally, this study segmented each invalidation method into examiner type (Figure 7). Interestingly, only secondary examiners issued patents that were later invalidated on § 101 ineligible subject matter grounds. Prior art novelty and obviousness rejections were the main methods used to invalidate patents, comprising 21.5 percent and 35.4 percent of invalidations, respectively.

Allison et al. have recently found that indefiniteness challenges to validity have increased dramatically since those authors' 1998 study.⁸⁵ Although this study did not see a similar increase in invalidation by indefiniteness, this could be because many of these patents were first litigated in early 2000s. This study focused on those litigations that terminated between 2010 and 2012. This study's results still mirror many of the conclusions found in the 1998 Allison et al. study.⁸⁶

85. Allison, Lemley & Schwartz, *supra* note 10, at 1782.

86. Allison & Lemley, *supra* note 10, at 251–52.

Figure 7. Number of Invalidated Patents by Method of Invalidation.



B. Segmentation by Prior Art

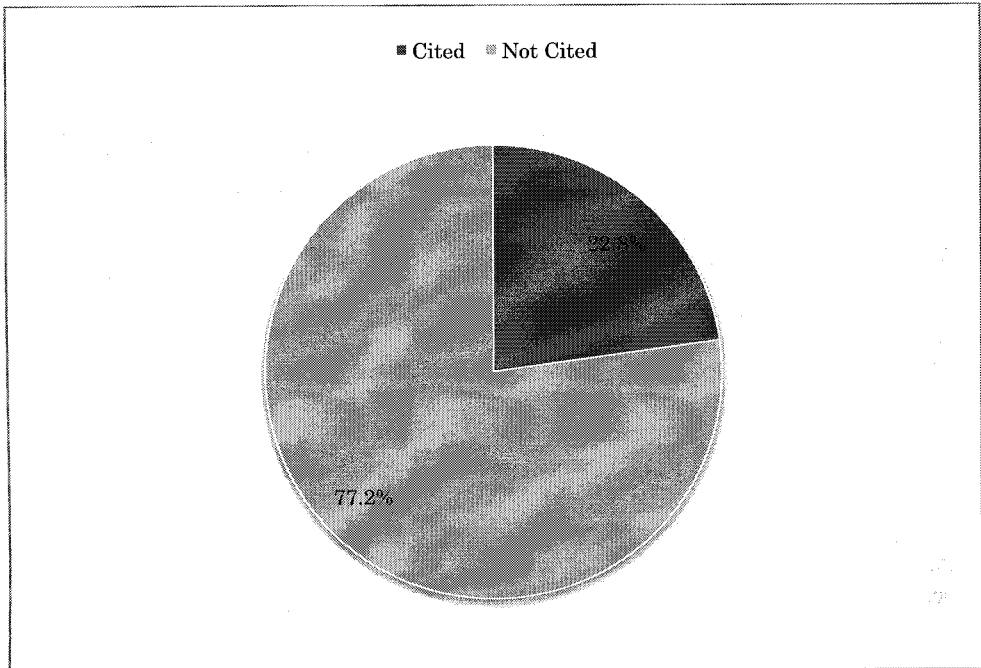
This study next focused on the prior art because §§ 102 and 103 prior art rejections comprised the major method of invalidation in our data set. Specifically, this study wanted to determine if the prior art references were being misinterpreted or if the prior art references were not being found by the USPTO. To determine this, this study reviewed the prosecution history of each patent, searching for the invalidating prior art reference, which may be foreign patents, US patents, or patent applications, and non-patent literature, in both non-final and final rejections. Additionally, the Information Disclosure Statements were searched to determine if the applicant initially cited the reference.⁸⁷ Finally, this study reviewed the face of the patent in the “References Cited” section to determine if the prior art patent was either cited by the examiner or cited by the applicant.

Of the patents that were invalidated using §§ 102 or 103 prior art references, only 22.8 percent of those patents cited to the invalidating prior art reference during prosecution (Figure 8). These

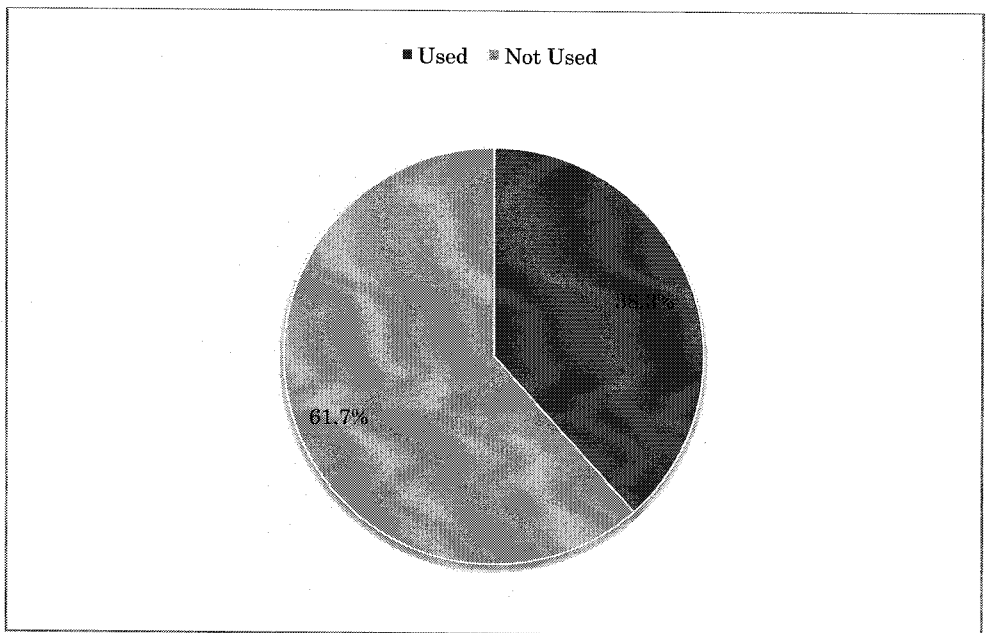
87. The Information Disclosure Statement is a list of US patents, US patent applications, foreign patents, or publications that the applicant feels may be important for patentability. See *Information Disclosure Statement*, USPTO.GOV, <http://www.uspto.gov/web/offices/pac/mpep/s609.html> [https://perma.cc/GFF9-TJRZ].

data suggest that a major problem with patent quality is examiner searching and finding of appropriate prior art. These data suggest that once the prior art is found, examiners generally can interpret the prior art reference correctly.

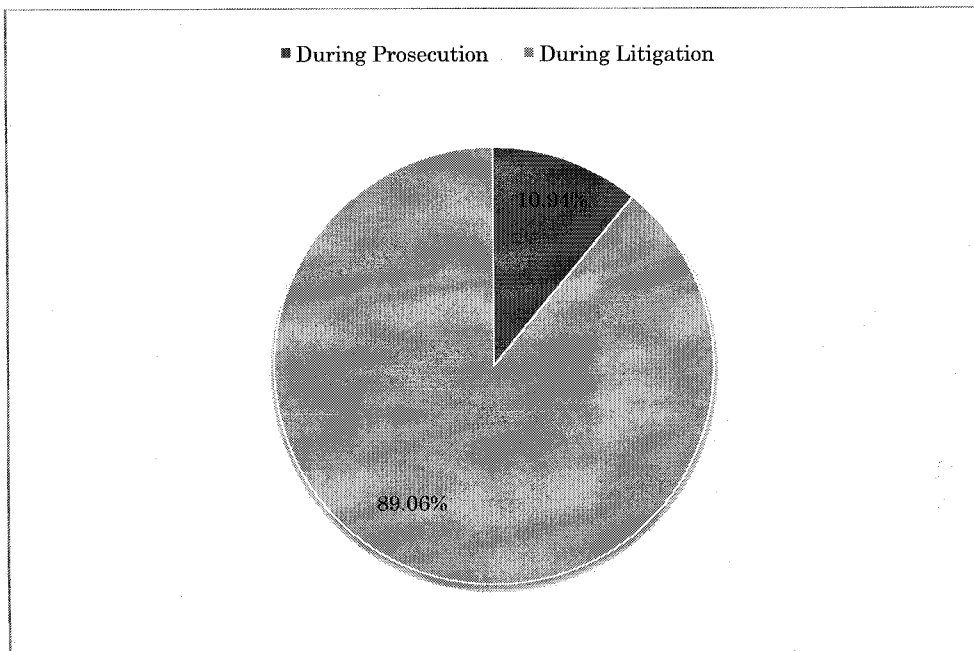
Figure 8. Patents Cited to the Invalidating Prior Art Reference During Prosecution.



This study then looked further into the type of prior art references that were invalidating patents. Specifically, this study determined the percentage of US patents and US patent applications used as prior art references (Figure 9). As shown in Figure 9, most of the prior art references that are invalidating patents are not US patents or US patent applications. However, a significant minority of references (38 percent) are US patents or US patent applications, which are clearly available and searchable for examiners.

Figure 9. US Patents Used as Prior Art References.

This study then further reviewed the US patents and US patent applications that were used as invalidating prior art by looking at the prosecution history of these patents to determine if the US patent or US patent application was cited during prosecution (Figure 10). This study found that when US patents or US patent applications were used as invalidating prior art, the examiner had not found the art during prosecution in the overwhelming majority of cases. Again, these data suggest that the examiners are not finding the relevant prior art during prosecution. Thus, a significant number of prior art references used by litigants to invalidate patents are US patents or US patent applications. Patent examiners should be able to catch these references because these references are relevant, certainly available, and searchable by US patent examiners.

Figure 10. Timing of Locating US Patents as Prior Art.

VII. SOLUTIONS

As shown by the data, one of the significant issues facing examiners is searching for and finding relevant prior art. Most significantly, one possible way to increase the quality of the prior art search is to create a two-track system for patent examiners. This innovation may allow the USPTO to simulate the experience of seasoned examiners who issue less-litigated, invalidated patents in a much shorter amount of time. A division of labor where one group of examiners specializes in prior art searching, while another group of examiners specializes in drafting office actions could mimic the specialization of one senior examiner in a much shorter timeframe.⁸⁸

Specifically, the first track would be a prior art searching track, and the second track would be an office-action generation track. Prior art searching examiners would specialize and have sole responsibility for completing prior art searching. This new arrangement would allow some examiners to specialize deeply in creating targeted keyword searches for a variety of different inventions within the same art unit or workgroup. The second track would consist of office-action

88. Tu, *supra* note 4, at 542.

generation, based in large part on the results gathered from the prior art searchers. Office-action generation examiners would specialize in understanding and applying the relevant patent law and would have sole responsibility for composing complete office actions that correctly apply the law. This change would allow specialization in the writing skills necessary to convey clear rejections. Specialization should also decrease the workload per examiner and result in faster and more efficient application processing rates.⁸⁹

Additionally, this two-track system would combat the incomplete or piecemeal search by the examiner in the first action with a more complete search in the "final" action. Patent quality should increase because relevant prior art would be determined in the first instance. Additionally, prosecution times would decrease because office actions would be written in a clear and coherent manner on relevant patent laws such that applicants could determine the real issue at hand. Applicants would be able to identify the precise point of disagreement so that the applicant could provide well-targeted arguments. In general, there may be an increase in "quality" patents, because relevant art would be found and clear rejections would be written by examiners. Prosecution histories would be clearer, and those issues in litigation that had been previously vetted by the examiner would be distinct.

There are several possible limitations with this two-track system. Foremost, this division of labor would limit the office-action generation examiners' knowledge of the relevant prior art, and therefore dull their ability to gauge the novelty or non-obviousness of the invention. Additionally, for particularly complex inventions, increased searching costs may be experienced when the invention is incorrectly classified.

VIII. CONCLUSIONS

Patent quality in many ways is tied to not only good patent and claim drafting by the applicant, but also to good examination at the USPTO. This study attempted to characterize the type of examiner who issues litigated and invalidated patents. Along with my previous studies,⁹⁰ this study shows that primary examiners allow the most patents that are later found invalid. This is unsurprising since primary examiners allow the majority of patents.

89. *Id.*

90. *See generally* Tu, *supra* note 2; Tu, *supra* note 4.

This study also suggests that patent searching may play a greater role in improving patent quality. In particular, this study found that patents are invalidated mainly based on prior art references that were not found by either the applicant or the patent examiner. Specifically, 77 percent of the prior art references used to invalidate patents were not found by the USPTO. Additionally, many of these references were US patents or US patent applications. In cases where the invalidating prior art was a US patent or US patent application, the invalidating references were not found by the patent examiner 89 percent of the time. Given the ease of examiner access to US patent and US patent application references, this is surprising.

One possible solution to this issue is to divide patent examiners into two separate tracks. One track would focus on searching and finding the most appropriate and relevant prior art references (searching examiners). A second track would focus on generating appropriate office actions based on the prior art received from the searching examiners (office-action generation examiners). This division of labor would have the advantage of specialization, which might increase the quality of both the prior art reviewed during prosecution as well as substantively improving the quality of the office actions. As shown in this study as well as in our previous study,⁹¹ high-volume examiners who have more experience issue less-litigated patents and also fewer patents that are later held invalid. Accordingly, if the USPTO could mimic more experienced high-volume examiners by specialization and division of labor, we might decrease the number of litigated patents that are later held invalid.

91. Tu, *supra* note 4, at 528.

