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In Pursuit of Patent Quality (And Reflection of Reification)

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IN PURSUIT OF PATENT QUALITY (AND REFLECTIONS ON REIFICATION)

KENNETH L. PORT*, LUCAS M. HJELLE** AND MOLLY LITTMAN***

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I. INTRODUCTION

[E]very individual . . . endeavors . . . to employ his capital . . . so that its produce may be of greatest value He generally . . . neither intends to promote the public interest, nor knows how much he is promoting it [H]e intends only his own security . . . only his own gain, [a]nd he is in this . . . led by an INVISIBLE HAND to promote an end, which was no part of his intention By pursuing his own interest he frequently promotes that of society more effectually than when he really intends to promote it.

Although Adam Smith penned these words at the time of the American Revolution, they are apropos to patenting today. Without patents, inventors would disclose less,¹ our economy would suffer,² and the United States would lose ground to its international competitor nations. These are economic truisms that we accept for the purposes of this article. That is, this article is based on the premise that patenting is good for the American economy.³ Presuming that

1. See James A. Lewis, *Intellectual Property and Innovation Policy: Executive Summary*, CTR. FOR STRATEGIC & INTL' STUDIES (2007).

2. William A. Drennan, *Changing Invention Economics by Encouraging Corporate Inventors to Sell Patents*, 58 U. MIAMI L. REV. 1045, 1048 (2004); see MICHAEL E. PORTER, KLAUS SCHWAB & AUGUSTO LOPEZ-CLAROS, *THE GLOBAL COMPETITIVENESS REPORT, 2005-2006: POLICIES UNDERPINNING RISING PROSPERITY* (Palgrave Macmillan 2005) [hereinafter *THE GLOBAL COMPETITIVENESS REPORT*].

3. Though the causal relationship between patents and the economy are often accepted as self-evident, there appears to be little empirical support for this premise. Further, there is substantial scholarship that disputes this point for various forms of patents and other intellectual property. See, e.g., MICHELE BOLDRIN & DAVID K. LEVINE, *AGAINST INTELLECTUAL MONOPOLY* (2010); Rochelle Cooper Dreyfuss, *Are Business Method Patents Bad for Business*, 16 SANTA CLARA COMPUTER & HIGH TECH. L.J. 263 (2000); Jay P. Kesan & Andres A. Gallo, *Why "Bad" Patents Survive in the*

patenting is good for the economy, a reduction in patenting is, arguably, bad for the United States' economy.

Another truism in patenting is that the high, reified standards that America requires for individuals to become patent attorneys is somehow connected to the "quality" of American patents. There are many different and competing definitions of "quality." We adopt what we believe is the most objective and reliable definition to conclude that, in fact, the highly reified standards of American patent attorneys has no visible correlation to patent quality.

We have established elsewhere that new entrants to the patent bar are in free-fall decline.⁴ By 2018, new patent bar entrants will be "one half of what they were in 2008."⁵ One reason for the decline of the number of new patent attorneys is the reified standard for entry to the patent bar. There is a certain and looming crisis in America because the number of patent bar qualified individuals is in decline and it will decline sharply in the near future. This is not a prediction. It is a certainty. The individuals set to enter the patent bar in 2018 are currently second year law students. That is, we only need to count people in their second year of law school to know the size of the 2018 class.⁶

In this article, we argue that the number of patent-bar eligible attorneys will decline and that the reification of patent attorneys is not related to American patent quality. The next question becomes what to do about it, if anything. We also attempt to answer this next vexing question with this article.

We think that a diminished number of patent bar practitioners in the United States will have negative consequences for American innovation and, ultimately, American international competition. There has been plenty of work done by others that has clearly established that one of the reasons for the advanced state of American competitiveness on an international scale has to do with American innovation, and that is a direct result of a robust patent law system.⁷

We believe that a strong and robust patent system has been instrumental in the development of the United States economy. We worry that, as the aggregate size of the patent bar applicant pool shrinks, many important and negative consequences will result.

The first consequence is, of course, that there will be fewer people to do the

Market and How Should We Change?—The Private and Social Costs of Patents, 55 EMORY L.J. 61 (2006). However, for the purposes of this paper, we will presume that patents have an overall positive effect on the economy.

4. See Kenneth L. Port, Lucas Hjelle & Molly Littman, *Where Have All the Patent Lawyers Gone? Long Time Passing . . .*, 97 J. PAT. & TRADEMARK OFF. SOC'Y 193 (2015).

5. *Id.* at 194.

6. *Id.* at 193.

7. See THE GLOBAL COMPETITIVENESS REPORT, *supra* note 2.

important work that the various initiatives inspire and, in fact, require. As the number of patent attorneys shrinks, the workload per existing patent attorney will naturally increase. This increased workload may have a multiplying effect, encouraging existing patent attorneys to leave the practice of patent law, something we refer herein as “exit.”⁸ Exit is likely to hasten the shortage of patent attorneys as many law firms have high demands on the productivity of individual patent attorneys, which makes being a patent attorney less attractive.⁹ Although compensation per existing patent attorney is also likely to increase as a result, burn out will encourage more and more patent attorneys to exit.¹⁰ As the number of patent attorneys shrinks, the cost per patent is likely to increase to pay for the salaries of existing patent attorneys that will ultimately be in higher demand. As the cost per patent increases, it will discourage inventors from filing patents. This is precisely the opposite incentive provided by the American Invents Act,¹¹ the United States Patent and Trademark Office itself,¹² all law schools with any interest in intellectual property, and inventor-support groups across the country.¹³

Of course, and paradoxically, the decreased number of patent attorneys may have some positive consequences. For example, as patent attorneys get busier, they may be more selective of the patents they file, and therefore be less likely to file patents of lesser quality that are not enforceable. However, there is no evidence to suggest that busier attorneys are more selective of the applications they file or clients they select.

Although the minor and hypothetical positive consequences are beyond the scope of this article, it is important to point out that as patent attorneys become busier, they will likely have less time to devote to non-patent matters such as trademark and copyright work, litigation work, and licensing work as they have done to date. Today, an average patent attorney’s portfolio of work usually includes many non-patent aspects of intellectual property law.

We need not wait as we realize a reduced patent bar pool and the negative consequences that will result therefrom. We should increase the size of the

8. *See infra* Part II.C.

9. *See infra* Part II.C.

10. *See infra* Part II.C.

11. Pub. L. No. 112-29, 125 Stat. 284 (2011).

12. *Leahy-Smith America Invents Act Implementation*, U.S. PATENT & TRADEMARK OFFICE, <http://www.uspto.gov/patent/laws-and-regulations/leahy-smith-america-invents-act-implementation> (last visited Sept. 17, 2015).

13. *Organizations for Inventors*, INVENTORS EYE (Aug. 2012), <https://www.uspto.gov/custom-page/inventors-eye-organizations-inventors-2> (last visited Sept. 17, 2015). *see also* Dennis Crouch, *Independent Inventors: Five Ways to Reduce the Cost of Patenting and Get a Better Patent Application*, PATENTLYO (Mar. 26, 2009), <http://patentlyo.com/patent/2009/03/independent-inventor-s-five-ways-to-reduce-the-cost-of-patenting-and-get-a-better-patent-application.html>.

patent bar, not passively watch and report on its demise. We argue that America has, for good or bad reasons (or for no reason we can discern at all), established a uniquely reified class of individuals who can become patent attorneys. We believe that this reification does not contribute to patent quality in America, contrary to the general consensus.

In this article, we test the notion that reification is correlated or causes patent quality in America. To do so, we compare levels of reification in many nations and look for correlations to quality. As there exists extreme disparity in the levels of reification in comparable nations, we would expect to see disparity in the levels of quality. This, in fact, is not the case. Quality is more or less constant between comparable nations while reification is extremely disparate. America's competitors on the world scale do not create such reified classes to the extent that America has with reified patent attorneys.¹⁴ This, by definition, limits the number of people that can do the job of being a patent attorney compared to America's competitor nations.

Although the high price of entry is a positive for subsisting patent attorneys as they understandably protect market share, it will ultimately have negative consequences on the United States economy's continued dominance on a global scale. As the patent bar shrinks, costs per patent will increase and overworked patent attorneys will exit. And though there is a steady increase in the number of patent applications that are being filed, having fewer patent attorneys to file them will ultimately have a deleterious effect on the United States economy. Accordingly, entry will have to change if America is to remain competitive.

First, the United States should change the reified requirements of entry to the patent bar. As is, if a person graduates from MIT with a 4.0 GPA in mathematics (a degree that all would agree assures the person is one of the brightest people in America), that person is excluded from entry. On the other hand, if another person graduates from the University of Wisconsin-River Falls with a 2.0 GPA in biology,¹⁵ that person is not barred from entry. The current minimum threshold for practicing patent law in the United States requires, in addition to graduating from law school and passing some State bar exam, a bachelor's degree in one of a very limited number of engineering or science degrees. Though ensuring patent quality is the claimed goal of the patent bar requirements (which we establish below is misguided), that goal alone does not explain why one of the best and brightest in America would be denied entry. Thus, we recommend that this reified standard be liberalized if America is to

14. See THE GLOBAL COMPETITIVENESS REPORT, *supra* note 2, at Part III.

15. We mean no pejorative reference to University of Wisconsin-River Falls. We only mean to compare a school (MIT) with which everyone is aware with one that not so many people are aware.

remain competitive.¹⁶

Second, we recommend that law schools do a better job promoting the practice of patent law to existing and potential law students.¹⁷ Third, we believe that the existing patent bar should be made more penetrable so that more people can pass it.¹⁸ Today, it has a passage rate of some 40%. We think this is too low and further contributes to the reified nature of the practice and the reduced number of people that engage in patent law. The patent exam should more accurately reflect the actual practice of patent law rather than a grueling exam on the applicant's memorization of the MPEP.¹⁹ Fourth, we believe that there are large, underrepresented sections of the United States society that have been demonstratively excluded from the patent bar, namely, women and minorities.²⁰ These underrepresented demographics should be encouraged to join the patent bar. If women and minorities were represented to the extent that white men are represented in the patent bar, we believe that the coming decline would be more than ameliorated if not reversed.

Short of making these and/or other changes, we predict a difficult time ahead for American competitiveness. Corporate America is likely to buy up the existing talent leaving small and medium sized inventors left to fend for themselves with little or no patent representation. If we act now, these difficult times do not have to be realized.²¹

II. REQUIREMENTS TO BECOME A PATENT ATTORNEY IN THE UNITED STATES

A. *History of the American Patent Bar*

The first United States Patent Act went into effect on April 10, 1790.²² Prior to 1836, patent registration was fairly straightforward: inventors could successfully file patent applications on their own.²³ In 1836, Congress changed

16. See THE GLOBAL COMPETITIVENESS REPORT, *supra* note 2, at Part V.

17. *Id.*

18. *Id.*

19. See Holly Chamberlin and Ethan Rubin, *The Patent Bar: What it is and What it Means For You*, INTELL. PROP. & TECH. F. AT B.C. L. SCH., Nov. 10, 2013, <http://bcipf.org/?p=1164>; U.S. PATENT & TRADEMARK OFFICE, MANUAL OF PATENT EXAMINING PROCEDURE (9th ed. Mar. 2014), <http://mpep.uspto.gov/RDMS/detail/manual/MPEP/current/d0e18.xml> [hereinafter MPEP].

20. See THE GLOBAL COMPETITIVENESS REPORT, *supra* note 2, at Part V.

21. We do not recommend making any of the entry standards “easier.” Our goal is not to dumb down the patent bar. Rather, our goal is to make it more representative of American society and more accessible to all.

22. *The U.S. Patent System Celebrates 212 Years*, U.S. PATENT & TRADEMARK OFFICE (Apr. 9, 2002), <http://www.uspto.gov/about-us/news-updates/us-patent-system-celebrates-212-years>.

23. Christi Guerrini, *The Decline of the Patent Registration Exam*, 91 NEB. L. REV. 325, 331 (2013) (“Under the Patent Act of 1793, any applicant who presented the required paperwork in good order, accompanied by the necessary drawings, model, and fee, was virtually assured a patent.”); Kara

the patent system from one of registration to one of examination;²⁴ therefore, only those applications that established the invention was “original, useful, and important” would issue.²⁵ This new law created a need for patent-drafting specialists, “the patent prosecutor,” who was an expert in drafting applications and communicating with the newly created Patent Office.²⁶ Because both lawyers and non-lawyers were eligible to prosecute patents, this made a very lucrative practice for these patent experts. However, this also made inventors very susceptible to fraud.

Because of the victimization of inventors, Congress began regulating patent prosecutors in 1861 by granting the Commissioner of Patents the power to regulate practice before the Patent Office.²⁷ In 1869, the Commissioner required that all patent prosecutors be of “intelligence and good moral character.”²⁸ However, in 1899, the Commissioner required that all patent practitioners register with the PTO.²⁹ In 1922, Congress amended patent law to recognize “the distinction between patent agents and patent [sic] attorneys, and made explicit the commissioner’s powers to regulate those admitted to practice in the office, including the requirement that they show ‘necessary qualifications.’”³⁰

Prior to the Commissioners exam requirement in 1934, Rule 17 of the *Rules of Practice in the United States Patent Office* permitted “any attorney at law who [was] in good standing,” or any non-attorney who was a citizen and filed

W. Swanson, *The Emergence of the Professional Patent Practitioner*, 50 *TECH. & CULTURE* 519, 524 (2009).

24. See HERBERT HOVENKAMP, MARK D. JANIS, MARK A. LEMLEY, CHRISTOPHER R. LESLIE & MICHAEL A. CARRIER, *IP AND ANTITRUST: AN ANALYSIS OF ANTITRUST PRINCIPLES APPLIED TO INTELLECTUAL PROPERTY LAW* § 2.2 (2d ed. 2015).

25. Guerrini, *supra* note 23, at 332 n. 29.

26. Swanson, *supra* note 23, at 526 (In fact, “[w]ithin three months of the act taking effect, Thomas Jones, a well-known man of science and technology, had opened an office as a patent practitioner in Washington and was advertising his services to inventors in the *Journal of the Franklin institute*, a prominent journal aimed at educated mechanics and men of science.”).

27. *Sperry v. Florida*, 373 U.S. 379, 388 (1963).

28. *Id.* at 388 (quoting RULES AND DIRECTIONS FOR PROCEEDINGS IN THE PATENT OFFICE § 127 (1869)). See also Swanson, *supra* note 24, at 530 (“[The commissioner] could ban patent agents from appearing in a particular case or generally for ‘gross misconduct.’ While useful to quell the worst abuses, this statutory change did not provide any legislative guidance regarding the nature of expertise necessary or useful for the patent practitioner.”).

29. *Sperry*, 373 U.S. at 390 (explaining that non-lawyers, who were not subject to the professional code of ethics, “were particularly responsible for the deceptive advertising and victimization of inventors which long plagued the Patent Office”).

30. Swanson, *supra* note 23, at 544; see also *Sperry*, 373 U.S. at 390 (citing Act of February 18, 1922, ch. 58, § 3, 42 Stat. 390; *cf.* Act of July 8, 1870, ch. 230, § 19, 16 Stat. 200). “Disclosure that persons were falsely holding themselves out to be registered patent practitioners led in 1938 to the enactment of legislation making such misrepresentation a criminal offense.” *Sperry*, 373 U.S. at 393 (Act of May 9, 1938, 52 Stat. 352; now 66 Stat. 796, 35 U.S.C. § 33).

proof with the Commissioner that he was of “good moral character and of good repute and possessed the necessary legal and technical qualifications” entrance to practice before PTO.³¹ On March 12, 1934, the Commissioner instituted a new requirement, that all patent prosecutors and agents pass a written exam to be eligible to represent patentees before the Patent Office.³²

In the 1934 amendments to Rule 17, the Commissioner made several changes: he changed words “file proof” in sections (a) and (b) to “establish;” he changed the word “technical” in sections (a) and (b) to “scientific;” and he changed the language in section (b) from: “who has had 3 years’ experience in patent work under the personal direction and supervision of a duly registered patent attorney, or who has served for 3 years in the examining corps of the Patent Office,” to a new paragraph stating:

In order to determine whether a person seeking to have his name placed upon the aforesaid register has the qualifications specified in paragraph (b), an examination will be held from time to time. No person will be permitted to take the examination unless he submits satisfactory proof as to his good moral character and as to having had a sufficient basic training in scientific and technical matters: *Provided*, That the taking of the examination may be waived in the case of any person who has served for 3 years in the examining corps of the Patent Office.³³

On September 27, 1934, the first patent registration exam, described in Rule 17, was administered.³⁴

Today, the legal and technical requirements set forth by the Commissioner in 1934 are still adhered to.³⁵ The particular technical skills required for admission to the patent bar are set forth in the General Requirements Bulletin.³⁶ Scholars suggest that this technical requirement is “meant to serve as a proxy for possession of the technical knowledge necessary for a practitioner to ‘render

31. JAMES LOVE HOPKINS, *THE LAW OF PATENTS AND PATENT PRACTICE IN THE PATENT OFFICE AND THE FEDERAL COURTS WITH RULES AND FORMS*, Vol. II, 1472–73 (1911) (citing Supplement to Patent Office Rules (1911)).

32. See Comm’r of Patents, Order No. 3,266, *printed in* 440 OFF. GAZ. PAT. OFFICE 781 (Mar. 27, 1934).

33. See *id.*

34. Guerrini, *supra* note 23, at 341 (citing *United States Patent Office Examination for Enrollment of Attorneys*, 17 J. PAT. OFF. SOC’Y 259, 259 (1935)).

35. 37 C.F.R. § 11.7(a) (2015).

36. See U.S. PATENT & TRADEMARK OFFICE, OFFICE OF ENROLLMENT & DISCIPLINE, GENERAL REQUIREMENTS BULLETIN FOR ADMISSION TO THE EXAMINATION FOR REGISTRATION TO PRACTICE IN PATENT CASES BEFORE THE UNITED STATES PATENT AND TRADEMARK OFFICE (July 2015), http://www.uspto.gov/sites/default/files/OED_GRB.pdf [hereinafter GENERAL REQUIREMENTS BULLETIN].

applicants for patents valuable service,” therefore insuring the quality of patents applications.³⁷

This reified standard, created by one person to avoid fraud on the public, has rendered today a very valuable monopoly for those admitted to the patent bar. Today, it is said that this monopoly is required to ensure American patent quality instead of avoiding fraud on the public. That is, one rhetoric has been replaced with another. We test to see if the new rhetoric has merit.³⁸ In the end, we conclude that that the rhetoric supporting the reified patent attorney has no association with patent quality.

B. Data on Entry

Fiscal Year	Number of Exams	Percent Pass
2014	2799	42.8%
2013	2766	46.8%
2012	3365	53.8%
2011	2716	56.0%
2010	3120	59.4%
2009	3357	59.6%
2008	3634	56.6%
2007	3192	55.6%
2006	2923	58.8%
2005	2673	57.4%

In addition to being a rather reified individual, a subsisting patent attorney today in America has also passed the challenging patent bar. As evidenced from the USPTO data in Table 1 above, approximately 43% of patent bar takers passed in 2014. In addition to the general decline in eligible people who are

37. W. Michael Schuster, *Claim Construction and Technical Training: An Empirical Study of the Reversal Rates of Technically Trained Judges in Patent Claim Construction Cases*, 29 QUINNIPIAC L. REV. 887, 902 (2011); see *Sperry v. Florida*, 373 U.S. 379 (1963) for a discussion of the poor quality of patentees issued and need for regulation of those representing inventors before the Patent Office.

38. We leave for others to determine if the old rhetoric of saving American inventors from fraudulent patent practitioners had any merit.

39. *Exam Results by Fiscal Year*, U.S. PATENT & TRADEMARK OFFICE, http://www.uspto.gov/ip/boards/oed/exam/past/results/#heading-1_1 (last modified Oct. 17, 2013). It is interesting that the number of registration exams taken jumped from 292 in 2004 to 2,673 in 2005. *Id.* However, 1,571 people took the patent bar in 1999, so it is likely that this value of 292 people does not represent the entire year of data. *Id.*

becoming patent attorneys in America, the bar passage rate is in decline, despite a fairly even increase in passage rates from 2005-2010.⁴⁰

The number of exam-takers in this data set has leveled off (if not declined) in recent years and the percentage of patent bar passers has declined; as a result, the net number of new patent bar entrants has already declined. With a drastically reduced number of patent-bar eligible people entering law school and a continuous decline in patent-bar passage rates, the entrants to the patent bar will fall precipitously.

C. Exit

It is unclear how many registered patent attorneys are leaving the practice each year, as the PTO has only recently begun to conduct surveys of registered practitioners. Beginning January 31, 2012, the PTO conducted a survey of registered practitioners to determine whether registered practitioners wished to remain on the register.⁴¹ Based on survey results, the PTO involuntarily removed 952 patent attorneys and agents on June 14, 2012,⁴² removed 754 patent attorneys and agents from the registry on January 31, 2013,⁴³ and removed 255 patent attorneys and agents from the registry on March 23, 2015.⁴⁴ However, these surveys and removals are only for practitioners whose registration number is between 35,000 and 39,999,⁴⁵ which corresponds approximately to practitioners who entered the patent bar between August 27,

40. We only make note of the decline and the result that about 43% of takers passed the patent bar exam in 2014. Any assertions or observations regard this fact is beyond the scope of this article.

41. William R. Covey, *Removal from Register - June 14, 2012*, U.S. PATENT & TRADEMARK OFFICE, <http://www.uspto.gov/learning-and-resources/ip-policy/removal-register-june-14-2012.html> (last visited Sept. 17, 2015).

42. *Id.*

43. William R. Covey, *Removal from Register - January 31, 2013*, U.S. PATENT & TRADEMARK OFFICE, <http://www.uspto.gov/learning-and-resources/ip-policy/removal-register-january-31-2013.html> (last visited Sept. 17, 2015).

44. *Notice of Administrative Suspension - June 2014 Survey*, U.S. PATENT & TRADEMARK OFFICE, <http://www.uspto.gov/learning-and-resources/ip-policy/notice-administrative-suspension-june-2014-survey> (last visited Sept. 21, 2015). The data used in this article reflects the state of the patent bar after these practitioners have been removed from the list of registered patent practitioners.

45. William R. Covey, *Survey of Registered Practitioners in Patent Cases*, U.S. PATENT & TRADEMARK OFFICE (Apr. 7, 2014), <http://www.uspto.gov/patent/laws-and-regulations/survey-registered-practitioners-patent-cases.html> (“Practitioners having a registration number below 35,000 or above 39,999 are not in the current survey. Accordingly, it is not necessary for them to call or advise OED that they did not receive the survey. A survey will be sent to them in the future.”).

1991⁴⁶ and February 14, 1996⁴⁷ Without more data regarding practitioners who registered before August 27, 1991 or after February 14, 1996, it is impossible to predict the attrition rate of registered practitioners. Considering how forthcoming the PTO is regarding the availability of patent information and patent practitioner information, the PTO should make available the data regarding which practitioners are actually prosecuting patents over time.

However, the attrition rate is surely not zero. That is, any conversation about the size of the subsisting patent bar applicant pool needs to take into account the rate at which subsisting patent attorneys leave the practice. As this number is currently unknowable, it provides for an unquantifiable variable; however, it is one that cannot be simply ignored. In order to understand the actual size of the patent bar pool in the future, we call on the PTO to gather statistics in a reliable form to conclude who is and who is not filing patent applications. We suggest that something that is no better than an opinion survey (as the PTO has heretofore done) is not sufficient. The PTO should be able to say who has and who has not, for example, filed a single patent application in the last ten years. Perhaps if one has not filed a patent application in ten years, they should not be considered to be part of the active and subsisting patent bar.⁴⁸

D. Current Requirements for Entry

The Director of the Patent and Trademark Office has unfettered discretion to determine who gets admitted to the patent bar and who gets excluded.⁴⁹ To

46. See *Patent Attorney/Agent Search—Steven Grossman*, U.S. PATENT & TRADEMARK OFFICE, <https://oedci.uspto.gov/OEDCI/details.do?regisNum=35001> (last visited Sept. 17, 2015) (Steven Grossman is the earliest registered practitioner in this range at registration number 35,001, registered on Aug. 27, 1991.).

47. See *Patent Attorney/Agent Search—Dean Golden*, U.S. PATENT & TRADEMARK OFFICE, <https://oedci.uspto.gov/OEDCI/details.do?regisNum=39999> (last visited Sept. 17, 2015) (Dean Golden is the latest registered practitioner in this range at registration number 39,999, registered on February 14, 1996.).

48. See U.S. PATENT & TRADEMARK OFFICE, REINSTATEMENT, DATA SHEET – REGISTER OF PATENT ATTORNEYS AND AGENTS, http://www.uspto.gov/sites/default/files/PTO107R_Reinstatement.pdf (last visited Sept. 21, 2015) (A reinstatement form and a \$100 fee is apparently all that is required to change a patent practitioner status back from inactive to active.).

49. See 35 U.S.C. § 2(b)(2)(D) (2012); 37 C.F.R. § 11.7 (2015); see also *Premysler v. Lehman*, 71 F.3d 387, 389 (Fed. Cir. 1995) (“[T]he Commissioner has the discretionary authority to regulate the practice of patent agents before the PTO.”). After the restructuring of patent law, the Commissioner was replaced with the Director of the USPTO. See 1 R. CARL MOY, *MOY’S WALKER ON PATENTS* §2:22 (4th ed. 2016) (“In terms of personnel, the Act deleted the position of Commissioner of Patents and Trademarks, and replaced it with the position of Director of the Patent and Trademark Office.”). However, the PTO sought comments from the public prior to 37 C.F.R. § 11 replacing a number of rules previously located at 37 C.F.R. § 10. See *Changes to Representation of Others Before the United States Patent and Trademark Office; Notice of Proposed Rulemaking*, 68 Fed. Reg. 69,442 (Dec. 12, 2003), 1278 OFF. GAZ. PAT. OFFICE 22 (Jan. 6, 2004) (proposed rule).

become a registered patent attorney or patent agent, many reified standards must be met. Before sitting for the patent bar exam, the applicant must first qualify under 37 C.F.R. § 11.7, which states as follows:

- (a) No individual will be registered to practice before the Office unless he or she has:
 - (2) Established to the satisfaction of the OED Director that he or she:
 - (i) Possesses good moral character and reputation;
 - (ii) Possesses the legal, scientific, and technical qualifications necessary for him or her to render applicants valuable service; and
 - (iii) Is competent to advise and assist patent applicants in the presentation and prosecution of their applications before the Office
- (b)(1) To enable the OED Director to determine whether an individual has the qualifications specified . . . , the individual shall: . . .
 - (ii) Pass the registration examination, unless the taking and passing of the examination is waived⁵⁰

Although the CFR does not specify what technical and scientific requirements patent attorneys must have, the USPTO Office of Enrollment and Discipline (OED), apparently relying on the rulemaking authority that it was granted under 15 U.S.C. § 1123 (2012) and 35 U.S.C. § 2(b)(2)(D) (2012),⁵¹ has set out the scientific and technical requirements in its General Requirements Bulletin for Admission to the Examination for Registration to Practice in Patent Case before the United States Patent and Trademark Office (the “Bulletin”).⁵²

50. 37 C.F.R. § 11.7. Examination is waived for those who were who were former patent examiners prior to a specified date.

51. 35 U.S.C. § 2(b)(2)(D) states that the USPTO:

may prescribe regulations governing the recognition and conduct of agent, attorneys, or other persons representing applicants or other parties before the Patent and Trademark Office, and may require them, before being recognized as representatives of applicants or other persons, to show that they are of good moral character and reputation and are possessed of the necessary qualifications to render to applicants or other persons valuable service advice, and assistance in the presentation or prosecution of their applications or other businesses before the Office.

35 U.S.C. § 2(b)(2)(D) (emphasis added). This power is now granted to the USPTO under 35 U.S.C. § 2(b)(2)(D). The only language that is different is that “the commissioner” is replaced with USPTO and “subject to the approval of the Secretary of Commerce” has been stricken.

52. See GENERAL REQUIREMENTS BULLETIN, *supra* note 37. No one is quite sure of the process for amending the General Requirements Bulletin, but several scholars have identified the issue of allowing the PTO to promulgate and revise the Bulletin without opportunity for anyone outside of

We looked in vain for rulemaking authority or processes used to generate this now sacrosanct list of approved degrees. None apparently exists. As far as we can tell, the list of approved degrees was established through the unfettered discretion of the Director in years past and this has only been continued out of disinterest or the fallacy that the reified standards somehow contributes to the quality of American patents.⁵³

Nonetheless, the Bulletin sets out three categories under which an applicant can fulfill the scientific and technical requirements.

1. Category A: Bachelor's Degree in a Recognized Technical Subject

Under category A, an applicant will be considered to have established the requisite technical and scientific requirements if he or she proves (through official documentation) that he or she received a Bachelor's degree from an accredited university in one of the following subjects:

Biology	Physics	Engineering Physics
Biochemistry	Textile Technology	General Engineering
Botany	Aeronautical Engineering	Geological Engineering

the USPTO to provide comments. *See* Michelle J. Burke & Thomas G. Field, Jr., *Promulgating Requirements for Admission to Prosecute Patent Application*, 36 IDEA 145, 151 (“Despite the need for timely changes in the admission requirements for applicants the Bulletin has been promulgated, and is regularly revised, without opportunity for those outside the PTO to submit formal comments. However, the PTO, and heretofore the courts, seem to regard the Bulletin’s contents as carrying as much legal authority at 37 C.F.R. or even the patent statute itself.”).

53. Several other scholars identify this same issue. *See, e.g.*, Nicholas Matich, *Patent Office Practice After the America Invents Act*, 23 FED. CIR. B.J. 225, 230 (2014). Matich recognized two major procedural defects with respect to these technical requirements. Matich argues that the first procedural problem is that the USPTO’s technical degree requirement “has not properly announced the rule it uses.” *Id.* We agree. After exhaustive research, the only seemingly connected authority is 37 C.F.R. § 11.7, which states that applicants must have sufficient “scientific and technical qualifications.” *Id.* Matich argues that in practice, applicants are rejected based on the Bulletin’s guidelines, but that “[s]ince the GRB is not a rule, and has never been subjected to public comment, it may not be given this binding effect.” *Id.* at 231.

Second, Matich argues that the USPTO has failed to adequately explain the justification for its technical degree requirement because it has failed to publish “notice and comments” that are required by the Administrative Procedure Act, 5 U.S.C. § 553. *Id.* at 232. Like Matich, we have been unable to find any justification for the technical requirements set forth in the Bulletin. *Id.* (“Nothing in the *Federal Register* discusses the technical degree requirement except to mention its existence.”).

Computer Science	Agricultural Engineering	Industrial Engineering
Electronics Technology	Biomedical Engineering	Metallurgical Engineering
Food Technology	Ceramic Engineering	Mining Engineering
General Chemistry	Chemical Engineering	Nuclear Engineering
Marine Technology	Civil Engineering	Petroleum Engineering
Microbiology	Computer Engineering	
Organic Chemistry	Electrical Engineering	
Pharmacology	Electrochemical Engineering	

The USPTO requires that “[a]n applicant with a Bachelor’s degree in a subject not listed above, such as Biological sciences, Pharmacy, Mechanical Technology, Computer Science degree from an institution that was not accredited by the CSAC or the CSAB or by the CAC of ABET . . . must establish to the satisfaction of the OED Director that he or she possesses the necessary scientific and technical training under either Category B or Category C”⁵⁴

2. Category B: Bachelor’s Degree in Another Subject

An applicant with a Bachelor’s degree in a subject other than those listed in Category A, “must establish to the satisfaction of the OED Director that he or she scientific and technical training equivalent to that received at an accredited U.S. college or university for a Bachelor’s degree in one of the

54. See GENERAL REQUIREMENTS BULLETIN, *supra* note 37.

subjects listed in Category A.” An applicant can meet this burden by supplying the necessary documentation that he or she has completed:

Option 1: 24 semester hours in physics. Only physics courses for physics majors will be accepted.

Option 2: 32 semester hours in a combination consisting of the following: 8 semester hours of chemistry or 8 semester hours of physics, and 24 semester hours in biology, botany, microbiology, or molecular biology.

The 8 semester hours in chemistry or 8 semester hours of physics must be obtained in two sequential courses, each course including a lab. Only courses for science or engineering majors will be accepted.

Option 3: 30 semester hours in chemistry. Only chemistry courses for chemistry majors will be accepted.

Option 4: 40 semester hours in a combination consisting of the following: 8 semester hours of chemistry or 8 semester hours of physics, and 32 semester hours of chemistry, physics, biology, botany, microbiology, molecular biology, or engineering. (Computer science eligibility is subject to determination under the “Other Acceptable Course Work” option).⁵⁵

The 8 semester hours of chemistry or 8 semester hours of physics must be obtained in two sequential courses, each course including a lab. Only courses for science or engineering majors will be accepted.

The USPTO notes that all acceptable coursework for Options 2 and 5 must be for science and engineering majors.

3. Category C: Practical Engineering or Scientific Experience

An applicant relying on practical engineering or scientific experience or who does not qualify under Category A or B may establish the required technical training by demonstrating that he or she has taken and passed the Fundamentals of Engineering (FE) test.

Not only do these requirements substantially limit the number of individuals eligible to become patent attorneys, they limit the number of individuals who can even *try* to become patent attorneys. This is especially harmful for those such as math and computer science majors, who are either ineligible to take the Exam under the Bulletin or are subject to a set of additional requirements.⁵⁶ Again considering our hypothetical two applicants for

55. See Ralph D. Clifford, Thomas G. Field, Jr. & Jon R. Cavicchi, *A Statistical Analysis of the Patent Bar: Where Are the Software-Savvy Patent Attorneys?* 11 N.C. J.L. & TECH. 223, 241 (2010) for a discussion of computer science and the patent bar. The authors argue that the patent bar should explicitly allow computer science majors to enter the patent bar without additional requirements. *Id.* This, for example, led to the issuance of a patent falling within the prior art of an earlier patent, which, the authors argue, would have been recognized by a computer science engineer. *Id.* at 239.

56. See GENERAL REQUIREMENTS BULLETIN, *supra* note 37.

admission from above, one a math major from MIT and the other, a biology major from UW River Falls, we recognize a prescribed discrimination to exclude the MIT student and include the River Falls student.

Additionally, there is limited recourse for those who have been denied admittance to the patent bar exam. Applicants may petition to the Director of the OED to appeal a decision of the Commissioner of the PTO denying the applicant's entrance to take the exam.⁵⁷ Furthermore, a final decision by the OED Director refusing admission to take the patent bar may be reviewed upon petition to the Director of the USPTO.⁵⁸ While the USPTO retains and publishes all patent and trademark statistics,⁵⁹ the PTO does not publish any data regarding who is excluded from the exam and why they are excluded.

Naturally, for subsisting patent attorneys, the bar should remain where it is at; however, for the American economy, if we do not change the admission policies to the patent bar and increase the number of patent attorneys significantly, the United States economy will suffer.

III. REQUIREMENTS IN OTHER COUNTRIES

All major trading partners and competitors in trade of the United States have requirements for becoming a patent agent and a patent attorney.⁶⁰ These standards are quite disparate from one another. Generally, each country requires its attorneys or agents to take an exam before practicing before the country's patent office. However, this exam does not always allow a patent attorney/agent to litigate these patents. Some jurisdictions require patent attorneys to pass a separate bar exam to fully litigate a patent dispute. Therefore, the job of being a "patent attorney" in the comparative jurisdictions listed below is not always a perfect comparison as "patent attorney" does not always mean the same thing. However, for our point and our question of whether reification of a patent professional contributes to patent quality, it will have to suffice.

57. 37 C.F.R. § 11.2(c) (2015).

58. 37 C.F.R. § 11.2(d) (2015).

59. See *Statistics*, U.S. PATENT & TRADEMARK OFFICE, <http://www.uspto.gov/learning-and-resources/statistics> (last visited Sept. 10, 2015).

60. In France and Germany, "patent attorneys" are those eligible to practice law, including prosecuting patents before the countries' patent office. In the UK, a "patent attorney" must pass not only the requisite patent exams, but also the litigation skills examination in order to practice before the Patent Court and other High Courts. See *Patent Examination Board Examination Policies*, THE CHARTERED INST. OF PATENT ATT'YS, <http://www.cipa.org.uk/patent-examination-board/policies/examination-policies/> (last visited Oct. 5, 2015). In Canada, the patent agent is the person who represents clients in front of the patent office. But, the patent agent is not an attorney, so attorneys are the only ones allowed to litigate patent claims in Canada. Generally, each country has requirements for those seeking to prosecute patents before the patent office.

A. Japan

In Japan, a technical or scientific undergraduate degree is not a prerequisite to taking the patent bar.⁶¹ In Japan, a “patent attorney” is a person who represents parties before the Japan Patent Office in matters pertaining to patents and trademarks.⁶²

Japan’s patent attorney examination is administered to judge whether an individual has knowledge of and can apply Japan’s patent and trademark laws.⁶³ The written exam has three parts: multiple choice, essay, and oral.⁶⁴ The multiple choice section tests the individual on laws and regulations relating to patents, utility models, designs, and trademarks (industrial property rights); treaties on the industrial property rights; and laws and regulations necessary for work as a patent attorney provided by the Ordinance of the Ministry of Economy, Trade, and Industry.⁶⁵

Once an individual passes the multiple choice section, he or she is subject to the essay examination that tests the individual on laws and regulations relating to industrial property rights, and on one article of technology or one Act prescribed by the Ordinance of the Ministry of Economy, Trade and Industry selected by the examinee in advance.⁶⁶ Lastly, the oral examination is conducted on the laws and regulations relating to the industrial property rights for those who have passed both the multiple choice and essay exams.⁶⁷ To finally be admitted to the patent bar, all individuals have to complete the required practical training conducted by the Minister of Economy, Trade and

61. Japan Patent Attorney Act (Act No. 49 of April 26, 2000), ch. 1, art. 7 specifies as follows: A person who falls under any of the following items and has completed the practical training as specified in Article 16-2 (1) is qualified to be a patent attorney:

- (i) A person who has passed the patent attorney examination;
- (ii) A person who is qualified to be an attorney at law; or
- (iii) A person who has engaged in the trial or examination affairs as a trial examiner or examiner at the Japan Patent Office for a total of seven or more years.

Benrishiho [Patent Attorney Act], Law No. 49 of 2000, art. 7 (Japan), translated in Patent Attorney Law (Apr. 26, 2000), <http://www.jpaa.or.jp/english/aboutus/pdf/PatentAttorneyAct.pdf>.

62. Benrishiho [Patent Attorney Act] Law No. 49 of 2000, art. 7 (Japan). The business of a patent attorney in Japan may consist of: helping parties acquire industrial property rights, such as patent and trademark rights; arguing before the Japan Patent Office if an application is rejected; appealing a decision of the Japan Patent Office to the Intellectual Property High Court; represent rights holders in import/export suspension matters; and representing those in litigation concerning infringement of an industrial property right. See *Scope of Major Business of Japanese Patent Attorneys (benrishi)*, OHTSUKI PATENT & TRADEMARK L. FIRM, http://www.benrishi.com/en/patentattorney/scope_of_work.html (last visited Sept. 13, 2015).

63. Benrishiho [Patent Attorney Act] Law No. 49 of 2000, art. 7 (Japan).

64. *Id.*

65. *Id.*

66. *Id.*

67. *Id.*

Industry.⁶⁸

Japan's regulations on its patent bar first went into effect in 1899.⁶⁹ The "Regulations on Patent Attorney Registration" established the qualifications of the patent agent, a predecessor to the current patent attorney.⁷⁰ These qualifications were established to enhance the credibility of the patent agent.⁷¹ In 1915, the Japan Association of Patent Attorneys, the predecessor to the current Japan Patent Attorneys Association, was established to maintain the morality of patent attorneys.⁷² Finally, in 1922, the Patent Attorneys Association was established to prescribe that only members of the Patent Attorneys Association were allowed to conduct the business of a patent attorney.⁷³ This rule is in effect today.⁷⁴

Nowhere in Japan's complicated and detailed rules and regulations dictating who will be admitted to the patent bar are any requirements that an applicant possess any specific undergraduate degree and also none are found in the myriad number of Cabinet Orders implementing the Patent Act.

B. Canada

Canada also has no formal requirements that are statutory or regulatory prerequisites to being admitted to the Canadian patent bar. Like in Japan, those seeking entrance to the Canadian patent bar usually specialize in a specific field of which they have some practical knowledge. While this assists them in obtaining clients, no rule prohibits anyone from being admitted to the patent bar.

To register before the patent bar in Canada, a person must take the qualifying exam.⁷⁵ Passing the patent exam qualifies that person to prosecute patents, but not to do any other legal work in Canada (similar to a patent agent in the United States). To sit for the exam, the Canadian Intellectual Property Office requires that on the day of the exam, the individual is a resident of

68. *Id.* This training includes practical training at the time of registration, as well as, continual training of 70 or more hours every five years after registration. This training includes group lectures and discussion, similar to the continuing legal education (CLE) in the U.S. See *Regulations Pertaining to Patents and Patent Attorneys (benrishi)*, OHTSUKI PATENT & TRADEMARK L. FIRM, http://www.benrishi.com/en/patentattorney/rule_about_attorney.html (last visited Sept. 13, 2015).

69. *History of Japanese Patent Attorney System*, OHTSUKI PATENT & TRADEMARK L. FIRM, <http://www.benrishi.com/en/patentattorney/history.html> (last visited Sept. 13, 2015).

70. *Id.*

71. *Id.*

72. *Id.*

73. *Id.*

74. Benrishiō [Patent Attorney Act] Law No. 49 of 2000, art. 7 (Japan), translated in Patent Attorney Law (Apr. 26, 2000), <http://www.jpaa.or.jp/english/aboutus/pdf/PatentAttorneyAct.pdf>.

75. Patent Rules, SOR/96-423 (Can.), <http://laws-lois.justice.gc.ca/PDF/SOR-96-423.pdf>.

Canada and has been employed for at least 24 months on the examining staff of the Patent Office; or has worked in Canada in the area of Canadian patent law and practice for at least 24 months; or has worked in a patent law and practice, including preparation and prosecution of patent application, for at least twenty-four months as a registered patent agent in good standing.⁷⁶ An individual may sit for the exam, if within two months after the Commissioner of the Patent Office publishes the date of the next exam, the individual notifies the Commissioner in writing of his or her intention to sit for the exam, pays the fee, and furnishes the Commissioner with evidence that he or she meets the work requirements.⁷⁷

The exam consists of four papers written over four days on patent drafting, patent validity, patent office practice, and patent infringement.⁷⁸ Approximately 10% of eligible candidates pass every year.⁷⁹ There are no formal education requirements for working as a patent agent, but the working requirements act as a barrier.⁸⁰ That is, although no degree requirement exists, presumably only those trained in electrical engineering, for example, would get a job for two years prosecuting patents prior to taking the patent exam.

C. UK

In the UK, a patent attorney is an individual trained in “securing, enforcing or advising about patents.”⁸¹ To become a patent attorney in the UK, one must take a series of qualifying examinations administered through the Chartered Institute of Patent Attorneys (CIPA).⁸² The process to become a patent attorney in the UK can take several years, as the exams are only held once every year.⁸³ To qualify to sit for the initial exams, the PEB Foundation Certificate examinations, an individual must have a degree in science, technology, engineering or mathematics (STEM).⁸⁴ An individual without such a degree

76. *Id.*

77. *Id.*

78. Alan Macek, *Patent and Trade-Mark Agent Requirements*, SLAW, <http://www.slaw.ca/2012/10/22/patent-and-trade-mark-agent-requirements/> (last visited Sept. 13, 2015).

79. *Id.*

80. *How to Become a Canadian Patent Agent*, INTELL. PROP. INST. OF CAN., <http://www.ipic.ca/english/the-profession/careers-in-ip/how-to-become-a-patent-agent.html> (last visited Sept. 13, 2015).

81. *What Does a Patent Attorney Do?*, HAWK IP DASHBOARD, <http://www.hawkip.com/advise/what-does-a-patent-attorney-do> (last visited Sept. 13, 2015).

82. *Patent Examination Board—FAQS*, THE CHARTERED INST. OF PAT. ATT’YS, <http://www.cipa.org.uk/pages/PEB-FAQs> (last visited Sept. 13, 2015).

83. *Id.*

84. *Patent Examination Board—Examination Policies*, THE CHARTERED INST. OF PATENT ATT’YS, <http://www.cipa.org.uk/pages/PEB-Examination-Policies> (last visited Sept. 13, 2015).

may be granted access to the exam through a variety of exceptions.⁸⁵ One interesting example of exceptions to the degree requirement in the UK is that the degree requirement is waived if the applicant has completed a certificate in IP at one of the eligible universities. However, as is true in the United States, there appears to be no public access to data regarding how often the degree requirement is waived for intellectual property students in the UK.

After passing the foundation exams, the individual must then pass the Final Diploma Examination.

D. France

To become a patent attorney in France, one “must hold a degree in engineering or natural science and take part in a legal training course, CEIPI.”⁸⁶ The applicant to the patent bar must also take an exam, the EQF, organized by the French Patent Office (INPI).⁸⁷ This exam consists of a written and an oral section.⁸⁸ In France, qualification as a national patent attorney “does not give an attorney any rights to conduct litigation in the national courts.”⁸⁹

E. Germany

To be a patent attorney in Germany, one must have a college “degree in a science, engineering or a technical subject and a subsequent almost three-year training under supervision of a patent attorney and the patent authorities.⁹⁰ After the training, the [applicants] must pass a written and oral qualifying exam.”⁹¹ If an applicant has worked for “many years” as a patent expert, he or she may be admitted to the exam without undergoing the three-year training.⁹²

F. Conclusions on Comparison

Therefore, of the United States’ most valued trading partners, Germany has the highest and most reified standards to become admitted to the German Patent Bar. The least reified standards appear to be that of Japan and Canada. If the

85. *Id.* (One may qualify to sit for the exam if he or she has passed a different set of examinations.).

86. *Patent Attorneys*, INTELLEKTUS, <http://www.intellektus.com/patent-attorneys.html> (last visited Sept. 13, 2015).

87. *Id.*

88. *Id.*

89. Response by Intellectual Property Lawyers’ Association on Consultation on European Patent Litigation Certificate, BRISTOWS UPC, [http://www.bristowsupc.com/assets/files/EPLC%20-%20IPLA%20Response%20to%20consultation%20\(22376063_1\).pdf](http://www.bristowsupc.com/assets/files/EPLC%20-%20IPLA%20Response%20to%20consultation%20(22376063_1).pdf) (last visited Sept. 13, 2015).

90. *Training at the German Patent and Trade Mark Office*, DEUTCHES PATENT-UND MARKENAMT, http://dpma.de/english/the_office/training/index.html (last updated Feb. 10, 2015).

91. *Id.*

92. *Id.*

rhetoric that a reified patent bar is required for patent quality is legitimate, we would expect to see much lower patent quality statistics arising out of Japan and Canada than the United States and Germany.

As we point out below, this is not the case, which leads us to the conclusion that reification standards do not predict quality patents. Therefore, patent quality cannot act as a statistically supported justification of reification standards.

IV. CONSEQUENCES OF HAVING FEWER PATENT ATTORNEYS

There will be many consequences to the United States patent bar and its economy for having fewer and, perhaps, too few patent attorneys to do patent application work. All of these consequences are cumulative and the aggregate sum of these consequences will result in a less than optimal situation for the American economy, the American patent bar, and, most importantly, American inventors. The latter is a class of individuals that the United States Patent and Trademark Office (USPTO or PTO) has worked hard to support and encourage.⁹³ The PTO has encouraged Congress to adopt legislation to their advantage and is working hard to make patenting more accessible to inventors.⁹⁴ Of the numerous stakeholders the PTO routinely consults with, there is no indication that they ever have considered consulting with law school admissions offices. Hearing from a limited number of professors from self-proclaimed elite law schools⁹⁵ would not give an accurate picture of the state of patent bar-eligible prospective and subsisting law students.

As we know the number of new patent bar entrants will shrink drastically in the next few years, it seems time for the PTO interact with all law school admission offices to encourage the students they want to see prosecuting patents to attend law school.

A. Cost Per Patent Will Increase

The PTO conducted a survey of inventors regarding why each respondent company **did not** obtain patent protection.⁹⁶

93. See the discussion of pro bono initiatives, *infra* notes 100–103 and associated text.

94. *Id.*

95. For a general review of the legislative process and the various inputs, see Joe Matal, *A Guide to the Legislative History of the America Invents Act: Part II of II*, 21 FED. CIR. B.J. 539 (2012), available at http://www.uspto.gov/sites/default/files/aia_implementation/guide_to_aia_part_2.pdf.

96. We are not presenting these results as normatively meaningful. Of course, such surveys are fraught with methodological issues. As this survey is nothing more than an uninformed opinion survey, we caution any reliance on this for normative findings. It does indicate a general reputation or trend that shows that inventors believe patenting is too expensive. Whether it is or isn't is beyond the scope of this point and this piece but the so-call data does show that inventors have the opinion that it

In Table 2 below,⁹⁷ it is important to notice that the PTO did not ask “could not find a patent attorney to do the work.” A total of 54.9% responded that the reason they did not seek patent protection was because they perceived it as too expensive. This data set from the PTO does not answer the question of why it was perceived as too expensive. Presumptively, it was too expensive not because of patent fees the PTO charges but, rather, the fees patent attorneys charge.

Table 2: Reasons for Not Seeking Patent Protection

Industry	All respondents	Biotechnology (A)	Medical Devices	IT Hardware [#]	IT Software (B)	Test of difference (A) against (B)
Did not want to disclose	35.0	58.8	45.2	50.0	25.0	**
Cost of filing	54.9	42.6	52.6	38.1	63.5	**
Ease of inventing around	43.7	41.9	48.1	35.7	45.7	
Trade secret was adequate	35.6	48.5	45.2	45.2	29.0	**
Cost of enforcing	44.2	36.0	35.6	31.0	52.0	**
Did not believe patentable	37.6	27.9	28.1	36.9	41.9	**
Did not need protection	17.4	16.9	13.3	7.1	20.0	
Total responses	1,057	136	135	84	589	

As the number of subsisting patent attorneys decreases, basic economics of supply and demand informs us that the cost of median patent attorney services will increase.⁹⁸ An increase in the median cost of obtaining a patent will likely chill patenting. Chilling patenting is precisely the opposite of Congress’ stated intentions.⁹⁹

is too expensive. Of course, that conclusion itself is subjective and depends on many unknown and unstated variables such as whether the respondent company had a recent positive or negative interaction with a subsisting patent attorney.

97. Stuart Graham, *Patenting, Entrepreneurship, and the USPTO Response*, U.S. PATENT & TRADEMARK OFFICE (May 10, 2012) <https://www.oecd.org/sti/inno/workshop-patent-practice-and-innovation-Graham.pdf>.

98. See Kenneth J. Arrow, *Toward a Theory of Price Adjustment*, in *THE ALLOCATION OF ECONOMIC RESOURCES: ESSAYS IN HONOR OF BERNARD FRANCIS HALEY* 41 (1959).

99. The Patent Reform Act of 2007, 153 CONG. REC. E773-E775 (daily ed. Apr. 18, 2007) (statement of Rep. Howard L. Berman).

In the Leahy-Smith America Invents Act (AIA),¹⁰⁰ there are numerous places that are designated specifically to encourage patenting.¹⁰¹ One requirement that President Obama has taken very seriously is to increase the number of pro bono attorneys filing patent applications for inventors for no charge. The clear intention here is to encourage more filing (even this effort is bound to be short-lived and not successful). As the median price for patent attorney services increases, we can expect fewer patent attorneys willing to give their time for free. Also, as the work load of subsisting patent attorneys increases, they will have less time to devote to pro bono activities, not more time as prescribed by the AIA and President Obama.

The pro bono activities of the patent bar are perceived to be so important that there is a special section in the AIA that commands the PTO to develop a pro bono program. The President has appointed Jennifer McDowell to head the Pro Bono Section of the PTO. Ms. McDowell reports great success in starting pro bono service serving all states in the United States.¹⁰² The PTO has set up the National Clearinghouse to be a “single entry point” for anyone needing pro bono patent services. The PTO specifically mentions the efforts made by the State of Minnesota in encouraging the development of pro bono activities. The PTO has even started a “Pro Bono Page” which consists of a web site and starting point for anyone to seek pro bono patent services nationwide.¹⁰³

This is a legislative response to Table 2 above, a legislative response that concludes that most people who do not obtain patent protection fail to do so because they perceive patenting to be too expensive. However, with fewer patent attorneys to do the actual patenting work in the United States, this pro bono initiative is not likely to be sustainable. The little data that is available seems to indicate that inventors fair far better when represented than not, as Graph 1¹⁰⁴ below from the PTO’s pro bono initiative in Minnesota seems to indicate:

[Graphical material on the following page.]

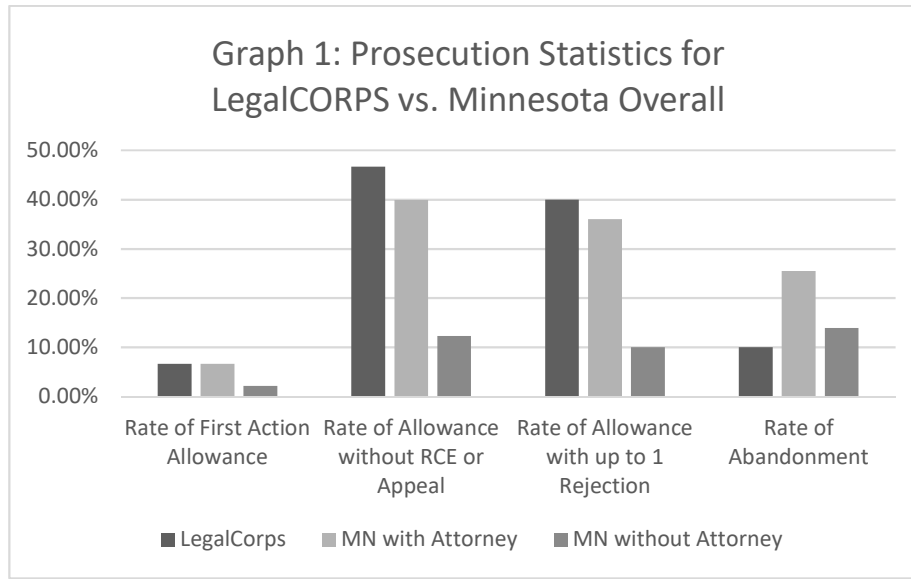
100. Pub. L. No. 112-29, 125 Stat. 284 (2011).

101. Specifically, these are in the areas of pro bono activities, diversity of applicants, creating an Ombudsman for Small Businesses, and to create satellite offices of the PTO around the country.

102. Jennifer M. McDowell & Saurabh Vishnubhakat, *The USPTO Patent Pro Bono Program*, 7 CYBARIS 1 (2015).

103. *Patent Pro Bono Program*, U.S. PATENT & TRADEMARK OFFICE, <http://www.uspto.gov/patents-getting-started/using-legal-services/pro-bono/patent-pro-bono-program> (last visited Sept. 13, 2015).

104. McDowell & Vishnubhakat, *supra* note 102, at 63.



If in addition to normal fee-paying clients, United States patent attorneys are expected to take on inventors who cannot afford a patent attorney, this will likely only further tax an already taxed group of people.

The AIA made many mandates of subsisting patent attorneys. It did nothing to encourage patent eligible people to attend law school and become patent attorneys. Further taxing a shrinking group with pro bono responsibilities seems to be the equivalent of unfunded federal mandates.¹⁰⁵ This time, the funding is in the form of people to do the work because the barriers to entry are too reified.

The United States has created great incentives to patent; however, with fewer people to do the job, the burden shouldered by the remaining patent attorneys who will do work pro bono will increase significantly. With fewer patent attorneys to file and prosecute patents, with increasing fees and increasing demands to work for paying clients, the pro bono objectives mandated by the AIA will likely not be satisfied.

In addition, data presented to the President of the United States by Jennifer McDowell, the Pro Bono Coordinator, indicates that attorneys have an extremely positive effect on patenting as opposed to proceeding pro se. This

105. Robert W. Adler, *Unfunded Mandates and Fiscal Federalism: A Critique*, 50 VAND. L. REV. 1137, 1256 (1997) (stating that although cities and states are net fiscal beneficiaries of federal mandates, they “do pose legitimate normative issues of autonomy, accountability, efficiency, and equity”).

seems to establish the fact that attorneys, at least in the Minnesota data, play an important role in patenting.

Through the AIA, the PTO has invested heavily in increasing the number and frequency of issued patents. This investment has focused on increasing inventor incentives and decreasing patent pendency time at the PTO, however the investment has been apparently without regard to the increased number of attorneys that would be needed to prosecute the increased number and frequency of issued patents. The number of law students with patent bar eligible undergraduate degrees is available upon request from the LSAC,¹⁰⁶ so the PTO and Congress knew or should have known of this impending dearth of patent attorneys throughout the revisions and passage of the AIA.

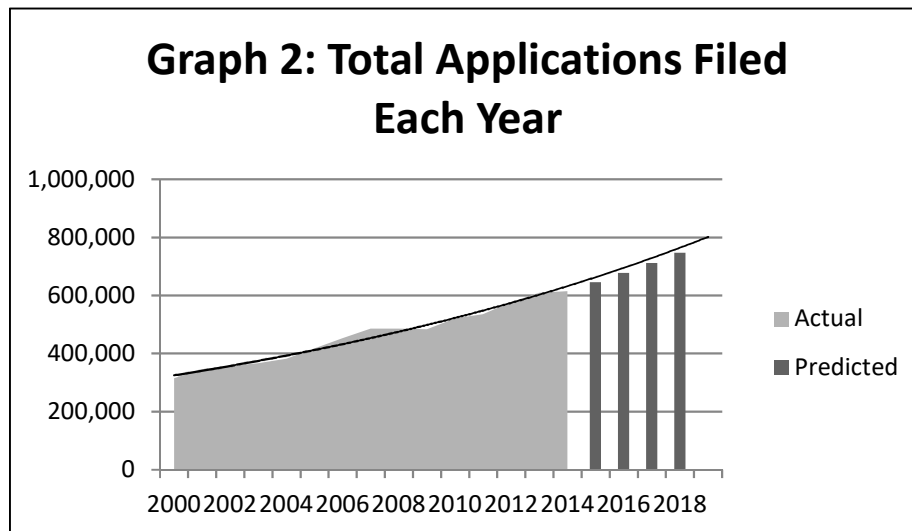
B. Work load of Existing Patent Attorneys Will Increase

Between 2010 and 2020, the median workload of patent practitioners is expected to increase significantly. From 2000 to 2014, the United States averaged an increase of 21,445 new applications per year. Based on this growth, we predict there will be 746,440 new applications in 2018, as shown in Graph 2¹⁰⁷ below:

[Graphical material on the following page.]

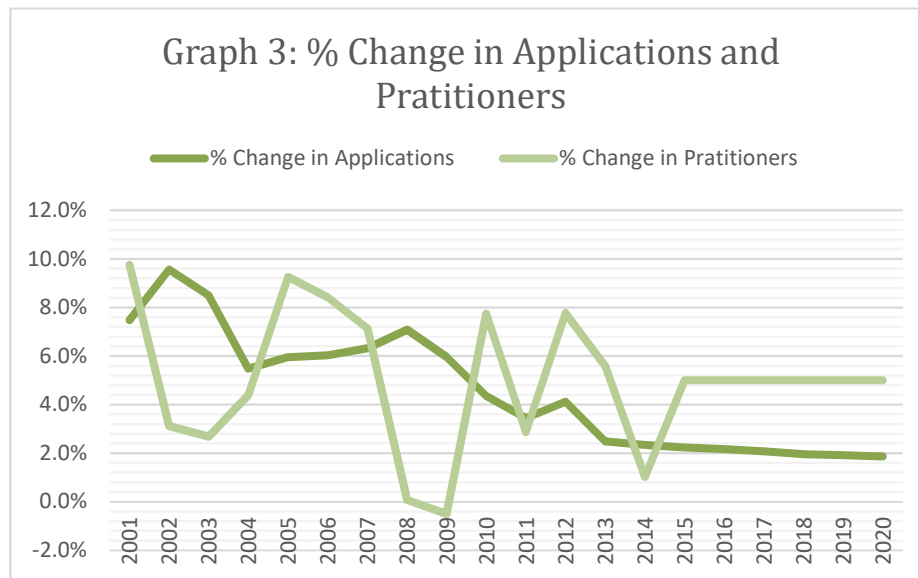
106. That is, this is not secret. The Law School Admissions Counsel provides the information upon request. We obtained significant information from them when researching our prior article in this series, Port et al., *supra* note 5. If we could do it so easily, presumably, the USPTO could do it as well.

107. See *U.S. Patent Statistics Chart Calendar Years 1963–2014*, U.S. PATENT & TRADEMARK OFFICE, http://www.uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.htm (last modified Jan. 6, 2016). In 1963, 66,715 utility patent applications of US origin were filed. The total number of patents filed in 2014 was 615,243. *Id.*



From 2000 to 2014, application filings increased by an average of 5.0% per year. In the same time, the number of registered practitioners decreased by 1.4%, which included an average increase in registered agents of 6.1% per year and an average decrease in registered attorneys of 4.4% per year. However, based on ABA entrance data, we predict an annual reduction in registered attorneys of 12.5% per year. Even if the number of registered agents continues to grow at 6.1% per year, the total number of registered practitioners will only grow by an average of 2% per year over the next five years. Graph 3¹⁰⁸ below compares the percentage change of application filings versus registered practitioners:

108. Practitioner data for this and subsequent graphs has been collected and statistically analyzed by the authors. The entire list of registered attorneys and agents is available in CSV format at <https://oedci.uspto.gov/OEDCI/index.jsp>. However, registration dates are only available by accessing a specific web page for each registered attorney or agent, where the page is available by using the registration number within a generalized URL, such as the author's page at <https://oedci.uspto.gov/OEDCI/details.do?regisNum=72945>. Some registration numbers do not have an associated attorney or agent, so a list of all available URLs was generated using the registration numbers downloaded from the PTO CSV file. This list of URLs was then used as the input of a call to the program "wget" to download each page; for example, as "wget --nocheck-certificate -i ./reg_numbers_temp.txt -w 0.5 -O ./reg_dates_temp.txt." (Here, the "-w" wait flag was used to insert a half-second pause between downloads to reduce the likelihood that this download would be erroneously flagged as a "denial of service" cyber-attack.) See *id.* for the percent change in filed applications.



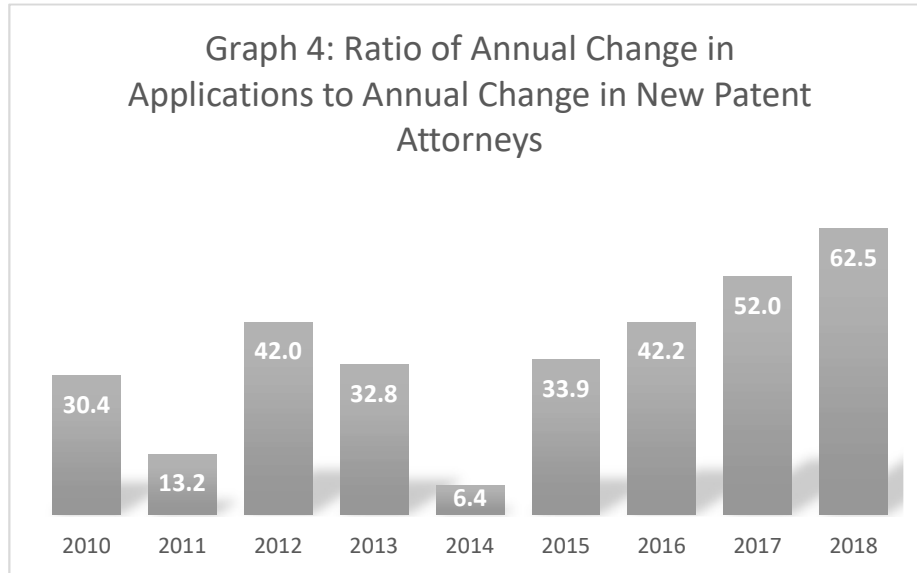
From 2000 to 2014, we averaged an increase of 1,870 new registered practitioners per year. Among the average of 1,870 new registered practitioners per year in 2000 to 2014, we averaged an increase of 1,240 new registered attorneys per year. However, based on ABA data, we expect this will only see an average of 716 new attorneys per year in 2015-2020, and an average of 1,048 new registered practitioners per year in 2015-2020.¹⁰⁹

As shown above, the number of applications is increasing each year. If each registered practitioner retains his or her present workload, then the increase in applications per year will have to be addressed by the increase in number of practitioners per year.

Graph 4¹¹⁰ below demonstrates the effect of the predicted 5% increase in applications and 12.5% decrease in the number of registered patent attorneys (excluding agents). In particular, Graph 4 shows that the ratio of annual increase in new patent applications to annual increase in patent agents to increase from an average of 30.4 new applications in 2010 to 62.5 new applications in 2018:

109. The predictive estimation of patent attorneys has been generated by extrapolating ABA-admitted student data provided on request by The Law School Admissions Counsel. Data show an average of 31.5% of students admitted to ABA-approved law schools with patent bar eligible majors eventually become registered patent attorneys. Port et al., *supra* note 5.

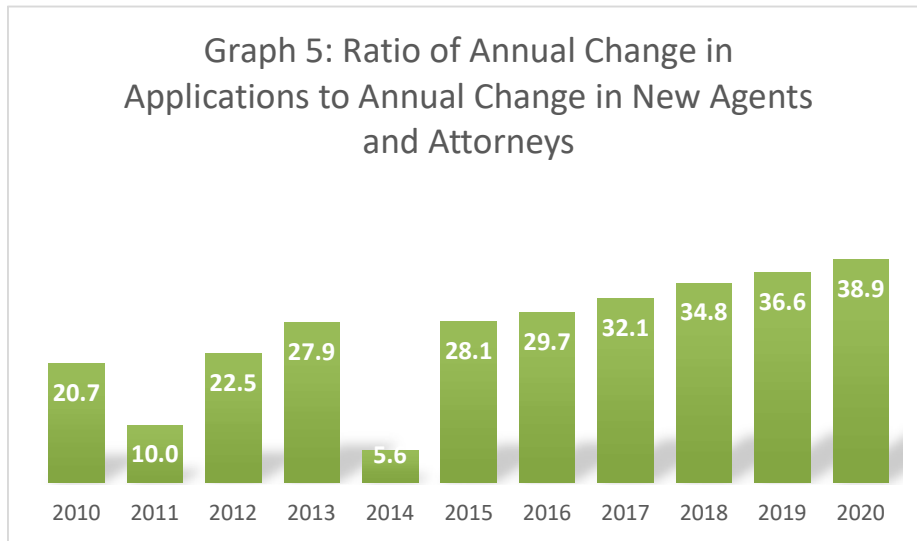
110. See *supra* notes 108–109.



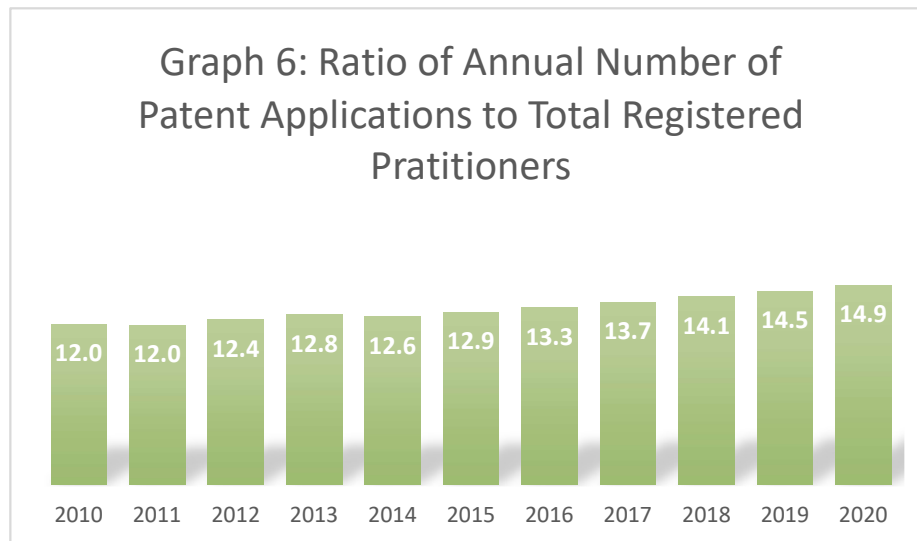
This graph makes a few assumptions. First, because this graph shows a ratio of new applications per new attorney, this assumes that all current patent attorneys are handling the same workload as the previous year's attorneys, and that only new patent attorneys handle the additional number of new applications per year. This also shows data for only patent attorneys. The following Graph 5¹¹¹ combines the changing number of patent agents and attorneys ("patent practitioners"), and shows that the ratio of new patent applications to new patent practitioners is predicted to increase from an average of 20.7 new applications in 2010 to 38.9 new applications in 2020:

[Graphical material on the following page.]

111. *Id.*



The two graphs above both make the assumption that only new practitioners file the number of new patents. However, even if the burden of the increasing number of new applications is distributed perfectly equally among all newly registered and previously registered practitioners, the number of new patent applications per cumulative amount of registered practitioners is predicted to increase from 12.0 to 14.9, an increase of 24%, as shown in Graph 6¹¹²:



112. *Id.*

This graph underestimates the workload of the patent practitioners in a few ways. First, the total number of practitioners is based on active registration numbers at the PTO, which includes all registered practitioners regardless of whether they are currently filing new patent applications or even practicing patent law. This data therefore makes the inappropriate assumption that every registered patent agent and attorney is completely dedicated to obtaining letters patent for individual or corporate clients. Second, the total number of patents only reflects the number of new patent filings, and does not reflect any of the work required in responding to Office Actions or any other aspect of patent prosecution. Third, this also assumes that between now and 2020, no patent attorney will exit the field, including practitioners who became registered practitioners in 1937.¹¹³ Recognizing that these assumptions cannot be true, the work load, by 2020, will be considerably more demanding than the 25% increase in workload predicted by the graph above.

As patent attorneys recognize more demand for their services, it may actually have a positive effect on the quality of individual patents. Patent attorneys will no longer need to accept work for obtaining a patent for analyzing a golf swing¹¹⁴ when there is more demand for their services. That is, patent attorneys may realize a positive effect of having fewer patent attorneys. That effect may be that patent attorneys can become more selective in the patent work they accept and not have to accept any invention that comes along just to remain profitable. However, enabling or encouraging patent attorneys to select higher paying patent prosecution work will work against the tenets of the AIA, especially those designed to encourage patenting by small businesses and solo inventors.¹¹⁵

C. *Multiplying Effect Encourages Exit*

To keep up with demand, median work hours of subsisting patent attorneys will have to increase. As work load increases, we expect to see a higher rate of

113. See *Patent Attorney/Agent Search*, U.S. PATENT & TRADEMARK OFFICE, <https://oedci.uspto.gov/OEDCI/details.do?regisNum=14311> (last modified Oct. 5, 2015) (The lowest registration number in the PTO database belongs to William Hall, who received registration number 14311 on January 15, 1937.). See also Dennis Crouch, *2015 U.S. Patent Practitioner Trends*, PATENTLYO, February 26, 2015, <http://patentlyo.com/patent/2015/02/current-patent-practitioner.html> (identifying the USPTO's problem in failing to update its practitioner list.)

114. U.S. Patent No. 8,715,096 (filed May 17, 2012).

115. We recognize the paradoxical nature of the statement, which suggests that reification reduces the size of the patent bar and may have a desired effect of reducing the likelihood that a patent practitioner will file lower quality patents based on inventions by small businesses or solo inventors. However, while small businesses and solo inventors may have less money to prosecute patents, there is no data suggesting that inventions by small businesses or solo inventors necessarily lead to lower quality patents.

exit from the profession which will further exacerbate the problem. Retention will become more and more problematic and salaries of subsisting patent attorneys will increase. This may be good news for subsisting patent attorneys, but in order to keep up with the work flow, patent attorneys will have to become much more efficient and productive.¹¹⁶

These demands to be more productive will change the nature of the patent profession. It will need to become more mechanized to achieve the level of productivity required. Few firms today are engaged in the level of productivity and efficiency that would allow them to absorb the workflow that is anticipated and required when the number of new patent attorneys entering the patent bar decreases by 50% by 2018.¹¹⁷

When the workflow increases to the levels anticipated, some of the existing work force will choose to exit rather than change. Although this is natural, it must be kept in mind when the PTO works hard to encourage innovation and patenting. In order for a patent system to function, there needs to be patent professionals to do the work. Although it is impossible to determine the rate of exit that we might experience due to increased workflow, increased mechanization, and/or demands for increased efficiency, it will not be zero.

We, therefore, have to take into account the impact that the decreasing number of new patent attorneys combined with the increased workflow will have on subsisting patent attorneys. That impact could be immense and subsisting patent attorneys may choose to exit rather than transform their practice.

D. Fewer Patent Applications Will Actually be Filed Counter to Incentives

As the number of new patent attorneys decreases, unless efficiencies or structural changes make up the slack, the aggregate number of new patent applications is likely to actually decline. With fewer people to do the work, this seems self-evident. The downturn in new patent attorneys the United States is facing is immense.

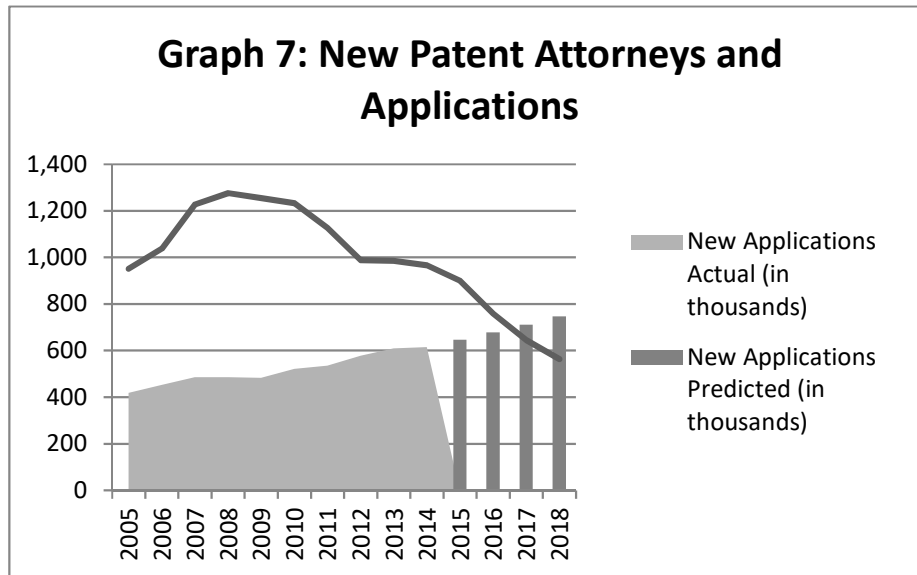
Graph 7¹¹⁸ below shows the historical and predicted number of applications filed compared to the number of new patent bar entrants:

[Graphical material on the following page.]

116. See THE GLOBAL COMPETITIVENESS REPORT, *supra* note 2, at Part II.B.

117. Port et al., *supra* note 4.

118. See *supra* notes 108–109.



Although the decrease in applications is not currently being realized in the number of actual patents applied for, this is momentary as this data just shows new patent bar entrants. As those young patent attorneys come up to speed and assume more of the patenting work load, we expect the number of actual patent filings to decrease corresponding to the number of actual patent attorneys filing patent applications.

E. Fewer Patent Applications Will Have a Negative Impact on American Economic Growth and Stability

The PTO and others have placed great weight on the idea that economic growth is highly dependent on patenting, such that inefficiencies and delays in the patenting process hinders innovation, negatively affecting economic growth.¹¹⁹ If this is true, coupled with our previous conclusion that the number of new patent attorneys is about to decrease substantially,¹²⁰ it follows that the economic impact of having fewer patent attorneys will also not be zero.

119. Arti Rai, Stuart Graham & Mark Doms, U.S. DEPT. OF COMMERCE, PATENT REFORM: UNLEASHING INNOVATION, PROMOTING ECONOMIC GROWTH & PRODUCING HIGH-PAYING JOBS 4 (Apr. 13, 2010), [http://2010-2014.commerce.gov/sites/default/files/documents/migrated/Patent_Reform-paper.pdf] (“While timely, high-quality patents can provide a strong spur to innovation . . . [d]elay, uncertainty, and poor quality at the front end ultimately make private investments in innovation less likely and undermine the potential for economic growth and job creation.”); *see also* Port et al., *supra* note 4, at 194.

120. Port et al., *supra* note 4, at 197.

When we claim that economic growth is dependent upon patenting, it follows then that a lack of patenting will lead to slower economic growth.

We accept the apparent normative truth that increased innovation leads to increased patenting and increased patenting leads to heightened competitiveness and therefore the health of the American economy. We have searched in vain for good, empirical evidence to support this claim. Although it is a truism that many support, it is difficult to find actual empirical evidence to support it. This has led some to suggest abolishing the patent system¹²¹ or are significantly critical of the existing system.¹²²

To the surprise of absolutely no one, David Kappos disagrees.¹²³ Mr. Kappos, the former Commissioner of Patent and Trademarks, head of the US Patent and Trademark Office and now senior adviser to the Partnership for American Innovation, argues in this blog post that “history has shown that those countries lacking effective patent protection see little investment in innovation at all.”¹²⁴ Mr. Kappos believes that it is the patent system that has made America’s economy great; however, he, too, points to no empirical evidence that supports that claim.

With this article, we do not intend to enter this debate. We accept the notion that patenting is significant for a healthy economy. Therefore, anything, like the reduction in subsisting patent attorneys, that negatively affects patenting should, correspondingly, have a negative effect on American innovation and that will have a negative effect on the United States’ economy and inventors’ ability to raise capital to finance their inventions.¹²⁵

Some, including us, predict negative consequences for the American

121. *Intellectual Property: A Question of Utility*, THE ECONOMIST (Aug. 8, 2015), <http://www.economist.com/node/21660559> (there is plenty of empirical evidence that shows that patents do not encourage innovation); *Time to Fix Patents*, THE ECONOMIST (AUG. 8, 2015), <http://www.economist.com/news/leaders/21660522-ideas-fuel-economy-todays-patent-systems-are-rotten-way-rewarding-them-time-fix> (today’s patent system is a poor excuse for rewarding the very ideas that fuel a successful economy).

122. See JAMES BESSEN & MICHAEL J. MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATION AT RISK 141 (2008) (the patenting process has a larger economic cost than the benefits received from the resulting patents); Amy L. Landers, *The Antipatent: A Proposal for Startup Immunity*, 93 NEB. L. REV. 950 (2015); Andrew W. Torrance and Bill Tomlinson, *Patents and the Regress of Useful Arts*, 10 COLUM. SCI. & TECH. L. REV. 130 (2009) (“Patent systems are often justified by an assumption that innovation will be spurred by the prospect of patent protection, leading to the accrual of greater societal benefits than would be possible under non-patent systems. However, little empirical evidence exists to support this assumption.”).

123. David J. Kappos, *Strong Patent System Essential to Strong Innovation Economy*, THE HILL (Aug. 20, 2015, 8:00am), <http://thehill.com/blogs/congress-blog/technology/251406-strong-patent-system-essential-to-strong-innovation-economy>.

124. *Id.*

125. B.H. Hall & R.H. Ziedonis, *The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979-1995*, 32 RAND J. ECON. 101, 125 (2001).

economy if the patent system falters.¹²⁶ Some reliable work establishes that patent rights appear to block follow-on innovation in computer technology, medical devices and electronics; however, this invalidation of large companies' patents spurs small companies to innovate.¹²⁷ Of course, this entire discourse could be academic as the real issue in patenting is whether inventions become available for exploitation through licensing.¹²⁸

The vexing and intractable conclusion of proving beyond a reasonable doubt that patenting encourages innovation and innovation supports a robust economy is not our point. Our point is that, presuming patenting encourages economic growth, the American economic system might see a reduced competitive edge if there are too few people to do patenting work and if inventions, therefore, go unprotected and undeveloped.

F. *Effect on Patent Quality*

There are many and, sometimes, conflicting definitions of "quality" in patenting. Although it may be important to sometimes come to a normative understanding of what "quality" means in patenting,¹²⁹ we do not intend to enter the debate of what a "quality patent" normatively means as if there could ever be a definition that would be applicable to all situations and with which we all might agree. This is a very complicated question that has led some to come up with very complicated stakeholder-related solutions that do not solve the basic question in an immediately applicable manner.¹³⁰

Rather than enter the metaphysical debate on quality¹³¹ and how it might manifest itself in patenting, because we need a comparative, cross-cultural

126. Kristina Lybecker, *What If We Don't Have Sufficient Intellectual Property Rights?*, IPWATCHDOG (Apr. 3, 2015), <http://www.ipwatchdog.com/2015/04/03/what-if-we-dont-have-sufficient-intellectual-property-rights/id=56169/>.

127. Alberto Galasso & Mark Schankerman, *Patents and Cumulative Innovation: Causal Evidence from the Courts*, 130 Q.J. ECON. 317, 317 (2015).

128. See Robert Litan & Hal Singer, *Unlocking Patents: Costs of Failure, Benefits of Success*, ECONOMISTS INC. (2014), available at http://www.ei.com/downloadables/EI_Patent_Study_Singer.pdf.

129. Rai, Graham & Doms, *supra* note 120 (defining low-quality patents as "patents that are obvious, overly broad, or unclear in the inventive territory that they cover").

130. Christi J. Guerrini, *Defining Patent Quality*, 82 FORDHAM L. REV. 3091, 3126 (2014) (Stakeholders could include the PTO, courts, patentees, and the public).

131. And neither do great minds who have considered this notion. See ROBERT M. PERSIG, *ZEN AND THE ART OF MOTORCYCLE MAINTENANCE: AN INQUIRY INTO VALUES* (1974); Louise Harmon, *Robert Pirsig: Zen and the Art of Motorcycle Maintenance: Essay and a Poem: Going Back to a Place Where You Once Led a Life: ReReading Zen and the Art of Motorcycle Maintenance*, 37 LEGAL STUD. FORUM 7, 8 (2013) ("I always hold out for Quality, and no, I cannot define it, but I recognize it when I'm under the hood of a good book."); Sarah B. Duncan, *Pursuing Quality: Writing a Helpful Brief*, 30 ST. MARY'S L.J. 1093 (1999).

model, we adopt the OECD's definition and data.¹³²

In order to establish if a reified patent bar contributes (or not) to quality patenting, we compare quality of numerous patent systems around the world, which have very disparate levels of reification in determining what the qualifications should be of people practicing before their respective patent offices. If reification of admission standards impacts patent quality, there should be disparate levels of quality between the disparate countries. In fact, we see no significant difference in patent quality between the countries of the United States, the United Kingdom, Japan, France, Canada and Germany, even though these countries have very disparate standards regarding admission to the patent bar.

That is, the United States and Germany, for example, have extremely high levels of reification of patent bar admission and Japan and Canada have comparatively low reification standards; however, all of these countries have essentially the same rate of patent quality as determined by the OECD.¹³³

As the United States patent system includes a heightened standard of patenting and an ongoing movement toward increasing patent quality,¹³⁴ we would expect to see much higher resulting quality in American patents. However, when compared to the countries described in the Graph 8 below,¹³⁵ there is no comparative evidence to suggest that the United States' patent bar requirements result in higher patent quality. It follows that changing requirements for admission to the patent bar will not necessarily lead to lower quality patents.

132. "The mission of the Organization for Economic Co-Operation and Development (OECD) is to promote policies that will improve the economic and social well-being of people around the world," where the OECD includes 34 member countries and has an annual budget of 363 million Euros. Patent quality is objectively measured:

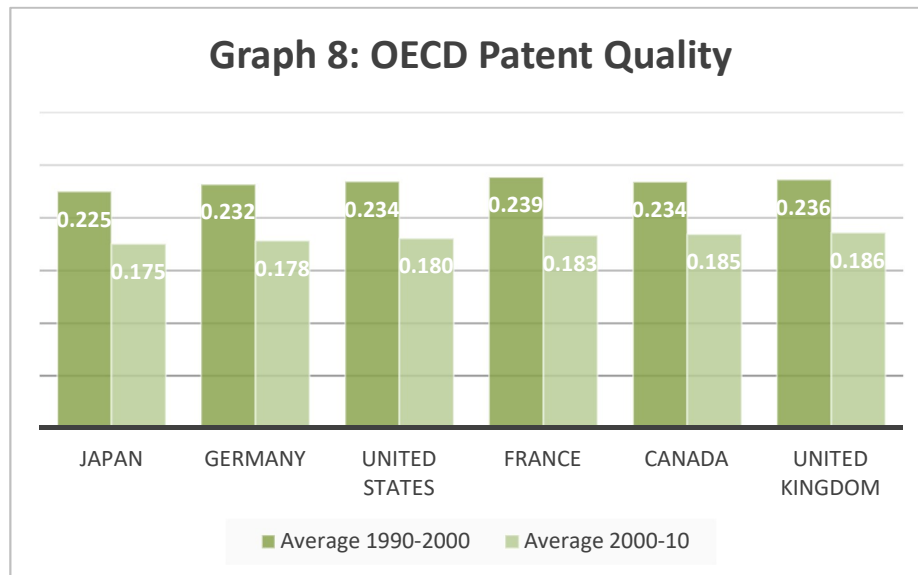
The patent quality index is a composite indicator based on six dimensions of patents' underlying quality: forward citations (number of citations a patent receives); backward citations (number of patents and scientific papers a patent cites); patent family size, i.e. the number of countries in which the patent is taken; number of claims; generality index, measuring the dispersion of citing patents over technology classes; and grant lag. The index does not use weights.

OECD, OECD SCIENCE, TECHNOLOGY AND INDUSTRY SCOREBOARD 2011: INNOVATION AND GROWTH IN KNOWLEDGE ECONOMIES 190 (2011).

133. We recognize the issue that some companies elect to patent a single invention in multiple countries which, of course, contributes to the fact that patent quality in the numerous patent systems is rather uniform.

134. *Patent Quality Summit*, U.S. PATENT & TRADEMARK OFFICE (Mar. 25–26, 2015), <http://www.uspto.gov/patent/initiatives/patent-quality-summit>.

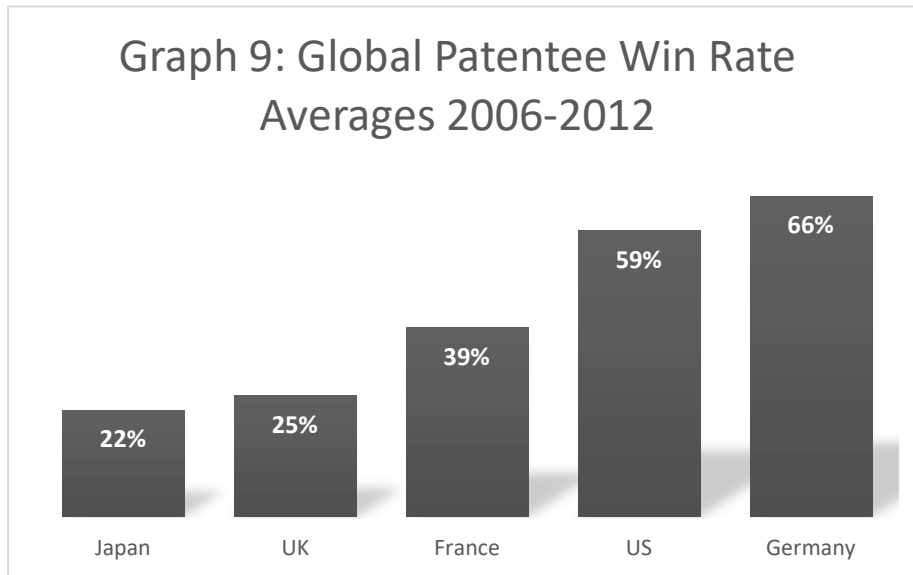
135. OECD, *supra* note 133.



Many people believe that the quality of a patent can be demonstrated by whether patentees prevail in enforcing those patents. Example patentee win rates for various countries are shown in Graph 9 below.¹³⁶ Even using this standard of quality, the reification levels of patent bar admission do not clearly correspond to an expected increase in patentees prevailing. The United Kingdom, for example, as a far more reified patent bar admission process than Japan, but the United Kingdom's win rate of patentees is lower than Japan's win rate. Further, France has a comparable level of reification of patent attorneys to Germany, but France's win rate is significantly lower than Germany's win rate.

[Graphical material on the following page.]

136. MICHAEL C. ELMER & C. GREGORY GRAMEMOPOULOS, GLOBAL PATENT LITIGATION: HOW AND WHERE TO WIN (2014).



Therefore, at best, it can only say that reified patent bar admission standards, at best, have a dubious, if any, correlation to quality if quality is defined as the win rate of the respective patentees. There appears to be no evidence to support a causal connection between quality of admissions to the patent bar and patent quality.

Even if we implement the stakeholder approach advocated by at least one academic,¹³⁷ a correlation between reified admission standards and patent quality is far from obvious.

One stakeholder, the PTO, is interested in issuing patents consistent with its institutional responsibility while creating a minimal burden following issuance.¹³⁸ The post-issuance burden may be felt throughout post-issuance patent re-examination, whether performed by the Patent Trial and Appeal Board (PTAB), federal courts, or otherwise.

Another stakeholder, the federal courts, are interested in reducing the number of patent-related disputes it is called upon to resolve, and increase the efficiency of the resolution. In contrast with various courts, the technical abilities required by PTO examiners and patent attorneys provide significant

137. Guerrini, *supra* note 131.

138. *Id.* at 3118. See also Dale L. Carlson, William B. Slate & Carolyn J. Vacchiano, "Are We Certifiable?" *Redux – A Strategic Plan for Maintaining Patent Practice Competence*, 85 J. PAT. & TRADEMARK OFF. SOC'Y 287 (2003) (reviewing various proposals to maintain practitioner competence including eliminating patent agents which would, in our estimation, make the problem of patent attorney numbers significantly worse).

advantages in examination of patents, and a concomitant responsibility to issue only patents that are expected to minimize the post-issuance burden to other stakeholders.

Another stakeholder, the patentees, are interested in patents that represent a reasonable return on investment in intellectual property. The monetary value of the patent is often realized in the form of a business asset or for the commercial success of a product protected by the patent. As such, patent value is often a function of the unique business circumstance of its owner and the nature of both the invention that the patent describes and the patents' description of that invention.

The (perhaps) final stakeholder, the public, is interested in maintaining a patent system that furthers economic productivity while not overly burdening our court system or burdening productivity through improper patent litigation. The public is therefore interested in protecting patented inventions when justifiable, while creating an efficient administrative judicial system by invalidating patents that never should have been issued and upholding patents' meriting protection.

Each of these stakeholders is affected differently by various patent quality measurements. While there is no consistent definition for patent quality measurements, proposed measurements include expected patent validity, patent clarity, faithfulness of patent to invention, social utility of invention, and commercial success of invention.¹³⁹

Expected patent validity focuses on the patent document itself. The PTO generally defines this to include the legal validity of the patent,¹⁴⁰ and the PTO,

139. Guerrini, *supra* note 131, at 3126.

140. As stated in the Manual of Patent Examination Procedures:

Every patent is presumed to be valid. See 35 U.S.C. § 282(a) (2012). Public policy demands that every employee of the United States Patent and Trademark Office (USPTO) refuse to express to any person any opinion as to the validity or invalidity of, or the patentability or unpatentability of any claim in any U.S. patent, except to the extent necessary to carry out:

- (A) an examination of a reissue application of the patent,
- (B) a reexamination proceeding to reexamine the patent, or
- (C) an interference involving the patent.

The question of validity or invalidity is otherwise exclusively a matter to be determined by a court. Likewise, the question of enforceability or unenforceability is exclusively a matter to be determined by a court.

MPEP § 1701 (“Office Personnel Not to Express Opinion on Validity or Patentability [R-07.2015]”). As stated in 35 U.S.C. § 282:

A patent shall be presumed valid. Each claim of a patent (whether in independent, dependent, or multiple dependent form) shall be presumed valid independently of the validity of other claims; dependent or multiple dependent claims shall be presumed valid even though dependent upon an invalid claim. The burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity.

public, and patentees generally prefer valid patents as a means of reducing the probability of a lawsuit. However, patent legal validity is surprisingly uncertain. Because patents may always be litigated, patent validity is never final, so it is useful to refer to a patent's probability of being held valid if challenged.

Patent clarity is interrelated with patent validity. While there is a definiteness requirement for patents, this definiteness is a low threshold. Patent clarity affects the outcome of patent suits and pre-suit settlement negotiations, as unambiguous patents are more easily argued or countersued. This results in an inherent contradiction of interest among stakeholders: patentees prefer vague claims to increase leverage in patent suits or pre-suit negotiations, but the PTO, courts, and the public prefer clarity to reduce costs associated with litigation.

Faithfulness of the patent to the scope of invention refers to whether the claims completely and accurately describe the scope of the underlying invention. A failure of patent claims for scope faithfulness may include an overbroad scope, an over-narrow scope, or an inaccurate scope. As with patent clarity, patentees prefer overbroad claims while the PTO, courts, and public prefer patent scope to adhere to the invention scope. In particular, overbroad claims exclude public from technological spaces in which they might otherwise freely be able to move and may result in a chilling effect on exploration of related inventive concepts. Conversely, over-narrow or inaccurate claims cheat the patentee of certain rights of exclusion to which she is entitled.

The social utility of a patented invention can be subdivided into the utility of the nature of the invention and the utility of the technological process. The nature of the invention may provide social utility to the public via discovery of a cure for a life-threatening disease, for example. In this respect, the PTO and courts are generally neutral with respect to utility derived from the nature of an invention. As expected, patentees associate patents on socially useful inventions with good patent quality to the extent that the patent can be translated into money or power in the marketplace. To the extent that socially useful patents are driven by financial motivations, a change in the number of patent attorneys is unlikely to change the social utility of the nature of patents.

The commercial success of a patent is generally indicative of patent quality. The commercial success of a patented invention ranges from a narrow patent on a drug that is never produced to a broad patent that redefines an industry standard, such as a pioneer invention. There is no requirement that a patented invention be commercially significant, and because the patent system is motivated by publication and not money, the patent system embraces the

35 U.S.C. § 282(a).

possibility that some patented inventions will have no commercial value. For a patent to result in commercial success, it must first survive patent prosecution, post-grant patent invalidation procedures (strengthened under the AIA), and possible lawsuits, which is retrospectively indicative of high patent quality. Inventions that are commercially successful because of a technological leap are considered good quality in the eyes of all stakeholders. The inverse statement is not necessarily true, as it is unclear whether a commercially unsuccessful patent is not of high quality. It is unclear whether PTO, courts, and society prefer commercially successful inventions that represent more modest technological improvements.

The patent practitioner has control over the drafting and prosecution of a patent, suggesting that a higher quality practitioner will result in a higher quality patent that may increase the likelihood of commercial success. However, commercial success depends on the survival of the patent in post-grant patent invalidation procedures and lawsuits, and depends on the patentee's effectiveness of enforcement of the patent. Because so much of the commercial success beyond the influence of the patent attorney, it is unlikely that a reduction of patent attorneys will affect the commercial success of patents.

Although the desire to improve patent quality is one of the more compelling motivations to artificially inflate the qualification requirements for patent practitioners, there appears to be no empirical support for the notion that reified admission standards necessarily lead to higher quality patents.

V. PROPOSED CHANGES TO INCREASE THE NUMBER OF PATENT ATTORNEYS

A. Open the Patent Bar to Non-engineers

A straightforward option in making the patent bar more accessible is to open patent bar admission to non-engineers. Access to the patent bar is only available through passing the patent bar exam, and access to the patent bar exam requires the applicant to demonstrate moral character, technical qualifications, and competent prosecution of patent applications before the PTO.¹⁴¹ These

141. 37 C.F.R. § 11.7 states registration requirements as follows: "(a) No individual will be registered to practice before the Office unless he or she has: . . . (2) Established to the satisfaction of the OED Director that he or she: (i) Possesses good moral character and reputation; (ii) Possesses the legal, scientific, and technical qualifications necessary for him or her to render applicants valuable service; and (iii) Is competent to advise and assist patent applicants in the presentation and prosecution of their applications before the Office." 37 C.F.R. § 11.7 (2015). This information is summarized in the General Requirements Bulletin for Admission to the Examination for Registration to Practice in Patent Cases before the United States Patent and Trademark Office. The Requirements Bulletin states the burden is on the applicant:

An applicant applying for the examination must demonstrate to the Director of the Office of

must be demonstrated to the PTO Director of the Office of Enrollment and Discipline (OED).¹⁴² The technical qualifications may be satisfied by a bachelor's degree in a specific science or engineering subjects.¹⁴³ While there is an affirmative list of eligible bachelor's degrees, a person with a degree not listed must submit coursework and transcripts to request admission to the patent bar, which includes people listed with master's degrees or higher in the categories listed.¹⁴⁴ In addition, many STEM majors and courses never satisfy the requirement. For example, the applicant mentioned above from MIT with a 4.0 GPA would never be allowed to sit for the patent bar.¹⁴⁵

While the rules do provide some discretion in OED Director to allow non-engineers to apply to take the patent bar, the technical requirements of the applicant remain high. At least some anecdotal evidence suggests that the PTO provides no information about applications other than those involving listed bachelor's degrees. The only way to determine eligibility is by filing an application to take the patent bar examination.¹⁴⁶ In determining whether an applicant meets these requirements, the OED Director has unfettered discretion. A denied applicant's only option is to petition for review.¹⁴⁷ With such

Enrollment and Discipline (OED) that he or she possesses the scientific and technical training necessary to provide valuable service to patent applicants. Applicant bears the burden of showing the requisite scientific and technical training. To be admitted to the examination, each applicant must demonstrate possession of the required scientific and technical training.

GENERAL REQUIREMENTS BULLETIN, *supra* note 37.

142. 37 C.F.R. § 11.7(a)(2).

143. GENERAL REQUIREMENTS BULLETIN, *supra* note 36.

144. *Id.*

145. *Id.*; see also Corey B. Blake, *Ghost of the Past: Does the USPTO's Scientific and Technical Background Requirement Still Make Sense?*, 82 TEX. L. REV. 735, 754 (2004) (describing how seemingly arbitrary the PTO's technical requirements are in one example: "For example, an applicant whose only degree is a Bachelor of Science in Transportation Design from the Art Center College of Design in Pasadena, California is not eligible to sit for the patent examination, even though the Art Center offers one of, if not the, best automotive design degree in the world. These individuals are among the world's foremost experts in design, but they are forbidden from practicing before the USPTO without additional education.").

146. This anecdote is derived from Gene Quinn, instructor of one patent bar examination course:

I have repeatedly heard over the years that when folks contact OED asking questions about whether they qualify to take the patent bar no useful information is provided. In fact, to a person I have heard the same story, which is that OED tells the caller that they cannot provide any information and that the only way to know for sure is to file an application to take the Patent Bar. Not terribly helpful or enlightening really.

Gene Quinn, *Does My Degree Qualify Me to Take the Patent Bar?*, IP WATCHDOG (Oct. 13, 2009), <http://www.ipwatchdog.com/2009/10/13/does-my-degree-qualify-me-to-take-the-patent-bar/id=6648/>.

147. GENERAL REQUIREMENTS BULLETIN, *supra* note 37 (The denied applicant must first appeal to the OED Director, and if denied again, can only appeal to the PTO director.).

discretion resting squarely in the hands of the PTO, it seems unlikely that the patent bar will be opened to individuals who do not have a demonstrably high technical and scientific background.

However, does it have to be that high? We have demonstrated here that high reification standards for admission to the patent bar are not correlated to patent quality. As such, perhaps it is time to relax the extreme reified admission standards and allow people possessing other applied degrees to sit for the patent exam. This could be done in a phased manner to judge effectiveness and the potential that it might have a deleterious effect on patenting, although the data here predicts that it would not. This phased approach could be gradually expanded to include other and more applied degrees to attempt to keep up with the coming demand on patent attorneys.

This *reductio ad absurdum* argument is not to suggest adding the complex and subjective school rankings as an additional barrier, but merely to suggest that patent quality would not be significantly decreased by expanding the list of acceptable undergraduate majors. Under this scenario, the market would dictate which patent attorney is profitable enough to stay in business, not the PTO.

B. Expand the Patent Bar

One way to increase the number of patent attorneys would be, of course, to increase the comparative and aggregate number of women and minorities that seek and obtain admission to the patent bar. However, the idea that the United States ought to incentivize these groups of under-represented demographics is a very old idea. America has been trying, yet failing to minorities to enter the general bar for a long time.¹⁴⁸ Greater minds than ours have worked tirelessly at the issue of employment of women in American law firms. However, today as it was 20 years ago, roughly 20% partners in American law firms are female.¹⁴⁹ One of the best minds has studied this issue very thoroughly and her conclusion is that as long as women and minorities are thought of as women

148. See Raymond L. Ocampo, Jr., *Women and Minority Attorneys: One General Counsel's Perspective*, FINDLAW FOR LEGAL PROFESSIONALS (1994), http://www.americanbar.org/content/dam/aba/publications/scitech_lawyer/hiring_women_minority_attorneys_one_gc_perspective.authcheckdam.pdf (arguing that neither “support or encouragement is enough”); *Neuman Anderson Partner Jennifer M. Grieco Addresses Organizational Diversity in September LACHES Article*, NEUMAN ANDERSON, <http://www.neumananderson.com/neuman-anderson-partner-jennifer-m-grieco-addresses-organizational-diversity-in-september-laches-article/> (last visited Sept. 19, 2015) (“With 50 percent of law school graduates being women, the shortage of women in leadership roles can no longer be blamed on the lack of a pipeline of qualified women. Unfortunately, the same cannot be said for minorities, who continue to account for less than 10 percent of the population of lawyers.”).

149. *Women in Law in Canada and the U.S.*, CATALYST (Mar. 3, 2015), <http://www.catalyst.org/knowledge/women-law-canada-and-us>.

and minorities (rather than just attorneys), there will be discrimination and there will not be parity in numbers.¹⁵⁰ That is, for how much time, energy and commitment she has invested in this issue, this is a rather disappointing and obvious conclusion. “Vexing” or “intractable” may not adequately describe this issue.

Therefore, it would not be reasonable to expect us to solve this intractable problem, as it is applied to patent lawyers, in this short article. However, it is important to recognize that this has been and will be a continuing issue for the American bar¹⁵¹ as well as the American patent bar.¹⁵² It becomes more obvious in talking about patent attorneys because subsisting patent attorneys exist in at least a triple-reified world¹⁵³ as we have pointed out above. First, a successful patent bar applicant must possess one of a few particular science or engineering degrees. Second, they must go to law school. Third, they must pass the patent bar, which has an historical passage rate of 50% or less.¹⁵⁴ These barriers make it very challenging for any person to become a patent attorney and women and minorities, demonstratively, are not doing it. If, therefore, we are to value women and minorities as part of the patent bar, the levels of reification will have to change. No one is arguing that it should be made easier, just more inclusive.

This is a very hard argument for subsisting patent attorneys to accept because it is against their economic self-interest. Naturally, subsisting patent attorneys want to maintain the levels of reification to minimize competition. That is, one of the reasons women and minorities have remained under-represented in the patent bar is that it is against subsisting patent attorneys’ self-interest to share the monopoly. If America truly wants women and minorities to enter the patent bar at rates on par with white males, more or something different will have to be done to encourage, incentivize, and convince subsisting patent attorneys that it is in their best interest to work to make the patent bar more inclusive.

The thesis of this article and our prior work¹⁵⁵ on this topic may be that very motivation. If new patent attorneys are to keep up with significantly increasing

150. DEBORAH L. RHODE, *THE TROUBLE WITH LAWYERS* (2015).

151. See *Women in Law in Canada and the U.S.*, *supra* note 150 (“Given the same rate of change, Catalyst estimates that it will take more than a woman lawyer’s lifetime to achieve equality.”).

152. Catherine, Blog, *Being a Woman in Patent Law*, UNIVERSITY OF NOTRE DAME (May 5, 2015), <https://blogs.nd.edu/patentlaw/2015/05/05/being-a-woman-in-patent-law/>.

153. We can imagine other reifications for patent attorneys like going to college at all or having the interest, aptitude, or, perhaps the most reified notion of all, the knowledge that it would take to get on this course early in their educational career.

154. See *Exam Results by Fiscal Year*, *supra* note 40.

155. See Port et al., *supra* note 5.

workload demands, subsisting patent attorneys will need help. Efforts to date to include women and minorities have been a failure.¹⁵⁶ The nature of the reified business of patenting will have to become more inclusive if subsisting patent attorneys have any hope at keeping up with demand and if innovations are going to be developed, encouraged and protected and the American economy is to continue to excel. To date, the motivation to include women and minorities has been, more or less, altruistic, but has not been enough to affect the makeup of patent bar. However, by 2018, it will be an issue of economic survival.

As the number of innovations that will require patenting work to monetize and commodify them, patent attorneys will become overwhelmed. Based on the rate at which the number of new patents is outpacing the number of new attorneys,¹⁵⁷ productivity and methodologies will be unable to change at a pace that could possibly keep up with such demand. The only way to keep up with demand (short of drastically revising the patent system as some recommend¹⁵⁸) is to increase the number of players. The logical place to find new entrants is in under-represented populations: women and minorities.

Unless the patent system is changed drastically or unless the number of new entrants to the patent bar is drastically increased, American economic dominance is at risk. The low hanging fruit is to encourage women with an already demonstrated interest in the sciences to enter the patent field. This could be done by broadening the scope of the allowable technical degrees to include those that women in the sciences are obtaining. For example, Mathematics is not listed among the Category A: Bachelor's Degree in a Recognized Technical Subject, however there appears to be no empirical or substantive evidence to support its exclusion from Category A. This and several other STEM degrees received by women are similarly excluded from Category A, as discussed in the following section.

1. Encourage Women to Enter the Patent Bar

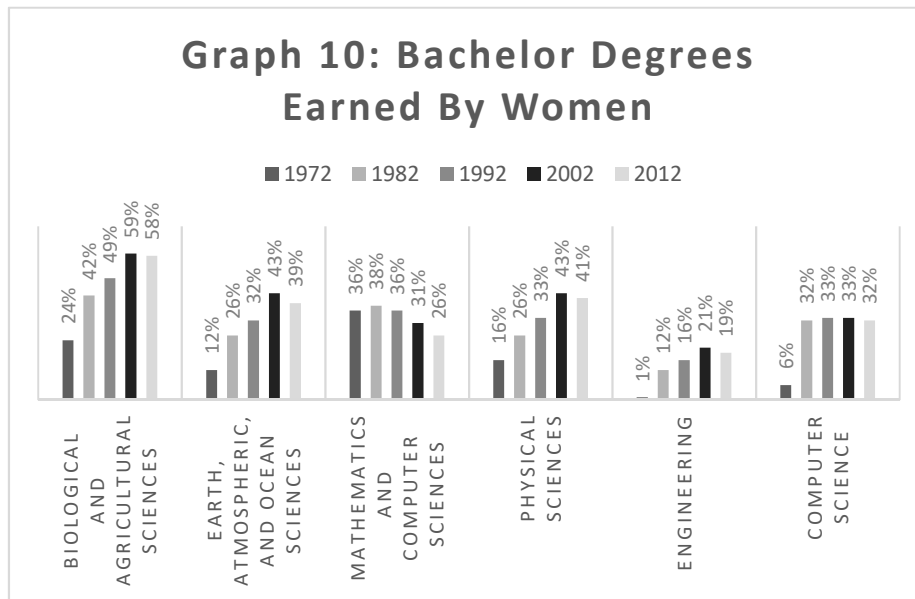
Women have been very slowly and gradually increasingly receiving STEM degrees and entering STEM professions. Graph 10¹⁵⁹ below shows the total number of United States bachelor degrees conferred on females in selected STEM fields:

156. *Id.*

157. *See* THE GLOBAL COMPETITIVENESS REPORT, *supra* note 2, at Part IV.B.

158. Other scholars have also proposed changes to the patent bar system. *See, e.g.*, Guerrini, *supra* note 23; Clifford, Field & Cavicchi, *supra* note 56; Blake, *supra* note 146.

159. The Authors analyzed and plotted data downloaded from Mark K. Fiegenger, NATIONAL CTR. FOR SCI. & ENGINEERING STATISTICS, SCIENCE AND ENGINEERING DEGREES: 1966-2012, NAT'L SCI. FOUND., (Jun. 2015), <https://www.nsf.gov/statistics/2015/nsf15326/pdf/nsf15326.pdf>.

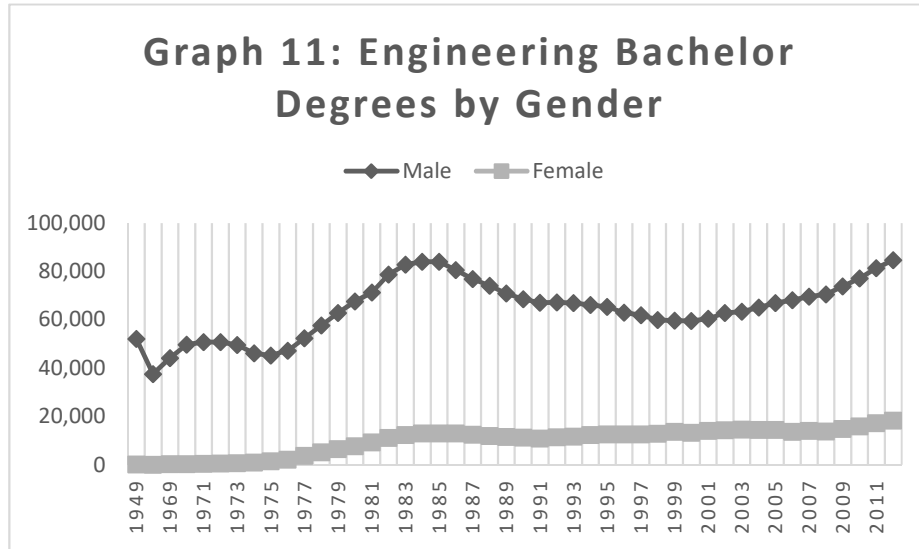


As shown in the graph above, while the percentage of women earning STEM degrees generally increased between 1972 and 2002, the percentage of women earning STEM degrees has decreased between 2002 and 2012. This decrease in the percentage of women earning patent bar eligible degrees will significantly change the comparative percentage of women in the patent bar in the near future.¹⁶⁰ Engineering has remained a predominantly male-dominated field. Graph 11¹⁶¹ below shows the total number of United States engineering bachelor degrees conferred for males and females:

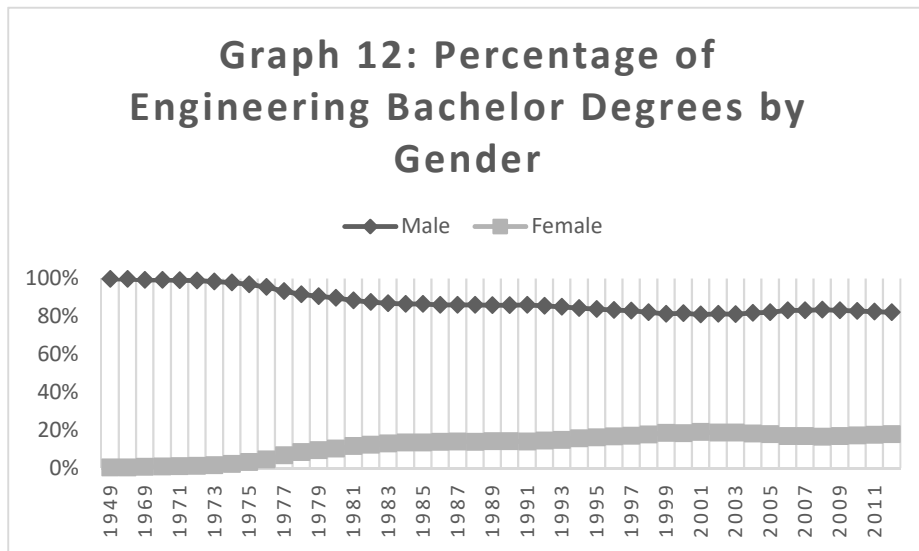
[Graphical material on the following page.]

160. *See id.*

161. *Id.*



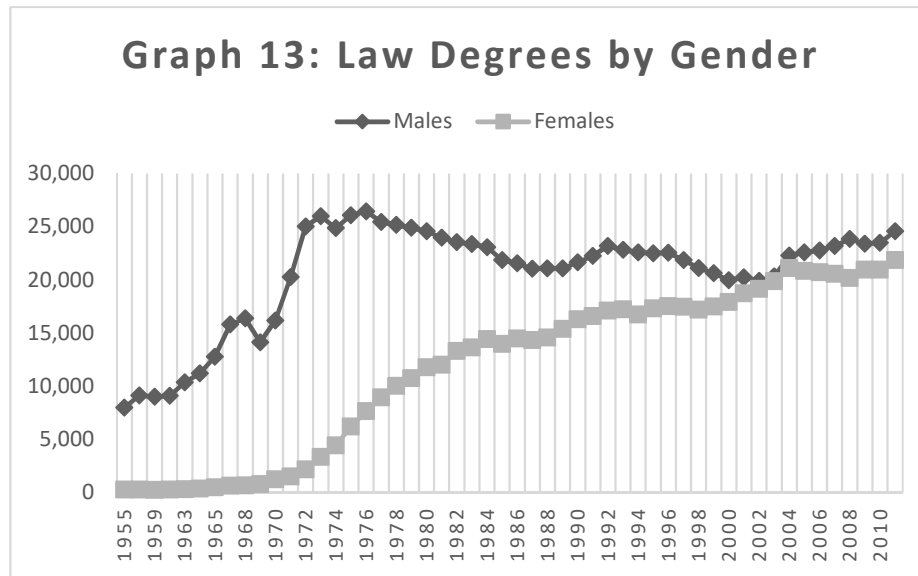
While the number of women earning engineering bachelor degrees has been increasing, the number of men earning engineering bachelor degrees has increased at a greater rate. Graph 12¹⁶² below uses the same data as Graph 11, but Graph 12 shows the percentage of bachelor degrees earned by men and women:



162. *Id.*

As shown in Graph 12 above, the percentage of women earning bachelor degrees has increased, though not significantly. For example, while women earned 9% of all engineering bachelor degrees in 1979, the most recent 2012 data show women have only doubled that percentage to 18%.

STEM has recognized more female participation, but this has not translated into more female attorneys who are also engineers. In particular, there is a discrepancy between the percentage of women in law and the percentage of women in engineering. Graph 13¹⁶³ below shows that women comprise a significant portion of the population earning law degrees:

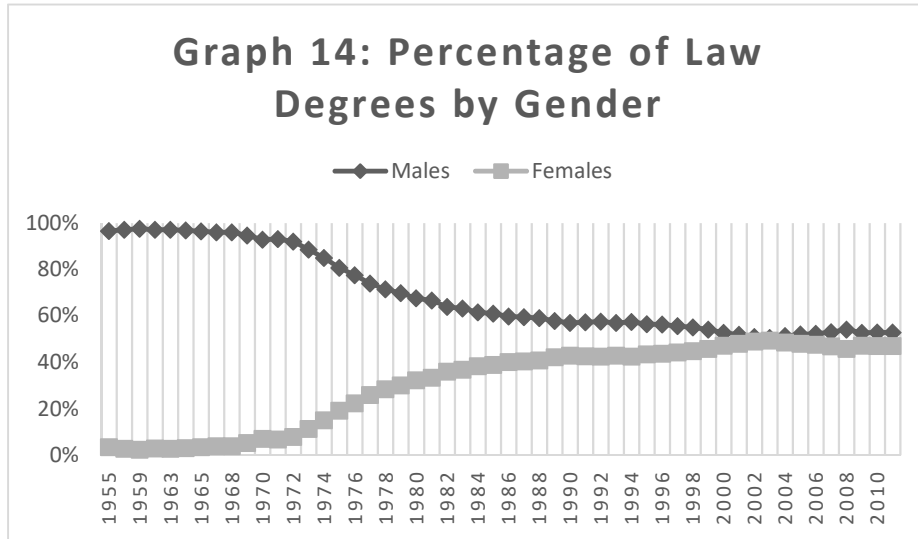


Graph 14¹⁶⁴ below uses the same data as Graph 13, but Graph 14 shows the percentage of law degrees earned by men and women:

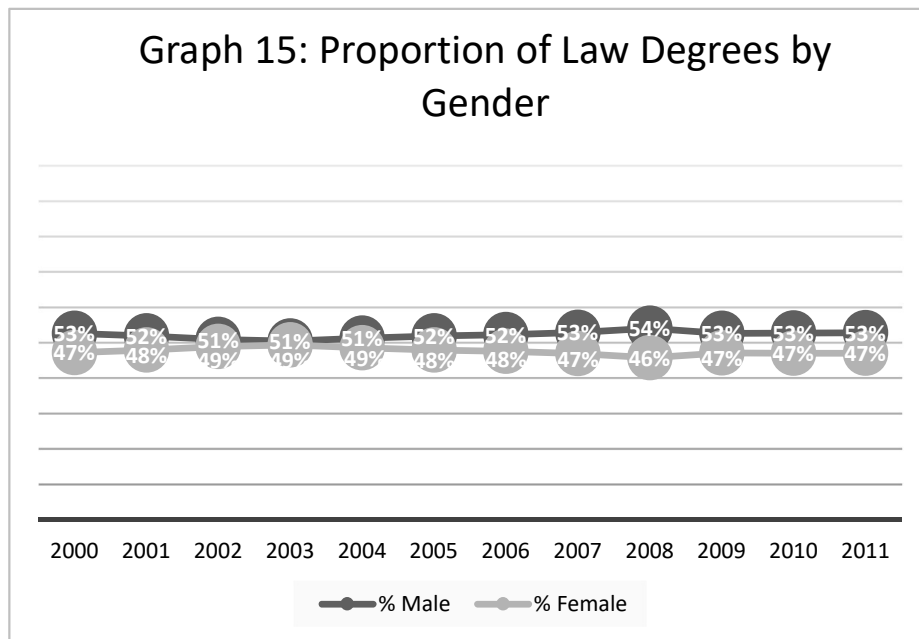
[Graphical material on the following page.]

163. *Id.*

164. *Id.*

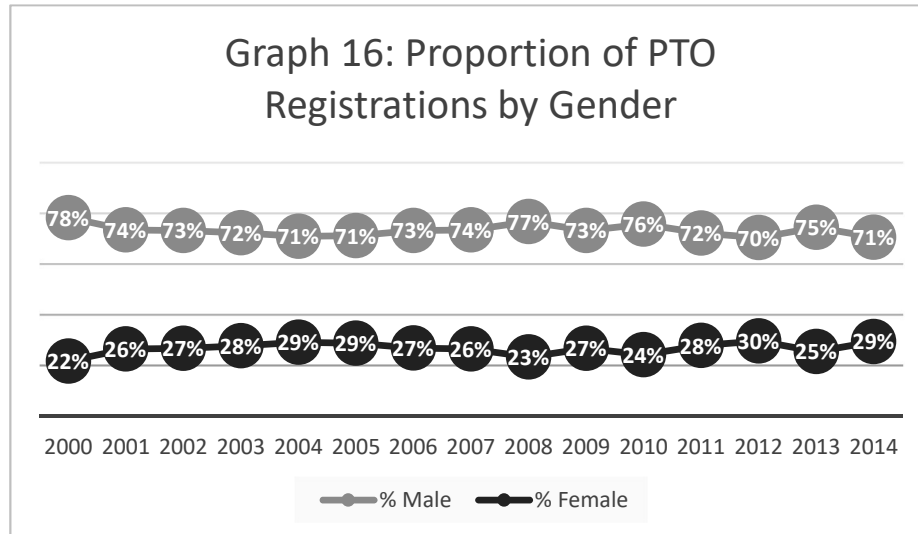


As shown in Graph 14 above, the percentage of men and women earning law degrees has been within 10% of one another since 1998, though men have always retained a majority. The same data is shown more clearly when zooming in to 2000 to 2011, as shown in Graph 15¹⁶⁵ below:



165. *Id.*

This is in stark contrast to women earning only 18% of engineering bachelor degrees. Even including other patent bar eligible majors, Graph 16¹⁶⁶ below shows the patent bar remains predominantly male:



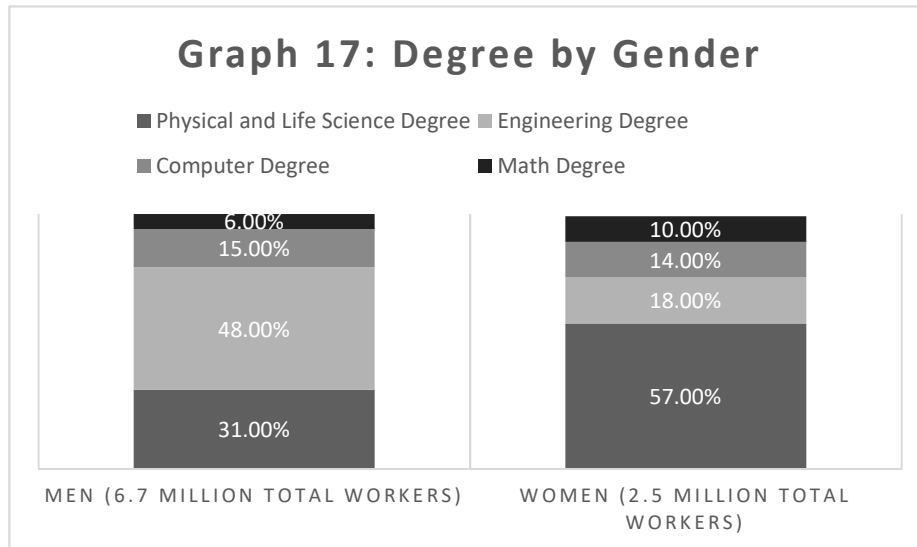
While the gap between male and female attorneys has remained within 10% since 1998, there has always been at least 30% more male patent attorneys than female patent attorneys.

Some of the disparity may be explained by the choice of STEM field. For example, while a bachelor's degree in engineering is presumptively eligible for the patent bar, other STEM fields may require additional hurdles in being allowed to take the patent bar or may not qualify at all.¹⁶⁷ Within the STEM fields, men are more likely to attain a degree in engineering, as is shown in Graph 17¹⁶⁸ below:

166. Data for patent attorney gender was not available through the PTO, so the estimation of patent attorney gender is primarily name-based. A spreadsheet was generated using the names of all of the registered patent attorneys, a list of all names was used to generate a URL, and the URL download was used to generate a spreadsheet of name, gender, and gender probability. This data set was generated using the website Genderize.io, which states the website "utilizes big datasets of information, from user profiles across major social networks and exposes this data through its API." *Determine Gender of a First Name*, GENDERIZE.IO, <http://genderize.io/> (last visited Jan. 5, 2016). Invocation of the API results in a text string, which includes an estimated gender, a probability of that gender, and a count of the number of names used to generate the probability. Data is on file with the Authors.

167. 37 C.F.R. § 11.7 (2015).

168. See *supra* note 159.



As shown in this graph, the percentage of women in physical and life sciences is almost double that of men, and the percentage of men in engineering is more than double that of women.¹⁶⁹ While many physical and life sciences degrees are patent bar eligible, this is an additional hurdle that must be overcome in becoming a registered patent attorney.

While STEM programs have been improving the percentage of women in engineering, additional incentives will be necessary to translate that into increasing the number of female patent attorneys. This incentive is made even more interesting and challenging if we consider the epistemological extremes that perhaps patents themselves have gender.¹⁷⁰ Dan Burk suggests that the notion of “objectivity” implied in the patent law’s famous axiom of a “person having ordinary skill in the art” to determine nonobviousness may be filled with gender-biased connotations. In this line of reasoning, a “person having ordinary skill in the art” is likely a white male, and this hypothetical skill level may be different from a skill level of a different gender or race. If this “objective” standard erroneously implies a white male skill level, as Burk suggests, patent law may be beyond fixing in this regard.¹⁷¹

169. DAVID BEEDE, ET AL., U.S. DEP’T OF COMMERCE, WOMEN IN STEM: A GENDER GAP TO INNOVATION, (2011), <http://www.esa.doc.gov/sites/default/files/womeninstemagaptoinnovation8311.pdf>.

170. See Dan L. Burk, *Do Patents Have Gender?*, 19 J. AM. U. J. GENDER, SOC. POL’Y & L. 881 (2011).

171. *Id.* at 919.

One does not have to go to epistemological extremes, however, to encourage more women to practice patent law. Further, it is not clear whatsoever that if we did go to epistemological extremes and, somehow, made patent law more female, that it would result in more women entering the patent bar.

We recognize that, to be sure, some women sometimes are discouraged from entering the patent bar by some systemic discrimination.¹⁷² However, it is unclear how much of an effect this discrimination has on women's career decisions. Moreover, the decision by women to not pursue the patent bar is a symptom and not a cause. The structural cause for those symptoms might be that we have a system that is by, for, and with white males, and it is therefore not surprising that women are not pursuing admission to the patent bar.

What is clear is that the United States needs to make patent law a more inclusive area of practice. Demonstratively, we have failed in making patent law an attractive area of law to practice for women. It is beyond the scope of this piece to heal an ill that has taken hundreds of years to contract. Our point is that if we are to generate more patent attorneys to do the important work of saving American inventiveness, one source of this is women.

To do that, we will need to do what is necessary to make patent law attractive for women. This may require us to go epistemological extremes and make the Patent Act recite affirmative efforts for gender diversity. Unless some changes are made, there will soon be too few patent attorneys to keep up with the demands that an innovative economy requires and some inventions will go unprotected and, therefore, undeveloped.

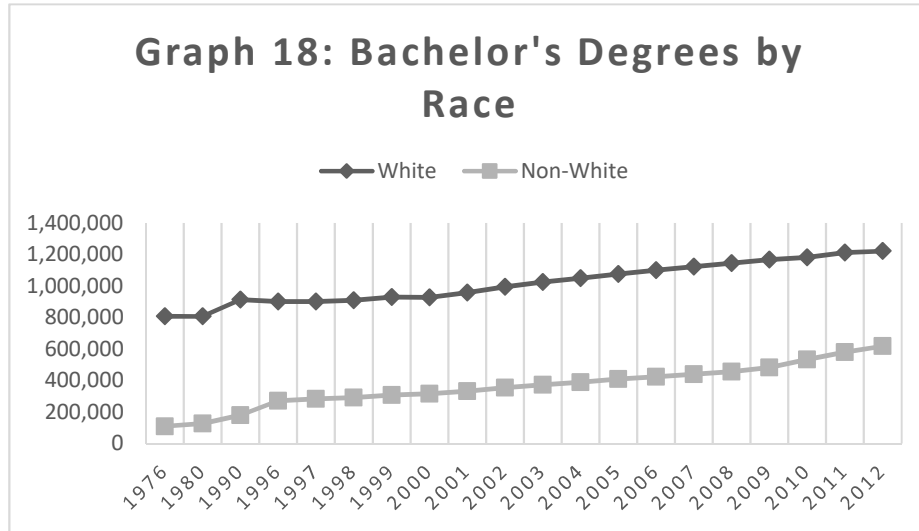
2. Encourage Racial Minorities to Enter the Patent Bar

People who racially identify as non-white have been increasingly entering STEM fields. Graph 18¹⁷³ below shows the total number of United States bachelor degrees conferred for people who identify as white and non-white:

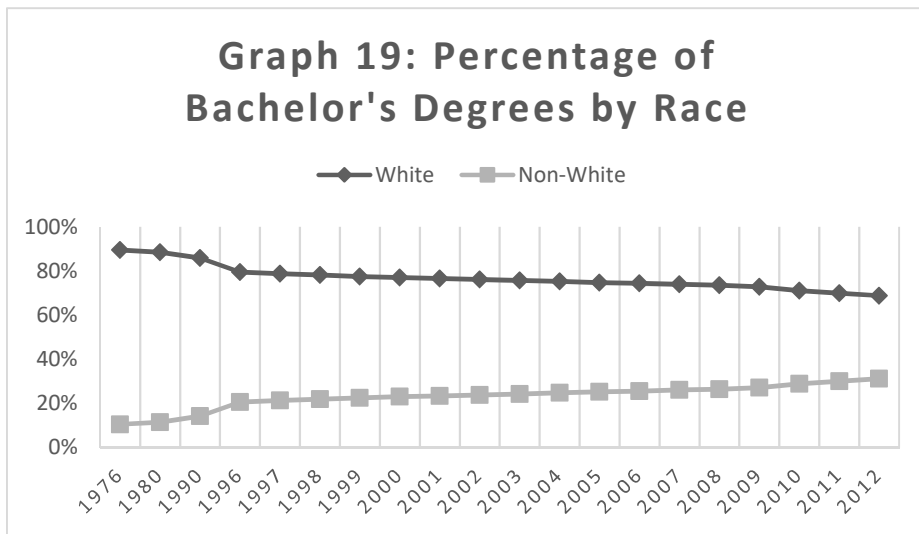
[Graphical material on the following page.]

172. This is another hot-button topic we will not engage. Many stories of discrimination are anecdotal but, nevertheless valid. The extent of discrimination of women and minorities in patenting is, therefore, presumed here to be a truism. The effect and extent are not clearly known.

173. Authors analyzed and plotted data taken from NAT. CTR. FOR EDUC. STATS., BACHELOR'S DEGREES CONFERRED BY POSTSECONDARY INSTITUTIONS, BY RACE/ETHNICITY AND SEX OF STUDENT (2014), https://nces.ed.gov/programs/digest/d14/tables/dt14_322.20.asp.



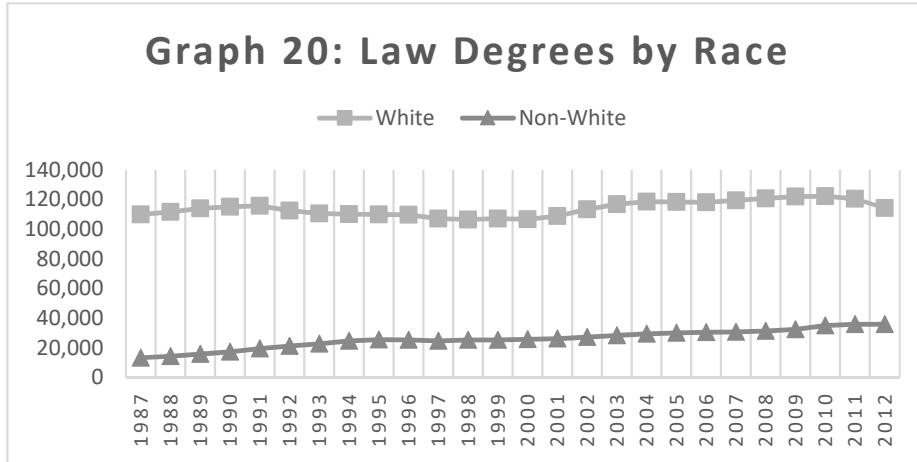
Graph 19¹⁷⁴ below uses the same data, but shows the percentage of bachelor law degrees earned by people who identify as white and non-white:



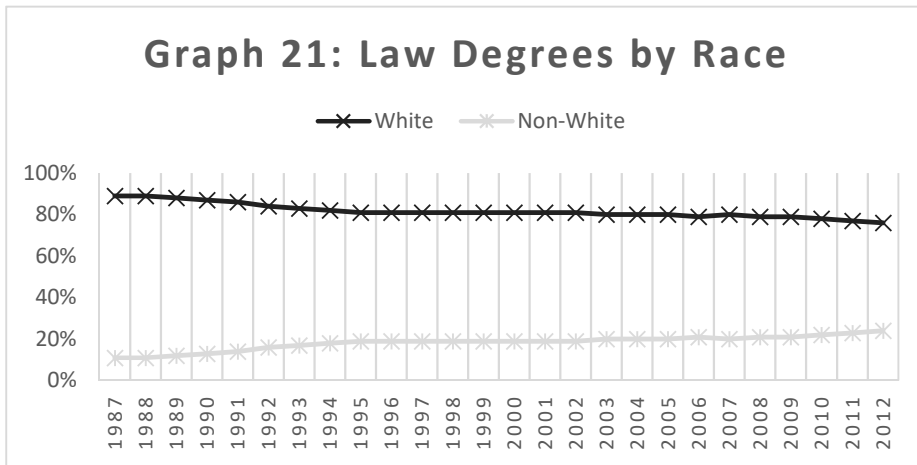
Similar to the discussion of women in law above, there is a discrepancy between the percentage of racial minorities attaining bachelor's degrees

174. *Id.*

attaining law degrees. As shown in Graph 20¹⁷⁵ below, non-white individuals comprise an increasing number of conferred law degrees:



Graph 21¹⁷⁶ below shows the same data in a percentage format:



Unlike the narrowing gap in legal degrees between men and women, less than a quarter of all law degrees are awarded to people identifying themselves

175. Authors analyzed and plotted data taken from NAT. CTR. FOR EDUC. STATS., NUMBER OF POSTSECONDARY INSTITUTIONS CONFERRING DOCTOR'S DEGREES IN DENTISTRY, MEDICINE, AND LAW, AND NUMBER OF SUCH DEGREES CONFERRED, BY SEX OF STUDENT (2014), https://nces.ed.gov/programs/digest/d14/tables/dt14_324.40.asp.

176. *Id.*

as non-white. Like that mentioned in our discussion of female patent-bar eligible students, we believe that encouraging racial minorities to enter the STEM field and the practice of law will help to reverse our disintegrating group of patent-bar eligible students. The discrepancy in law degrees issued to racial minorities compared to whites should be a wake-up call to the patent bar and the legal community, for the simplest answer to reversing our shrinking patent bar might simply be to include and encourage more people to enter it.

C. *Discourage People from Exiting*

One strategy to address the reduced ratio of practitioners to patents could be to discourage active practitioners from exiting the practice of patent law. Like most legal services, there is no mandatory retirement in patent law. Indeed, the increase in patents and stable or decreasing number of patent attorneys may result in more financial incentives to continue working as a patent lawyer. However, as described above, some of the existing work force will choose to exit the field as the workflow increases.

Considerable ink has been spilled in discussion of reducing stress and workload on attorneys.¹⁷⁷ Many similar techniques may be generally applicable to patent attorneys, including time bonuses, fixed-time commitments, and alternative pricing schemes. Some related techniques may be applied specifically to match current demands of patent clients and changes in patent law, such as careful selection of a fee structure and patent docketing system. Other techniques are specific to patent law, such as increasing the efficiency of patent attorneys through providing cost-effective patent tasks, including patent searching and patent figure drafting. While these techniques may be encouraged generally, a concerted industry effort should be made toward reducing patent attorney attrition. Most importantly, as pointed out above,¹⁷⁸ at the minimum, the PTO should collect and report data regarding who is and who is not actually prosecuting patents over time.

D. *Encourage the De-professionalization of the Patent Bar*

In addition to the codified barriers of the PTO exam, various social and economic barriers exist. While students are increasingly enrolling in STEM majors, STEM majors remain an enrollment minority in most undergraduate universities.¹⁷⁹ Social barriers may include STEM activities and opportunities

177. The ABA has an entire section on its website dedicated to stress. *Stress*, AM.BAR ASS'N, http://www.americanbar.org/groups/lawyer_assistance/resources/stress.html (last visited Sept. 17, 2015).

178. See THE GLOBAL COMPETITIVENESS REPORT, *supra* note 2, at Part II.C.

179. Allie Bidwell, *More Students Earning Degrees in STEM Fields, Report Shows*, U.S. NEWS & WORLD REP. (Jan. 27, 2015), <http://www.usnews.com/news/articles/2015/01/27/more->

that are predominantly male.¹⁸⁰ Socioeconomic barriers may increase the likelihood that students from underprivileged areas may experience a lower standard of STEM education in junior high and high school.¹⁸¹ Socioeconomic barriers may also disproportionately reduce the enrollment of women or minorities in STEM undergraduate majors.

Some of these socioeconomic barriers might be mitigated through public policy. For example, the Obama Administration has published a \$170 million STEM Innovation proposal, allocating \$110 million to improving STEM education in Preschool-12 curricula, \$40 million to STEM teaching, and \$20 million to a STEM outreach program.¹⁸² Since the 2003 Supreme Court case *Grutter v. Bollinger*, university admissions, including undergraduate engineering, law, and other majors, have been able to take race into consideration as one of many factors in reviewing a student's application.¹⁸³ While women and minorities are increasingly receiving law degrees, few of these law students have a STEM background, and fewer still possess one of the enumerated patent bar eligible degrees.¹⁸⁴ The focus must therefore be on improving STEM education in P-12 and undergraduate STEM university majors.

Another barrier to supplying patent attorneys and agents is simply awareness of the patent bar career path from an early age. That is, the cost of knowledge¹⁸⁵ here may be priceless and may be the real barrier to entry. As discussed above, a conventional path to the patent bar is to complete an engineering degree, complete law school, pass the state bar, and pass the patent

students-earning-degrees-in-stem-fields-report-shows. (40% of bachelor's degrees earned by men and 20% earned by women are in STEM fields).

180. *STEM Perceptions: Student & Parent Study*, MICROSOFT CORP., <http://news.microsoft.com/download/archived/presskits/citizenship/docs/stemperceptionsreport.pdf> (last visited Sept. 15, 2015) (according to the study "STEM Perceptions: Student & Parent Study," male students are more likely to pursue STEM based on their experience with STEM clubs, games, or books (51% vs. 35% females)).

181. Xianglei Chen & Matthew Soldner, *STEM Attrition: College Students' Paths Into and Out of STEM Fields*, U.S. Department of Education Statistical Analysis Report NCES 2014-001 (2013), <http://nces.ed.gov/pubs2014/2014001rev.pdf> ("Bachelor's degree STEM entrants who were male or who came from low-income backgrounds had a higher probability of leaving STEM by dropping out of college than their peers who were female or came from high-income backgrounds, net of other factors.").

182. *Preparing Americans with 21st Century Skills: Science, Technology, Engineering, and Mathematics (STEM) Education in the 2015 Budget*, WHITE HOUSE OFFICE OF SCIENCE AND TECHNOLOGY POLICY (2014), https://www.whitehouse.gov/sites/default/files/microsites/ostp/fy_2015_stem_ed.pdf.

183. See *Grutter v. Bollinger*, 539 U.S. 306 (2003).

184. See Port et al., *supra* note 4, at 200-01.

185. Cristiano Antonelli & Alessandra Colombelli, *The Cost of Knowledge*, DEPT. OF ECONOMICS AND STATISTICS, LEI&BRICK Working Paper 11/2014.

bar. However, there are many alternative routes, including avoiding law school altogether and becoming a patent agent, or avoiding engineering altogether and passing the Fundamentals of Engineering examination.¹⁸⁶ Even before the currently projected patent bar contraction, patent agents and attorneys enjoyed a low unemployment rate and relatively higher salaries than their fellow graduates. While this career path information is readily available on the internet, additional outreach on the part of P-12 guidance counselors, STEM universities, and law schools may help convey how realizable and rewarding it can be to become a patent agent or attorney.

That is, knowing that there are alternatives to a patent attorney and still be a patent professional prosecuting patents is a challenging notion. More challenging is making the entire patent professional career path known to young people at all. This additional cost of knowledge has been to date, demonstratively, extreme.

E. Encourage Efficient Division of Labor

Some de-professionalization may be realized through improved division of labor in patent preparation and prosecution. Almost all patent preparation and prosecution is performed by patent attorneys and patent agents who have passed the patent bar and demonstrated moral character, technical qualifications, and competent prosecution of patent applications before the PTO.¹⁸⁷ Inventors may file patents on their own behalf, but any company or other entity representing the inventor is required to file using an agent or attorney.¹⁸⁸ An attorney or agent of record may employ figure drafters, secretaries, or others in drafting and formatting a patent, but only an agent or attorney of record may file a patent after affirming that all statements in the patent application are true.¹⁸⁹ Even considering the signature requirement, practitioners would benefit greatly from the efficiencies in using drafters, secretaries, and other preparation services.

186. Each state has its own examination, so passage rates may vary. The National Council of Examiners for Engineering and Surveying (NCEES) found that, depending on the examinee's degree, the passage rate can range between 50% to 96%. *See* FE Exam, NCEES, <http://ncees.org/exams/fe-exam/> (last visited Aug. 12, 2015).

187. *See* GENERAL REQUIREMENTS BULLETIN, *supra* note 37.

188. 37 C.F.R. § 1.31 states "An applicant for patent may file and prosecute the applicant's own case, or the applicant may give power of attorney so as to be represented by one or more patent practitioners or joint inventors, except that a juristic entity (e.g., organizational assignee) must be represented by a patent practitioner even if the juristic entity is the applicant. 37 C.F.R. § 1.31 (2015).

189. 37 C.F.R. 11.18 outlines the many requirements and penalties regarding signature requirements, including the requirement that "(1) All statements made therein of the party's own knowledge are true, all statements made therein on information and belief are believed to be true . . ." 37 C.F.R. 11.18(b)(1) (2015).

However, the PTO encourages the use of a registered practitioner.¹⁹⁰

However, in the attempt to make subsisting patent attorneys more productive, as has happened in the medical field with the increasing reliance on physician assistants and nurse practitioners,¹⁹¹ it may be that more patent work is done by people who are not admitted to the patent bar. While export control has all but stopped overseas outsourcing of patent preparation,¹⁹² specialized United States companies exist to aid in patent preparation.¹⁹³ Although economic efficiencies are requiring this to varying degrees at various law firms today, it may have to become the norm. People with specific job titles may emerge, such as “claims drafter” or “specification master.” All this seems required to keep up with the demands that an innovative economy places on its patent professionals.

VI. CONCLUSION

The impact that the size of a reduced patent bar on the United States will be immense. Without people entering the patent bar, there will be a deleterious effect on the United States’ economy. We should not sit and wait to realize these negative consequences.

190. MPEP 402 ¶ 4.09:

While an applicant (other than a juristic entity) may prosecute the application, lack of skill in this field usually acts as a liability in affording the maximum protection for the invention disclosed. Applicant is, therefore, encouraged to secure the services of a registered patent attorney or agent (i.e., registered to practice before the U.S. Patent and Trademark Office) to prosecute the application, since the value of a patent is largely dependent upon skillful preparation and prosecution.

191. Ann Davis et al., *Access and Innovation in a Time of Rapid Change: Physician Assistant Scope of Practice*, 24 ANN. HEALTH L. 286 (2015).

192. While foreign patent preparation for patents to be filed in the United States is still possible, it requires applying for and being granted specific clearance from the Bureau of Industry and Security (BIS) at the Department of Commerce. This is codified in 37 C.F.R. § 5.11, and was emphasized in a sternly worded PTO Federal Register notice:

The USPTO has become aware that a number of law firms or service provider companies located in foreign countries are sending solicitations to U.S. registered patent practitioners offering their services in connection with the preparation of patent applications to be filed in the United States. Applicants and registered patent practitioners are reminded that the export of subject matter abroad pursuant to a license from the USPTO, such as a foreign filing license, is limited to purposes related to the filing of foreign patent applications. Applicants who are considering exporting subject matter abroad for the preparation of patent applications to be filed in the United States should contact the Bureau of Industry and Security (BIS) at the Department of Commerce for the appropriate clearances.

Scope of Foreign Filing Licenses, 73 Fed. Reg. 42,781 (July 23, 2008).

193. The authors make no recommendation or observation on the quality of a low-cost patent, but two low-cost patent preparation providers include Thompson Reuters (<http://ip.thomsonreuters.com/product/patent-preparation-and-prosecution-services>) and LegalZoom (<http://www.legalzoom.com/utility-patents/utility-patents-pricing.html>).

We should act now.

Meanwhile, the United States has some of the highest reified standards for individuals to enter the patent bar. They must possess one of a limited number of science and engineering degrees; they must graduate from law school; they must pass a State bar examination; and they must pass a difficult patent bar. We are told that these reified standards are required to maintain American high standards in patent quality. However, as we have shown here, there is no correlation between reification standards and patent quality.

Something needs to be done to increase the number of people entering the patent bar to do the work of patenting. One way to increase the number of patent attorneys is to liberalize the reification standards for entry to the patent bar. Another way is to be inclusive of women and minorities. Another option is to radically transform the entire patent system, which we do not support.

If, as we have demonstrated, quality patents are not related to reified standards and merely operate to exclude entry to the patent bar, we look in vain for an acceptable justification of the reified standards. The reified standards are driving people away from the job of patenting. Innovation is only significant if it can be commodified and monetized. The only way our system now knows for effectively commodifying and monetizing innovation is through the patent system. With fewer patent attorneys doing the job of patenting, fewer innovations will get commodified and monetized. This will, ultimately, have a deleterious effect on the United States economy. As such, it is urgent that the United States acts now to reduce and reverse the trend of a reduced patent bar.

If the United States economy is to remain robust in comparison with its largest competitor nations, the United States must act now to increase the number of new patent attorneys entering the patent bar.