

# UNREGISTERED PATENTS & GENDER EQUALITY

MIRIAM MARCOWITZ-BITTON,\* YOTAM KAPLAN,\*\*  
EMILY MICHIKO MORRIS\*\*\*

*Women do not get a fair share when it comes to patenting and are far less likely to own patents. This disparity is in part because of not only the inherent biases in science and technology and in the patent system itself, but also because of the high costs of even applying for patents. This article therefore proposes an unconventional new regime of unregistered patent rights to relieve women and other disadvantaged inventors of the costs of applying for registered patent rights and to help them gain greater access to patent protections. Patents are a glaring exception to the unregistered protections provided in other areas of intellectual property, which are more egalitarian in design. By providing automatic patent rights, our proposed regime would allow for greater protection for disadvantaged innovators, in much the same way that copyright, trademark, and other forms of intellectual property currently do.*

*To explain our proposal, we detail the challenges facing women and other disadvantaged inventors in applying for patents as well as the fact that other intellectual property regimes do not require such applications. We also address a number of objections that our proposal would inevitably raise. In particular we show that, because our proposed unregistered patent system would grant rights for only three years and would protect only against direct copying, these rights would be unlikely to deter incremental or complementary innovation. Such rights would also be fully subject to invalidation under a preponderance of the evidence standard.*

*Our proposed regime does not solve all of the issues female innovators face. Nonetheless, our proposed regime would benefit women and others by providing protection at no cost, without filing or renewal fees, and equally importantly, by protecting even inventors with little or no knowledge of the patent system and its importance in realizing the benefits of their inventive efforts.*

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\* Associate Professor, Bar-Ilan University Faculty of Law, S.J.D. University of Michigan Law School.

\*\* Assistant Professor, Bar-Ilan University Faculty of Law, S.J.D. Harvard Law School.

\*\*\* Visiting Associate Professor, Pennsylvania State University Dickinson School of Law, and former Fellow, Program for Professors of Special Appointment (Eastern Scholars) at Shanghai Institutions of Higher Learning, and Shanghai University of Political Science and Law; J.D. University of Michigan Law School. The authors wish to thank Daniel Benoliel, Thomas Cotter, Estelle Derclaye, Rochelle Dreyfuss, John Duffy, Graham Dutfield, Janet Freilich, Ruth Okediji, Dotan Oliar, Julio Raffo, Shlomit Yanisky-Ravid, and Lior Zemer.

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## INTRODUCTION

By effectively increasing the value of investments in innovation, intellectual property rights (“IPRs”) are often argued to be vital to the success of any innovative project.<sup>1</sup> Innovation is risky and expensive, but IPRs serve to protect both inventions and commercialization from copying, signal technological expertise, assure the freedom to operate, and defend against infringement lawsuits.<sup>2</sup> Inventors who secure IPRs are therefore more likely to attract investment and to make their ventures valuable and successful.<sup>3</sup>

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<sup>1</sup> Ted Sichelman & Stuart J.H. Graham, *Patenting by Entrepreneurs: An Empirical Study*, 17 MICH. TELECOMM. & TECH. L. REV. 111, 111–12 (2010).

<sup>2</sup> See WILLIAM M. LANDES & RICHARD A. POSNER, THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW 295–96 (2003) (discussing how patents protect against copying); Stuart J.H. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 BERKELEY TECH. L.J. 1255, 1287–1309 (2009) (discussing how patents help startups compete in the market by preserving their competitive edge); see generally Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625 (2002) (discussing how IPRs can transmit signals about the value of information as well as protect it); Sichelman & Graham, *supra* note 1, at 112–15 (discussing how IPRs serve “strategic” purposes, such as securing leverage in cross-licensing negotiations).

<sup>3</sup> See Graham et al., *supra* note 2, at 1258; Carolin Häussler et al., *To Be Financed or Not. . .—The Role of Patents for Venture Capital-Financing*, SSRN, 2 (2012), <http://papers.ssrn.com/abstract=1393725>.

Women contribute to all fields of intellectual endeavor but remain underrepresented in intellectual property-based entrepreneurship.<sup>4</sup> Women consistently hold fewer IPRs, particularly patents, even in areas nearing gender parity, and so lose the investment and profit opportunities that might otherwise be available to them.<sup>5</sup> A 2015 World Intellectual Property Organization (“WIPO”) study of Patent Cooperation Treaty (“PCT”) applications found that only 29% of all filings listed women inventors.<sup>6</sup> The percentage of patents that listed *only* women as inventors is even lower—less than 5%.<sup>7</sup> That women own fewer patents means that their innovations are less likely to be commercialized, which has far-reaching ramifications for economic growth and social equality.

The first plausible explanation for why women own fewer IPRs is the fact that entrepreneurship is male-dominated.<sup>8</sup> Between the years 1990 and 2016, only 10% of entrepreneurs were women.<sup>9</sup> Moreover, female-led firms underperform as compared to male-led firms in standard economic indicators.<sup>10</sup> This explanation confuses cause and effect, however: it is the lack of access to IPRs that (at least partially) explains women’s lower success rates as entrepreneurs, not vice versa. Women entrepreneurs (who are less likely to patent their inventions) are less likely to have access to start-up financing, because patent applications and patents can increase the probability of ob-

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<sup>4</sup> See Dana Kanze et al., *We Ask Men to Win and Women Not to Lose: Closing the Gender Gap in Startup Funding*, 61 ACAD. MGMT. J. 586, 586 (2018) (discussing how women entrepreneurs are disadvantaged by investor focus differences from promotion for men to prevention for women); Jessica Milli et al., *Equity in Innovation: Women Inventors and Patents*, 3–8, 11–12 (Inst. For Women’s Policy Research ed., 2016), <https://iwpr.org/wp-content/uploads/wpallimport/files/iwpr-export/publications/C448%20Equity%20in%20Innovation.pdf> [<https://perma.cc/6ZDA-UUFV>]; see also Berna Demiralp et al., *On the Commercialization Path: Entrepreneurship and Intellectual Property Outputs among Women in STEM*, 22–24 (Nat’l Women’s Bus. Council Reported., 2017), <https://s3.amazonaws.com/nwbc-prod.sba.fun/wp-content/uploads/2017/03/13133831/STEM-Commercialization-website-ready.pdf> [<https://perma.cc/5P8V-PMMW>].

<sup>5</sup> See Kanze et al., *supra* note 4, at 588 (suggesting women entrepreneurs may be missing out on investment and profit opportunities because of VC bias); see generally Milli et al., *supra* note 4 (discussing gender gaps in patent applications and application success as well as the economic and social impact).

<sup>6</sup> Gema L. Martinez et al., *Identifying the Gender of PCT Inventors*, 8 (World Intellectual Property Org., Working Paper No. 33, 2016).

<sup>7</sup> *Id.*

<sup>8</sup> See *id.*; Paul A. Gompers & Sophie Q. Wang, *Diversity in Innovation*, 14 (Harvard Bus. Sch., Working Paper No. 17-067, 2017) (noting that women are only 6% of information technology entrepreneurs); Milli et al., *supra* note 4, at 2 (women are underrepresented in STEM fields, where patenting is most prevalent).

<sup>9</sup> Gompers & Wang, *supra* note 8, at 45.

<sup>10</sup> Helene Ahl, *Why Research on Women Entrepreneurs Needs New Directions*, 30 ENTREPRENEURSHIP THEORY & PRAC. 595, 603 (2006); Helene Ahl & Susan Marlow, *Exploring the Dynamics of Gender, Feminism and Entrepreneurship: Advancing Debate to Escape a Dead End?*, 19 ORGANIZATION 543, 545 (2012); Colleen Collins-Dodd et al., *Further Evidence on the Role of Gender in Financial Performance*, 42 J. SMALL BUS. MGMT. 395, 396 (2004); Anita Du Rietz & Magnus Henrekson, *Testing the Female Underperformance Hypothesis*, 14 SMALL BUS. ECON. 1, 1 (2000).

taining funding from a number of sources.<sup>11</sup> Access to IPRs (or the lack thereof) thereby affects the success of women as entrepreneurs. Accordingly, women's difficulties in accessing IPRs deserve their own explanation.

The literature on IPRs and gender offers another explanation as to why women own fewer IPRs. This literature shows that intellectual property (IP) law, though ostensibly gender-neutral, actually perpetuates existing social hierarchies.<sup>12</sup> For example, IPRs protect male-dominated areas more than female-dominated areas, and standards such as those for patentability often assume an exclusively male point of view.<sup>13</sup> This scholarship is problematic, however, because it relies only on *a priori* feminist theory rather than empirical support and focuses mostly on IP doctrines rather than on legislation or regulation.<sup>14</sup> Nonetheless, the law can take some steps to remedy this problem, as this article proposes.

Specifically, this article proposes a novel legal remedy to the problems that women face in gaining access to patent protections and suggests a realistically obtainable patent rights to help mitigate the problem. We suggest introducing a new form of protection that grants unregistered inventions a limited period of protection from copying.<sup>15</sup> This move will especially benefit women inventors,<sup>16</sup> who tend to under-utilize the existing registered patent system and initiate patent applications at much lower rates,<sup>17</sup> even when their inventions could and should enjoy patent protection. These unregistered—that is to say, automatic—patent rights would protect inventions that otherwise meet all of the substantive standards for patentability without requiring inventors to undergo what are well known to be lengthy, expensive, and not infrequently obscure procedures for applying for a registered patent.<sup>18</sup> In doing so, a regime of unregistered patent rights would protect exactly those inventors who are, for a variety of reasons, least able to afford such a costly registration and examination process—women.<sup>19</sup> Forgoing a registration requirement would also avoid what is even now an often gender-

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<sup>11</sup> Häussler et al., *supra* note 3, at 1.

<sup>12</sup> See Kara W. Swanson, *Intellectual Property and Gender: Reflections on Accomplishments and Methodology*, 24 AM. U.J. GENDER, SOC. POL'Y & L. 175, 182 (2015) (arguing that the absence of scholarship on IP and gender highlights the field's failure to address gender-related issues).

<sup>13</sup> *Id.* at 185.

<sup>14</sup> See, e.g., Dan L. Burk, *Do Patents Have Gender?*, 19 AM. U.J. GENDER SOC. POL'Y & L. 881, 883 (2011); Shlomit Yanisky-Ravid, *Eligible Patent Matter—Gender Analysis of Patent Law: International and Comparative Perspectives*, 19 AM. U.J. GENDER SOC. POL'Y & L. 851, 854 (2011); Emily Chaloner, Comment, *A Story of Her Own: A Feminist Critique of Copyright Law*, 6 I/S 221, 239 (2010); Deborah Halbert, *Feminist Interpretations of Intellectual Property*, 14 AM. U.J. GENDER SOC. POL'Y & L. 431, 432 (2006).

<sup>15</sup> We show our proposal fits with some existing and historic features of patent law; see *infra* section III.A.

<sup>16</sup> See *infra*, sections I.B. and I.C.

<sup>17</sup> See *infra*, section I.C.

<sup>18</sup> See text accompanying note 98, *infra*.

<sup>19</sup> See text accompanying notes 97–122, *infra*.

biased patent examination process.<sup>20</sup> Giving women and other similarly disadvantaged inventors automatic, unregistered patent rights would, in this way, help them protect their inventions from copying and in turn attract the investment necessary to develop and commercialize them.

The article proceeds as follows. Part I introduces the problem of gender inequality under the existing patent system and discusses patenting patterns amidst gender disparity worldwide. This part surveys empirical evidence on the underrepresentation of women in the patent system and reviews the various theories on why this gender gap persists. Most important for our purposes is that the gender gap in patenting stems in part from the fact that the patent system requires both registration and examination, which are both costly and frequently biased. Creating a regime of unregistered, albeit quite limited, patent rights would thus remedy this particular part of the gender gap in patenting. Part II then looks at the existing IP rights regimes to show that in almost all regimes except that of the patent system, protection is typically not dependent on registration. Under copyright, trademark, and industrial design law, rights can—but do not have to—be registered in order to secure protection.<sup>21</sup> Instead, these intellectual property regimes offer a two-tiered approach: the option to apply for full protections under registered rights or a default option of unregistered rights that offer much, but not all, of the same protections as registered rights.<sup>22</sup> These two-tiered intellectual property regimes provide a model for our proposed unregistered patent rights regime.<sup>23</sup> Part III then explains in more detail our proposal to implement an unregistered patent protection regime and how it can help advance gender equality in technological innovation. Here, we explain how our proposal would work and the limitations that would have to be imposed on it, and we address the criticisms that our proposal would undoubtedly face. Part IV offers a brief conclusion and sets an agenda for future research.

## I. PATENTS AND GENDER INEQUALITY

To understand our proposal, one must first understand the role that the patent system plays in protecting and incentivizing technological development and entrepreneurship, as well as the intrinsic hurdles that woman face in trying to access patent protection. To this day, gender inequality under the current patent system remains the status quo. A number of empirical studies indicate that women own fewer patents compared to men, and female inventors file for fewer patents compared to their male counterparts.<sup>24</sup> This patent

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<sup>20</sup> See text accompanying notes 76–82, *infra*.

<sup>21</sup> See *infra*, subsections II.C–D.

<sup>22</sup> *Id.*

<sup>23</sup> *Id.*

<sup>24</sup> See Waverly W. Ding et al., *Gender Differences in Patenting in the Academic Life Sciences*, 313 *SCIENCE* (3) 665, 665 (2006); Kjersten B. Whittington, *Mothers of Invention? Gender, Motherhood, and New Dimensions of Productivity in the Science Profes-*

inequality exists even in fields nearing gender parity. The analysis below shows the link between these findings and the role of women in technological entrepreneurialism. The discussion also connects these findings with insights from the literature on gender and IP. The connection reveals how IP doctrine, and the patent system in particular often either implicitly favors male inventors or at least fails to help women innovators protect their inventions.

### A. *Theorizing Female Entrepreneurship Worldwide*

The ways in which patent protection, innovation, and technological entrepreneurship intersect have been the subject of extensive study. The basic premise of the studies is that innovation is expensive and that, by preventing others from copying an invention, patents prevent free-riding on investments in the invention.<sup>25</sup> Traditionally, patents were thought to protect investments in the research and development necessary to create an invention, but recently commentators have theorized that patents more likely protect investments in commercializing an invention after its creation.<sup>26</sup> Regardless, by guarding investments in innovation, patents are vital to the success of technological enterprises.<sup>27</sup>

Patents benefit technological entrepreneurs in other ways as well. Securing a patent helps a venture signal its technological expertise and the innovative legitimacy of its products and services, thereby boosting its reputation in the marketplace.<sup>28</sup> Entrepreneurs also report relying on their patents to give them leverage during negotiations with other companies for patent cross-licensing,<sup>29</sup> an important advantage for ventures trying to break into industries that depend on access to complementary or cumulative technologies.<sup>30</sup> Similarly, entrepreneurs sometimes use their patents to facilitate or even ward off infringement lawsuits by meaningfully threatening to counter-

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sion, 38 *WORK & OCCUPATIONS* 417, 418–20 (2011); Kjersten B. Whittington & Laurel Smith-Doerr, *Women Inventors in Context: Disparities in Patenting Across Academia and Industry*, 22 *GENDER & SOC'Y* 2, 194 (2008).

<sup>25</sup> See LANDES & POSNER, *supra* note 2.

<sup>26</sup> Michael Abramowicz & John F. Duffy, *Intellectual Property for Market Experimentation*, 83 *N.Y.U. L. REV.* 337, 395–56 (2008); *but see* Ted Sichelman, *Commercializing Patents*, 62 *STAN. L. REV.* 341, 396–400 (2010) (questioning whether the current patent system provides adequate protection for commercialization investments).

<sup>27</sup> Graham et al., *supra* note 2, at 1287; *see also* Häussler et al., *supra* note 3, at 1 (discussing the increased likelihood of VC funding if a company has patents); Sichelman & Graham, *supra* note 1, at 112–14 (emphasizing the guarding abilities of patents and the value investors consider guarding to have).

<sup>28</sup> Long, *supra* note 2, at 627–28.

<sup>29</sup> Graham et al., *supra* note 2, at 1297–1301.

<sup>30</sup> *See, e.g.*, Michael Mattioli, *Communities of Innovation*, 106 *Nw. U.L. REV.* 103, 113–14 (2012) (discussing technologies that can only be used in conjunction with other, interrelated or complementary technologies); *see also* Richard R. Nelson, *The Market Economy, and the Scientific Commons*, 33 *RES. POL'Y* 455, 464 (2004) (discussing technologies that build upon and are thus cumulative of other technologies).

sue for infringement.<sup>31</sup> Last, but perhaps most importantly, patent applications and patents also increase the probability of obtaining necessary investment funding from a number of sources, such as venture capitalists.<sup>32</sup> Intellectual property is therefore a major factor in the success of entrepreneurial enterprises. Holding fewer patents and other IPRs therefore impair the ability of women to realize the economic and other benefits of entrepreneurship. Despite this fact, research has repeatedly shown that women universally have less access to patent protections than their male counterparts.<sup>33</sup>

Fortunately, women's entrepreneurship now receives more attention than it has previously.<sup>34</sup> One main category of literature on women's entrepreneurship concerns gender-based differences in entrepreneurship and includes comparisons of the types of businesses men and women entrepreneurs pursue,<sup>35</sup> their motivations for doing so,<sup>36</sup> how they finance their ventures,<sup>37</sup> and their management styles.<sup>38</sup> Notwithstanding, this literature is relevant to our research only to the limited extent it links access to IPRs and women's entrepreneurship.

A second category of scholarship on the topic assesses how well women are able to participate and perform as entrepreneurs and the unique obstacles they face. Its main starting point is that entrepreneurship is quantitatively male-dominated; indeed, as one scholar noted, gender "is one of the best predictors we have of who will become an entrepreneur."<sup>39</sup> Recent studies find that merely 10% of U.S. entrepreneurs are women.<sup>40</sup> Qualitatively, several studies show that female-led firms also underperform relative to male-led firms on standard economic indicators, such as business size,

<sup>31</sup> Sichelman & Graham, *supra* note 1, at 113.

<sup>32</sup> Häussler et al., *supra* note 3, at 1.

<sup>33</sup> See, e.g., Kanze et al., *supra* note 4, at 588 (explaining how bias exists in the VC context with funding and patents); Milli et al., *supra* note 4; Martinez et al., *supra* note 6, at 8.

<sup>34</sup> Alexis Krivkovich et al., *WOMEN IN THE WORKPLACE 1–2* (McKinsey & Company 2017), at <https://www.mckinsey.com/featured-insights/gender-equality/women-in-the-workplace-2017> [<https://perma.cc/T6P4-X23W>].

<sup>35</sup> Anne H. Kelly, *A Woman's Place: Women's Emerging Role in Technology*, 72 J. PAT. & TRADEMARK OFF. SOC'Y 412, 413–14 (1990).

<sup>36</sup> J. McGrath Cohoon et al., *The Anatomy of an Entrepreneur: Are Successful Women Entrepreneurs Different than Men?*, 4 (Ewing Marion Kauffman Found., May 2010), [https://www.kauffman.org/-/media/kauffman\\_org/research-reports-and-covers/2009/07/successful\\_women\\_entrepreneurs\\_510.pdf](https://www.kauffman.org/-/media/kauffman_org/research-reports-and-covers/2009/07/successful_women_entrepreneurs_510.pdf) [<https://perma.cc/R95S-9EF3>]; Jennifer E. Jennings & Candida G. Brush, *Research on Women Entrepreneurs: Challenges to (and from) the Broader Entrepreneurship Literature?*, 7 ACAD. MGMT. ANN. 663, 668–70 (2013).

<sup>37</sup> Dafna Kariv & Susan Coleman, *Toward a Theory of Financial Bricolage: The Impact of Small Loans on New Businesses*, 22 J. SMALL BUS. & ENTER. DEV. 196, 198 (2015).

<sup>38</sup> Jennifer E. Cliff et al., *Walking the Talk? Gendered Rhetoric vs. Action in Small Firms*, 26 ORG. STUD. 61, 66 (2005).

<sup>39</sup> SCOTT A. SHANE, *THE ILLUSIONS OF ENTREPRENEURSHIP: THE COSTLY MYTHS THAT ENTREPRENEURS, INVESTORS, AND POLICY MAKERS LIVE BY*, 134 (2008).

<sup>40</sup> Gompers & Wang, *supra* note 8, at 45.

revenues, growth, and total assets.<sup>41</sup> Feminist theorists have disputed these indicators as biased compared to measures such as venture survival, return on sales, or equity, in which females fare somewhat better.<sup>42</sup> Yet the debate remains: why do women struggle under standard indicators and, more importantly, how does this relate to access to patent protection? Women also seek and raise less capital and investment than do men,<sup>43</sup> settle for lower firm valuations,<sup>44</sup> and make up only about 35% of project leadership on the popular crowdfunding platform Kickstarter.<sup>45</sup>

Scholars have identified a number of hurdles that female entrepreneurs face, many of which are not unique to entrepreneurship, such as domestic responsibilities,<sup>46</sup> limited access to resources and education,<sup>47</sup> societal biases,<sup>48</sup> and differing attitudes towards risk.<sup>49</sup> Proposed solutions to the lack of female entrepreneurship have been limited, however. Some scholars recommend measures specifically targeted toward women, such as increased funding options for not-for-profits (more common among women), collaborative events between start-ups and larger companies, and increased visibility for female role models.<sup>50</sup> Other scholars propose more indirect measures, such as fostering greater gender equality and helping women be more confident in the face of risk.<sup>51</sup>

<sup>41</sup> Ahl, *supra* note 10; Ahl & Marlow, *supra* note 10; Collins-Dodd et al., *supra* note 10; Du Rietz & Henrekson, *supra* note 10.

<sup>42</sup> See generally Alicia M. Robb & John Watson, *Gender Differences in Firm Performance: Evidence from New Ventures in the United States*, 27 J. BUS. VENTURING 544 (2012) (presenting a study using these alternative performance measures).

<sup>43</sup> Dora Gicheva & Albert N. Link, *The Gender Gap in Federal and Private Support for Entrepreneurship*, 45 SMALL BUS. ECON. 729, 733 (2015).

<sup>44</sup> Sharon Poczter & Melanie Shapsis, *Know Your Worth: Angel Financing of Female Entrepreneurial Ventures*, 25-7 SSRN (2016), [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2782266](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2782266).

<sup>45</sup> Dan Marom et al., *Gender Dynamics in Crowdfunding (Kickstarter): Evidence on Entrepreneurs, Investors, Deals and Taste-Based Discrimination*, 35 SSRN (2016) ([https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2442954](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2442954)).

<sup>46</sup> Paucic McGowan et al., *Female Entrepreneurship and the Management of Business and Domestic Roles: Motivations, Expectations and Realities*, 24 ENTREPRENEURSHIP & REGIONAL DEV. 53, 53-54 (2012).

<sup>47</sup> See Fiona Murray & Leigh Graham, *Buying Science and Selling Science: Gender Differences in the Market for Commercial Science*, 16 INDUS. & CORP. CHANGE 657, 663 (2007).

<sup>48</sup> Vishal K. Gupta et al., *Differences Between Men and Women in Opportunity Evaluation as a Function of Gender Stereotypes and Stereotype Activation*, 37 ENTREPRENEURSHIP THEORY & PRAC. 771, 780 (2013).

<sup>49</sup> Clare Brindley, *Barriers to Women Achieving Their Entrepreneurial Potential*, 11 INT'L J. ENTREPRENEURIAL BEHAV. & RES. 144, 153 (2005); see also Bertrand Marianne, *New Perspectives on Gender*, in 4 HANDBOOK OF LABOR ECONOMICS 1543, 1546 (2011).

<sup>50</sup> Friederike Welter, *The Environment for Female Entrepreneurship in Germany*, 11 J. SMALL BUS. & ENTERPRISE DEV. 212, 213 (2004); Lesa Mitchell, *Overcoming the Gender Gap: Women Entrepreneurs as Economic Drivers*, Ewing Marion Kauffman Found., 12-3 Sept. 2011, [https://www.kauffman.org/-/media/kauffman\\_org/research-reports-and-covers/2011/09/growing\\_the\\_economy\\_women\\_entrepreneurs.pdf](https://www.kauffman.org/-/media/kauffman_org/research-reports-and-covers/2011/09/growing_the_economy_women_entrepreneurs.pdf) [<https://perma.cc/C3NQ-ZYBV>].

<sup>51</sup> See, e.g., Brindley, *supra* note 49 (surveying literature on barriers for women entrepreneurs).



Our proposal focuses on a different aspect of the problem, aiming to address gender disparity that originates within the structure of the patent system itself, and not from general gender inequity. Intellectual property protections for new technology, most importantly in the form of patents, are pivotal to the success of any venture attempting to leverage that technology.<sup>52</sup> Our article therefore proposes modifying the patent system to help narrow the gender gap in technological entrepreneurship by narrowing the gender gap in patenting.

### B. Gender and the Propensity to Patent

The most comprehensive study to date on the gender gap in patenting is WIPO's survey of international patent applications in 182 different countries.<sup>53</sup> The study found that only 29% of those applications included women inventors, although specific numbers differed substantially across countries, technologies, and sectors and did at least rise over time.<sup>54</sup> Patent applications that listed *only* women inventors, on the other hand, amounted to just less than 5% of all patents.<sup>55</sup> The British Intellectual Property Office's major global study of the European Patent Office (EPO) Worldwide Patent Statistics (PATSTAT) and PatBase databases found that women represented less than 2% of inventors for most of the twentieth century, rising only to a little over 10% by 2015.<sup>56</sup> Although the study also found inter-country variation consistent with that found in other studies, this variation did not correlate with socioeconomic indicators such as GDP or the number of women in the labor market.<sup>57</sup> Moreover, although the number of patents listing women in-

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<sup>52</sup> See Sichelman & Graham, *supra* note 1, at 113 n.7.

<sup>53</sup> Martinez et al., *supra* note 6, at 6–8. WIPO used a dataset compiling all patent applications filed under the Patent Cooperation Treaty from 1995 through 2015. *Id.* at 8. The applications pertain to all PCT contracting states. *Id.* at 6. WIPO compiled 8,788,617 names of individual inventors. *Id.* at 7.

<sup>54</sup> *Id.* at 6–8.

<sup>55</sup> *Id.* at 8.

<sup>56</sup> *Id.*

<sup>57</sup> INFORMATICS TEAM, INTELLECTUAL PROP. OFFICE, GENDER PROFILES IN WORLD-WIDE PATENTING: AN ANALYSIS OF FEMALE INVENTORSHIP, 16–18 (2016), [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/567518/Gender-profiles-in-worldwide-patenting.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/567518/Gender-profiles-in-worldwide-patenting.pdf); Rainer Frietsch et al., *Gender-Specific Patterns in Patenting and Publishing*, 38 RES. POL'Y 590, 594–95 (2009); Fulvio Naldi et al., *Scientific and Technological Performance by Gender*, HANDBOOK OF QUANTITATIVE SCIENCE AND TECHNOLOGY RESEARCH 299, 307 (H.F. Moed, W. Glänzel & U. Schmoch eds., 2004).

ventors is on the rise, growth has been slow.<sup>58</sup> Seventy-three percent of all 2014 patent applications worldwide still listed only male inventors.<sup>59</sup>

Studies of academic patenting in particular reveal very similar trends, even in areas approaching gender parity (such as bioscience).<sup>60</sup> Women also patent less often than they publish.<sup>61</sup> In their novel research, Professor Ding and her colleagues pointed to two main obstacles for academic women (as compared to men) in obtaining IPRs: lack of contacts within the commercial sector and the concern that pursuing commercial opportunities might hinder their university careers.<sup>62</sup> Compared with men, female faculty also were much more likely to be influenced to patent by their (typically male) co-authors, who often drove the patenting process.<sup>63</sup>

Working conditions also affect patenting patterns among women. For reasons that are as yet unclear, women in hierarchical firms are less likely than men to patent.<sup>64</sup> Similarly, women are also less likely to be solo inventors<sup>65</sup> and more likely to work in larger research groups,<sup>66</sup> but women in research groups may also give up patent protection in favor of authorship, even when entitled to both.<sup>67</sup> Research area and industry are relevant factors as well. A 1999 study finds that biotechnology offered women better opportunities,<sup>68</sup> while other studies show women to be significantly under-

<sup>58</sup> See, e.g., Ding et al., *supra* note 24, at 666 (holding constant multiple variables comparable women life scientists patent at only 0.40 times the rate of equivalent male scientists); Frietsch et al., *supra* note 57, at 597 (showing the shares of women's contribution by scientific area, which includes patents); Taehyun Jung & Olof Ejermo, *Demographic Patterns and Trends in Patenting: Gender, Age, and Education of Inventors*, 86 TECHNOLOGICAL FORECASTING & SOC. CHANGE, 110, 110 (2014) (gender gap in patenting is decreasing but slowly in Sweden).

<sup>59</sup> Intellectual Prop. Office, Gender Profiles in Worldwide Patenting, *An Analysis of Female Inventorship*, 20 (Nov., 2016), [<https://perma.cc/XS5D-6VWG>].

<sup>60</sup> Ding et al., *supra* note 24, at 665.

<sup>61</sup> Frietsch et al., *supra* note 57, at 595.

<sup>62</sup> Ding et al., *supra* note 24, at 666; see *infra* text accompanying notes 104–122.

<sup>63</sup> Ding et al., *supra* note 24, at 666.

<sup>64</sup> Whittington & Smith-Doerr, *supra* note 24, at 194, 196.

<sup>65</sup> Naldi et al., *supra* note 57, at 307–08; Jung & Ejermo, *supra* note 58, at 110.

<sup>66</sup> Kordula Kugele, *European Studies on Gender Aspects of Inventions-Statistical Survey and Analysis of Gender Impact on Inventions*, 2 (European Studies on Gender Aspects of Inventions, Work Report 1, 2008), [[http://www.esgi.de/uploads/media/071112\\_WorkReport1.pdf](http://www.esgi.de/uploads/media/071112_WorkReport1.pdf)] [<https://perma.cc/U48V-3JWT>]; see generally James Moody, *The Structure of a Social Science Collaboration Network: Disciplinary Cohesion from 1963 to 1999*, 69 AM. SOC. REV. 213, 219, 226 (2004) (analyzing women participation in sociological studies/co-authorship, not patents specifically); Naldi et al., *supra* note 72, at 307; Jennifer Hunt et al., *Why Don't Women Patent?* 3, 17–19 (Nat'l Bureau of Econ. Research, Working Paper No. 17888, 2012).

<sup>67</sup> Francesco Lissoni et al., *Inventorship and Authorship as Attribution Rights: An Enquiry into the Economics of Scientific Credit*, 95 J. ECON. BEHAV. & ORG. 49, 50 (2013).

<sup>68</sup> See generally Susan Eaton, *Surprising Opportunities: Gender and the Structure of Work in Biotechnology Firms*, 869 ANNALS N.Y.ACAD.SCI. 175, 179–82 (1999) (identifying six aspects of work structure in biotechnology firms that help).

represented in the electrical and mechanical engineering industries,<sup>69</sup> and in industry relative to academia.

Moreover, although some studies find that patents issued to women are equal to or better in quality and impact than those issued to men,<sup>70</sup> other research shows that women still face an uphill battle in obtaining patents.<sup>71</sup> One recent study found that patent applications by women inventors were more likely to be rejected and that those rejections were less likely to be appealed.<sup>72</sup> This study also found that during prosecution, the PTO allowed fewer claims in women's applications and narrowed the scope and value of the allowed claims more than those in applications filed by men.<sup>73</sup> Finally, patents granted to women are less often cited and less likely to be maintained by their assignees.<sup>74</sup>

Accordingly, a considerable gender gap in patenting continues to exist. Given the value of patents to technological entrepreneurialism, this gap also continues to be an obstacle for women in commercializing their innovations. Identifying and remedying the underlying causes for this patent gap is important in helping female entrepreneurs succeed.

### C. IP and Gender: The Positive Theory

Studies of the intersection of IP law and gender are a fairly recent phenomenon but have identified a number of ways in which the law and other factors contribute to gender disparities in IPRs.<sup>75</sup> Professor Kara Swanson's overview on IP law and gender, for instance, provides helpful insights by identifying three fundamental causes for the gender gap in intellectual property: first, the way IP doctrines apply to subject matter involving gender and sexuality; second, the gendered nature of the various IP doctrines themselves; third, and most relevant for the purposes of this article, gender disparities in participation in IP systems.<sup>76</sup>

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<sup>69</sup> See Hunt et al., *supra* note 66, at 3.

<sup>70</sup> Steven G. McMillan, *Gender Differences in Patenting Activity: An Examination of the US Biotechnology Industry*, 80 *SCIENTOMETRICS*, 683, 690 (2009); Kjersten Bunker Whittington & Laurel Smith-Doerr, *Gender and Commercial Science: Women's Patenting in the Life Sciences*, 30 *J. Tech. Transfer*, 355, 366 (2005) (measuring patent quality based on its impact and usefulness for follow-up innovation, measured by forward and backward patent citations).

<sup>71</sup> See, e.g., Kanze et al., *supra* note 4, at 587–88 Milli et al., *supra* note 4, at 7; Martinez et al., *supra* note 6, at 8 (focusing on trends in the industry).

<sup>72</sup> Kyle Jensen et al., *Gender Differences in Obtaining and Maintaining Patent Rights*, 36 *NATURE BIOTECHNOLOGY* 307, 308 (2018).

<sup>73</sup> *Id.*; for definitions for “prosecution” and “claim,” see Robert P. Merges & John F. Duffy, *Patent Law and Policy* 31–32, 58 (7th ed., 2017) (explaining that “prosecution” refers the period during which the PTO examines applications to determine whether to issue them as patents and that “claims” are the part of the patent that establish its exclusive boundaries).

<sup>74</sup> Jensen et al., *supra* note 72, at 308.

<sup>75</sup> See Swanson, *supra* note 12, at 176.

<sup>76</sup> *Id.*

With regard specifically to the patent system, Professor Swanson notes that gender disparities arise because many patent doctrines that appear to be neutral on their face instead assume a certain level of masculinity in practice.<sup>77</sup> The notoriously nebulous “PHOSITA” (“Person Having Ordinary Skill In The Art”) standard, used to measure the equally ambiguous utility<sup>78</sup> and non-obviousness<sup>79</sup> requirements for patentability, in actuality adopts a male perspective of what is “objectively” patentable in ways prejudicial to women.<sup>80</sup> Likewise, decisions regarding patentable subject matter are based on inherently androcentric definitions of “invention,” “technology,” and “industrial application” in ways that may be detrimental to female inventors.<sup>81</sup>

Bearing out these theoretical assertions are recent empirical findings that indicate that the current patent system is indeed gender-biased. Patent applications by women inventors, for example, are 21% less likely to be accepted by the patent office as compared to applications submitted by men.<sup>82</sup> Part of this gap is attributed to the fact that women tend to file patent applications in technology classes with lower acceptance rates,<sup>83</sup> but even when controlling for this effect, researchers found that applications from women were 7% less likely to be accepted.<sup>84</sup> This trend also exists in the life sciences, despite the larger number of women in those fields.<sup>85</sup> In fact, if anything, patent applications by women in the life sciences seem to fare worse, not better, than patent applications by women in other fields. For instance, a patent application in the life sciences from an all-female team of inventors was found to be 11% less likely to be approved than a similar application by an all-male team.<sup>86</sup>

Empirical findings also suggest that these disparities stem in part from gender biases among patent examiners. Gender gaps in patent approval rates were more pronounced when applicants had names easily recognizable as feminine, while applications that listed inventor names that were more diffi-

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<sup>77</sup> *Id.* at 185.

<sup>78</sup> See Utility Examination Guidelines, 66 Fed. Reg. 1092, 1098 (Jan. 5, 2001) (defining utility as a use for the invention that would be “considered credible” by a PHOSITA).

<sup>79</sup> See 35 U.S.C. § 103 (requiring that a patentable invention be different enough from prior art that the claimed invention as a whole would not have been obvious before filing to a PHOSITA).

<sup>80</sup> See Dan L. Burk, *Diversity Levers*, 23 DUKE J. GENDER L. & POL’Y 25, 42 (2015) (concluding that with close analysis gender bias is found in the obviousness PHOSITA); Dan L. Burk, *Do Patents Have Gender?*, 19 AM. U. J. GENDER SOC. POL’Y & L. 881, 904 (2011).

<sup>81</sup> Shlomit Yanisky-Ravid, *Eligible Patent Matter—Gender Analysis of Patent Law: International and Comparative Perspectives*, 19 AM. U. J. GENDER SOC. POL’Y & L. 851, 860, 865 (2011) (arguing that these terms are interpreted to exclude the types of social or otherwise nonmechanical inventions that women often create).

<sup>82</sup> Jensen et al., *supra* note 72, at 307.

<sup>83</sup> *Id.*

<sup>84</sup> *Id.*

<sup>85</sup> *Id.* at 308.

<sup>86</sup> *Id.* at 308–09.

cult to characterize had higher rates of acceptance.<sup>87</sup> Furthermore, patent applications by women, even when approved, are not treated in the same way as those of men. Granted patent applications from women inventors are typically more narrowed, have fewer independent claims approved, and are less often cited by patent examiners.<sup>88</sup>

As a result, the existing registered patent regime clearly has a long way to go before it treats female inventors on par with male inventors. Measures such as modifying or applying patentability doctrines in more consciously non-gendered ways, or finding means to combat or at least control for patent examiner biases, could help women achieve greater parity with men and better outcomes on their patent applications. All the same, even before they can file applications with the patent office, female inventors face other hurdles that prevent them from simply gaining access to the patent system.

For example, another contributing cause is the concentration of women in less patent-intensive fields and jobs; the gender gap in patenting stems in part from this larger pattern of occupational and educational segregation in STEM (science, engineering, technology, and mathematics) fields.<sup>89</sup> Women are well known to be underrepresented in the STEM fields globally.<sup>90</sup> Even within science and engineering, the concentration of men and women also varies by field: women tend to concentrate in the life sciences, which are less patent-intensive, whereas men tend to concentrate in the more patent-intensive engineering fields.<sup>91</sup> The number of women with advanced engineering degrees thus positively correlates with patenting and commercialization of women's inventions.<sup>92</sup> Negative stereotypes, workplace biases, hostile environments, and ineffective messaging, however, effectively deter women from joining STEM fields.<sup>93</sup> Furthermore, researchers have found fewer women in development and design, the most patent-intensive job tasks.<sup>94</sup> An increase in the number of women in electrical and mechanical engineering as well as in design and development could increase patenting rates among women.<sup>95</sup> Finally, to the extent that disparities in family responsibilities neg-

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<sup>87</sup> *Id.* at 309.

<sup>88</sup> *Id.* at 308.

<sup>89</sup> Hunt et al., *supra* note 66, at 3.

<sup>90</sup> U.S. DEPT OF COM., ESA ISSUE BRIEF #04-11, WOMEN IN STEM: A GENDER GAP TO INNOVATION, 1 (Aug. 2011), files.eric.ed.gov/fulltext/ED523766.pdf [https://perma.cc/7MCF-4P6X].

<sup>91</sup> *Id.* at 3.

<sup>92</sup> Lisa D. Cook & Chaleampong Kongcharoen, *The Idea Gap in Pink and Black*, NAT'L BUREAU OF ECON. RES., 22 (2010), <https://www.nber.org/papers/w16331.pdf> [https://perma.cc/V9WW-Z2RT].

<sup>93</sup> NAT'L ACAD. OF ENGINEERING, COMM. ON PUB. UNDERSTANDING OF ENGINEERING MESSAGES, CHANGING THE CONVERSATION: MESSAGES FOR IMPROVING PUBLIC UNDERSTANDING OF ENGINEERING, 11–15 (Nat'l Academies Press, 2008).

<sup>94</sup> See Hunt et al., *supra* note 66, at 2; LORI TURK-BICAKI, & ANDREA BERGER, AM. INST. FOR RES., LEAVING STEM: STEM PH.D. HOLDERS IN NON-STEM CAREERS, 7 (2014), [http://www.air.org/sites/default/files/downloads/report/STEM%20PhDs%20in%20non-STEM%20Careers\\_July%202014.pdf](http://www.air.org/sites/default/files/downloads/report/STEM%20PhDs%20in%20non-STEM%20Careers_July%202014.pdf) [https://perma.cc/3S5S-32HP].

<sup>95</sup> Hunt et al., *supra* note 66, at 4.

atively impact female academics and other inventors,<sup>96</sup> family oriented policies, such as stopping the tenure clock around the birth of a new child, on-site childcare, and paid maternity and paternity leave are important changes that can help recruit and retain more women in science.

The data notwithstanding, mere disparity in the number of women in STEM fields cannot alone account for the gender gap in patenting. As noted above, research shows that the patent gender gap exists in areas such as bioscience even when controlling for male-to-female ratios and other variables.<sup>97</sup> This research suggests that, while increasing the number of women in STEM fields can increase the number of women who own patents, more needs to be done. Specifically, eliminating the obstacles posed by intellectual property law itself would allow more women in all fields to access and obtain patent protections for their innovations.

To understand this latter point about the impediments women face in simply trying to access the patent system, consider the complexity and costliness of the patenting process itself. The patenting process is complicated and often requires a substantial investment of time and money. The total cost of applying for and maintaining a patent in the United States for the full twenty-year maximum could total tens of thousands of dollars.<sup>98</sup> A patent application is a risky venture, with the potential for great gains through commercialization, but costly to go through. Financial barriers to applying for a patent are greater for women compared to men, as women tend to have fewer financial resources, in effect preventing women inventors and entrepreneurs from filing patent applications.<sup>99</sup> Inventors often turn to venture capitalists to fund their patenting, but evidence indicates that men are four times more likely than women to receive outside funding to finance their business ventures,<sup>100</sup> perhaps due to biases among venture capitalists.<sup>101</sup> In addition to cost, women often perceive the patenting process as too complex, long, and expensive to navigate, which may further discourage women from pursuing patent protection.<sup>102</sup>

Another difficulty for women seeking to gain access to the patent system is the limited social and professional networks available to them. Infor-

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<sup>96</sup> Murray & Graham, *supra* note 47, at 671, 675; see Sue V. Rosser, *Using POWRE to ADVANCE: Institutional Barriers Identified by Women Scientists and Engineers*, 16 *NWSA J.* 50, 65 (2004).

<sup>97</sup> Whittington & Smith-Doerr, *supra* note 24, at 194.

<sup>98</sup> See United States Patent and Trademark Office, USPTO Fee Schedule (2016). <http://www.uspto.gov/learning-andresources/fees-and-payment/uspto-fee-schedule> [<https://perma.cc/SNK3-U2ES>].

<sup>99</sup> Milli et al., *supra* note 4, at 18–19.

<sup>100</sup> Alicia Robb, *Access to Capital Among Young Firms, Minority-Owned Firms, Women-Owned Firms, and High-Tech Firms*, SBA Office of Advocacy 19 (2013), [https://www.sba.gov/sites/default/files/files/rs403tot\(2\).pdf](https://www.sba.gov/sites/default/files/files/rs403tot(2).pdf) [<https://perma.cc/QG92-KR6H>].

<sup>101</sup> See Paula E. Stephan & Asmaa El-Ganainy, *The Entrepreneurial Puzzle: Explaining the Gender Gap*, 32 *J. Tech. Transfer* 475, 481–84 (2006).

<sup>102</sup> See NATIONAL WOMEN'S BUSINESS COUNCIL, *INTELLECTUAL PROPERTY AND WOMEN ENTREPRENEURS: QUALITATIVE ANALYSIS*, 15 (2012).

mal social networks within industries enhance product innovation and resource exchange<sup>103</sup> by giving inventors access to information that can increase both their research quality and patenting rates.<sup>104</sup> For example, networks can provide expert advice on an invention's patentability, and network ties can become co-inventors over time.<sup>105</sup> At least one study nonetheless shows that women in academia receive less help in developing the skills to sell their research and fewer opportunities to join in developing patentable technologies.<sup>106</sup> The lack of access to networks likely stems in part from the effective exclusion of women early in their careers from commercial networks and opportunities<sup>107</sup> as well as exclusion from STEM fields, where access to networks is most relevant for patenting.<sup>108</sup> Women who work in environments that are already structured like networks, on the other hand, exhibit higher patenting rates, suggesting that professional networks—and women's typical lack of connection to and within networks—does indeed affect their likelihood of filing for and obtaining patents.<sup>109</sup>

Moreover, the networks to which women do have access tend to have fewer experienced scientists and a higher percentage of women, further limiting women's access to potentially critical resources and in turn their access to the patent system.<sup>110</sup> For example, women's networks tend to be smaller and more limited and generally consist of similarly situated peers who often face the same challenges that they do.<sup>111</sup> Women in academia also hold less central positions within their networks than men do, putting them at a disad-

<sup>103</sup> Wenpin Tsai & Sumantra Ghoshal, *Social Capital and Value Creation: The Role of Intrafirm Networks*, 41 *Academy Mgmt. J.* 464, 473 (1998) (presenting findings in support of the argument that social capital facilitates value creation).

<sup>104</sup> *Id.* at 470, 473; see also Atul Nerkar & Srikanth Paruchuri, *Evolution of R&D Capabilities: The Role of Knowledge Networks Within a Firm*, 51 *Mgmt. Sci.* 771, 771 (2005).

<sup>105</sup> See generally Lien-An Hsu, *A Comparison of Individual and Team Research Performance (18-22 July 2010)* (unpublished manuscript) (on file with IEEE) (describing the processes by which colleagues become co-inventors and how routine professional meetings can generate innovative patentable ideas).

<sup>106</sup> Murray & Graham, *supra* note 47, at 675, 679.

<sup>107</sup> *Id.* at 676.

<sup>108</sup> *Id.* at 679.

<sup>109</sup> Kjersten Bunker Whittington, *Patterns of Male and Female Scientific Dissemination in Public and Private Science* in *SCIENCE AND ENGINEERING CAREERS IN THE UNITED STATES: AN ANALYSIS OF MARKETS AND EMPLOYMENT* 195, 223–24 (Richard B. Freeman & Daniel L. Goroff eds., 2009).

<sup>110</sup> Murray & Graham, *supra* note 47, at 669–70, 677, 679.

<sup>111</sup> See Herminia Ibarra, *Homophily and Differential Returns: Sex Differences in Network Structure and Access in an Advertising Firm*, 37(3) *Admin. Sci. Q.* 422, 439–42 (1992) (finding that “according to similarity and/or status consideration, [women] are less desirable networking choices for men,” which decreases their centrality in networks); Mark Lutter, *Do Women Suffer from Network Closure? The Moderating Effect of Social Capital on Gender Inequality in a Project-Based Labor Market, 1929 to 2010*, 80(2) *Am. Socio. Rev.* 329, 332–33 (1992); Murray & Graham, *supra* note 47, at 671, 679; see generally RONALD S. BURT, *STRUCTURAL HOLES: THE STRUCTURE OF COMPETITION* (1992) (discussing the importance of “strategic partners” to women).

vantage in terms of collaborative co-patenting networks.<sup>112</sup> In one study of the women in academia, most reported few contacts with industry, suggesting that this affected their access to the resources needed to assess patentability and commercial value.<sup>113</sup> Even navigating the patenting process was shown to be more confusing for women who lacked a network of advisors or experienced peers to guide them.<sup>114</sup>

In addition to lacking access to financial resources and informal networks, women lack the kinds of institutionalized support that can be important for patenting. The lack of cross-organizational support structures contributes significantly to the under-representation of women in patenting.<sup>115</sup> For example, university technology transfer offices (TTOs) or a firm's patenting services can provide a wide range of support functions, including contacts, advice and encouragement, and expertise. While many female academics have TTO services available to them, many others do not and have few support systems to tap.<sup>116</sup> Male academics, by contrast, need rely much less on the availability of TTO services, as they can rely on their own networks.<sup>117</sup> Outside of academia, inventors draw from a variety of resources such as networks and intra-organizational supports, although no single resource offers inventors help and support, and many inventors, particularly women, do not know where to look.<sup>118</sup>

Relatedly, biases common in the commercial science community contribute to the gender gap in patenting as well. Historically, men dominated commercialized academic science, and the resulting stereotype has affected women.<sup>119</sup> Female academics who commercialize their research often view themselves as less competent and their patenting and commercialization efforts as taking time away from students, teaching, and university obligations, whereas men tend to view patenting as improving the quality of their teaching.<sup>120</sup> Cultural stereotypes about women and money serve further to reinforce women's ambiguity about their roles as commercial scientists.<sup>121</sup> More blatant sexism from peers, industry contacts, customers, and even patent examiners also plays a role in whether women perceive their own work as patentable and whether others perceive that work as important.<sup>122</sup>

The plethora of research on the subject shows that a wide variety of factors contribute to women not only obtaining fewer patent rights but also

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<sup>112</sup> Whittington, *supra* note 109, at 224.

<sup>113</sup> Ding et al., *supra* note 24, at 666.

<sup>114</sup> See NAT'L WOMEN'S BUS. COUNCIL, *supra* note 102, at 3.

<sup>115</sup> *Id.* at 5.

<sup>116</sup> *Id.*

<sup>117</sup> Ding et al., *supra* note 24, at 666–67.

<sup>118</sup> NAT'L WOMEN'S BUS. COUNCIL, *supra* note 102, at 3, 5, 15.

<sup>119</sup> Murray & Graham, *supra* note 47, at 660–61.

<sup>120</sup> *Id.* at 677–78.

<sup>121</sup> *Id.* at 678.

<sup>122</sup> See NAT'L WOMEN'S BUS. COUNCIL, *supra* note 102, at 16; Christine Wenneras & Agnes Wold, *Nepotism and Sexism in Peer-Review*, 387 NATURE 341, 341 (1997).



applying for fewer patents. Addressing and remediating each of these individual factors will take time and a great deal of coordinated effort. Lessening the overall effect of these combined factors, on the other hand, could be much less complicated, effort-intensive, and diffuse. We offer a measure that could help reduce the gender gap in patenting by modifying the patent system itself to include a limited form of unregistered patent rights. The next two Parts explain our proposal and place it within the larger framework of intellectual property rights.

## II. REGISTERED AND UNREGISTERED IPRs

Our proposal is to create a two-tiered patent protection regime, combining the current, higher levels of protection afforded to registered patents with an unregistered system that also grants patent protection, albeit at lower levels. This two-tiered structure, while novel to patent law, is a familiar feature in other areas of IP law, including copyright, trademark, and industrial design. This Part therefore briefly surveys these other types of IP regimes and the differing degrees of protection they provide to registered and unregistered works respectively.

### A. *The Theory of Registries*

Douglas Baird and Thomas Jackson highlight the centrality of filing systems for rights operating *in rem*: in order to justify their rights as valid against all others, owners can provide the public with at least notice of those rights.<sup>123</sup> A filing system offers a cost-effective way to achieve this goal relative to the value of the property involved.<sup>124</sup> In keeping with this fundamental tenet of the *in rem* nature of property rights, our proposal to allow unregistered patent rights is carefully tailored to ensure that those rights are not valid against all others, but only against those who knowingly copy the subject inventions.

Property rights registries serve several additional functions. For example, registries perform a facilitative role by streamlining transactions between willing sellers and buyers.<sup>125</sup> Professors Bell and Parchomovsky have highlighted the importance of registries in providing buyers with credible information about existing property rights in order to assess a seller's claim

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<sup>123</sup> See Douglas G. Baird & Thomas H. Jackson, *Information, Uncertainty, and the Transfer of Property*, 13 J. LEGAL STUD. 299, 303–04 (1984) (discussing a “filing system of title claims”).

<sup>124</sup> See *id.* at 304–05 (noting that properly organized filing systems provide a cost-effective means of finding/using files and cost relatively little compared to the relevant property).

<sup>125</sup> Abraham Bell & Gideon Parchomovsky, *Of Property and Information*, 116 COLUM. L. REV. 237, 242 (2016).

of ownership in the underlying asset.<sup>126</sup> In this way, central registries afford owners a much greater degree of freedom in transferring their rights, making entitlements more marketable, and increasing their value.<sup>127</sup> Along a similar vein, Professors Baird and Jackson have noted that filing systems can provide value to owners by allowing them to transfer only partial rights while retaining others.<sup>128</sup> These benefits of the use of registries comport with the basic premise of property rights economics<sup>129</sup> and transaction costs economics,<sup>130</sup> which inform how rules and legal institutions should be designed to streamline transactions and lower transaction costs. Professor Benito Arruñada and his colleagues point out that registries can reduce transaction costs by viably facilitating impersonal trade (trading with very limited personal information) and making public property rights, especially abstract ones.<sup>131</sup>

In addition, registries fulfill at least two other secondary roles.<sup>132</sup> First, registries hinder non-consensual encroachments and takings of assets.<sup>133</sup> Owners who register their assets can more easily prove their ownership rights against third parties who might trespass on them.<sup>134</sup> Second, registries enable owners to enjoy their property rights by allowing them to locate and recover assets that have been stolen, lost, or poorly transferred.<sup>135</sup> Patents, for example, enjoy this enabling function under the existing registered rights regime to the extent that patent rights are transferred through sale, licensing, or even inheritance.

Importantly, our proposal does not attempt to dismiss the usefulness of registries. As described in further detail in Part III, we are not calling for an abolition of patent registries but rather for the introduction of a system of unregistered patents *in addition* to the familiar registered patent system. This is a key distinction. A patent owner who wishes to enjoy the benefits of a registry is free to do so under our model. We simply add another layer of protections for those inventors who, for reasons unrelated to the merits of their inventions, are unable to gain access to the higher levels of protection available through the registered patent system.

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<sup>126</sup> *Id.* at 241.

<sup>127</sup> *Id.* at 241–42.

<sup>128</sup> Baird & Jackson, *supra* note 123, at 304–05.

<sup>129</sup> YORAM BARZEL, *ECONOMIC ANALYSIS OF PROPERTY RIGHTS* 3 (1997); see Gary D. Libecap & Dean Lueck, *The Demarcation of Land and the Role of Coordinating Property Institutions*, 119 J. POL. ECON. 426, 427–29 (2011) (showing that specific property rights regimes can alter the costs of transacting in land).

<sup>130</sup> See Patrick W. Schmitz, *Bargaining Position, Bargaining Power, and the Property Rights Approach*, 119 ECON. LETTERS 28, 29 (2013) (showing that property rights determine the division of bargaining surplus).

<sup>131</sup> Benito Arruñada, Giorgio Zanarone & Nuno Garoupa, *Property Rights in Sequential Exchange*, 35 J. L., ECON., & ORG. 127, 141–42 (2019).

<sup>132</sup> Bell & Parchomovsky, *supra* note 125, at 241–42, 159.

<sup>133</sup> *Id.* at 241–42.

<sup>134</sup> *Id.*

<sup>135</sup> *Id.* at 159.

*B. Use of Registered and Unregistered Rights in Trademark*

A trademark is a word, logo, or package design, or combination thereof, used by a manufacturer or merchant to identify its goods or services and distinguish them from others.<sup>136</sup> Trademarks include brand names,<sup>137</sup> service marks,<sup>138</sup> certification marks,<sup>139</sup> and collective marks.<sup>140</sup> Importantly, simply using a mark “in commerce” on or in connection with goods or services can allow the user to acquire trademark rights.<sup>141</sup> The first user of a mark is considered its owner, even if someone else has been the first to apply to register the same mark.<sup>142</sup> In this way, registering the mark is not mandatory, as rights in the mark are protected even without registration as long as the mark is actually used in commerce. Some mark owners, for example of international companies, may nevertheless often find it beneficial to buttress their rights by registering their marks with the U.S. Patent and Trademark Office, either before or after use commences in the U.S.<sup>143</sup> Federal trademark registration provides constructive notice of ownership nationwide<sup>144</sup> and is generally preferable as federal rights take precedence over state registration rights and can provide procedural advantages.<sup>145</sup> State trademark registration systems, by contrast, generally are of benefit mostly to local businesses whose marks do not qualify for federal registration.<sup>146</sup>

Usually, federally registered mark owners may use a statutory trademark registration symbol to indicate that their marks enjoy the extra benefits of registration.<sup>147</sup> Like registration itself, marking is not mandatory but is necessary in order to obtain infringement damages under some circumstances.<sup>148</sup> Trademark rights can continue indefinitely as long as the owner does not abandon the mark or permit it to lose its distinctiveness by becom-

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<sup>136</sup> 15 U.S.C. § 1127 (2012); *see* RESTATEMENT (THIRD) OF UNFAIR COMPETITION § 9 (AM. LAW INST. 1995).

<sup>137</sup> 15 U.S.C. § 1127 (2012).

<sup>138</sup> *Id.*

<sup>139</sup> *Id.*

<sup>140</sup> *Id.*

<sup>141</sup> 15 U.S.C. § 1051(a) (2017); alternatively, trademark protection can also be granted based on bona fide intention to use (15 U.S.C. § 1051(b) (2017)); 15 U.S.C. § 1127 (2012). This is the main difference between trademarks, which require actual use to establish the intellectual property right, and patents, which require no actual use of the invention.

<sup>142</sup> *See* 15 U.S.C. § 1051(a) (2017) (explaining applications must include date of first use and any *known* other users/uses of the mark).

<sup>143</sup> *Id.* at § 1126 (2012).

<sup>144</sup> 15 U.S.C. § 1072 (2012).

<sup>145</sup> Lee Ann W. Lockridge, Abolishing State Trademark Registrations, 29 CARDOZO ARTS & ENT. L. J. 598, 599, 603, 605, 607, 610 (2011).

<sup>146</sup> *Id.* at 622–23; *Zirco Corp. v. Am. Tel. & Tel. Co.*, 21 U.S.P.Q.2d 1542 (T.T.A.B. 1991).

<sup>147</sup> 15 U.S.C. § 1111.

<sup>148</sup> *Id.*

ing a generic term.<sup>149</sup> Registrants must maintain their federal registrations at regular intervals by certifying that their marks continue to be in bona fide use in commerce.<sup>150</sup> A trademark owner may license another to use the mark as long as the recipient continues to produce goods of the same nature and quality previously associated with the mark.<sup>151</sup> The mark can also be assigned, but only if the assignment is part of a larger transfer of the business and the goodwill attached to the mark, as well as any existing registrations or pending applications.<sup>152</sup>

Federal trademark law protects a mark against infringement whether or not it is registered.<sup>153</sup> Infringement includes use of an identical or confusingly similar mark on the same or closely related goods or services within the same geographical area or area of natural and likely expansion.<sup>154</sup> The civil remedies available under federal law include: injunctive relief against future infringement;<sup>155</sup> disgorgement of the infringer's profits;<sup>156</sup> damages for past infringement (which may be trebled under federal law);<sup>157</sup> litigation costs;<sup>158</sup> and, in exceptional cases, reasonable attorney's fees.<sup>159</sup> As noted above, however, mark owners may not recover profits or damages under federal law unless they used a statutory trademark registration notice or prove that infringers had actual notice of trademark registration.<sup>160</sup> Infringers may even face criminal penalties for certain forms of trademark infringement.<sup>161</sup>

<sup>149</sup> *Id.* at §§ 1127, 1064; *see* *Saratoga Vichy Spring Co. v. Lehman*, 625 F.2d 1037, 1043 (2d Cir. 1980); *King-Seeley Thermos Co. v. Aladdin Indus.*, 321 F.2d 577, 579 (2d Cir. 1963); *Bayer Co. v. United Drug Co.*, 272 F. 505, 512 (S.D.N.Y. 1921).

<sup>150</sup> 15 U.S.C. §§ 1058–59.

<sup>151</sup> *Id.* § 1127 (defining “certification mark” as a mark an owner allows another to use).

<sup>152</sup> 15 U.S.C. § 1060; *Yokum v. Covington*, 216 U.S.P.Q. 210, 216–17 (T.T.A.B. 1982); *Clark & Freeman Corp. v. Heartland Co.*, 811 F. Supp. 137, 140 (S.D.N.Y. 1993)

<sup>153</sup> 15 U.S.C. § 1125.

<sup>154</sup> *Id.*; *contra* *Polaroid Corp. v. Polarad Elecs. Corp.*, 287 F.2d 492, 495 (2d Cir. 1961), *cert. denied*, 368 U.S. 820 (1961) (denying infringement claim because the “evidence of confusion. . . is not impressive”); *Vitaroz Corp. v. Borden, Inc.*, 644 F.2d 960 (2d Cir. 1981) (denying infringement claim because plaintiff was not going to expand into competitors product area).

<sup>155</sup> 15 U.S.C. § 53(a); *see* *Church of Scientology Int'l v. Elmira Mission of the Church of Scientology*, 794 F.2d 38, 41–42 (2d Cir. 1986).

<sup>156</sup> *See* 15 U.S.C. § 1114 (1).

<sup>157</sup> *See id.* at § 1114(2)(D)(iv); *Taco Cabana Int'l, Inc. v. Two Pesos, Inc.*, 932 F.2d 1113, 1125–27 (5th Cir. 1991), *aff'd*, 112 S.Ct. 2753 (1992).

<sup>158</sup> 15 U.S.C. § 1114(2)(D)(iv).

<sup>159</sup> *Id.*; *Sands, Taylor & Wood v. Quaker Oats Co.*, 34 F.3d 1340, 1347 (7th Cir. 1994).

<sup>160</sup> 15 U.S.C. § 1111.

<sup>161</sup> 18 U.S.C. § 2320; BRIAN T. YEH, CONG. RESEARCH SERV., RL34109, *Intellectual Property Rights Violations: Federal Civil Remedies and Criminal Penalties Related to Copyrights, Trademarks, and Patents*, 24 (2007) (detailing criminal forfeiture as a remedy for trademark infringement); Irina D. Manta, *The Puzzle of Criminal Sanctions for Intellectual Property Infringement*, 24 HARV. J. L. & TECH. 469, 485 (discussing criminal sanctions for trademark infringement).

C. *Use of Registered and Unregistered Rights in Design Protection*

Several jurisdictions offer protection for new unregistered industrial designs once they become publicly available. Most prominent of these protections is in the European Union, which protects unregistered designs under the Community Design Regulation (CDR).<sup>162</sup> This regulation protects an unregistered design for a period of three years from the date it first was made available to the public<sup>163</sup> in a way that specialists in the relevant sector could be reasonably assumed to know of the design.<sup>164</sup> To be eligible for protection, a design must be new<sup>165</sup> and of individual character over prior designs.<sup>166</sup> By contrast, unregistered designs are protected only against infringers who have knowingly copied the protected design;<sup>167</sup> independent creation of a similar design by someone not familiar with the protected design does not qualify as infringement.<sup>168</sup> We have in many ways modeled our proposed unregistered patent system after this unregistered industrial design protection scheme, including its three-year term of protection against knowing copying. The EU model is similar to the U.K. unregistered design right system introduced under the Copyright Designs and Patents Act of 1988.<sup>169</sup> This U.K. law, however, provides for a much longer period of protection than does its EU counterpart. The U.K. version offers a term of protection of up to fifteen years,<sup>170</sup> during which the owner of the design right enjoys “the exclusive right to reproduce the design for commercial purposes.”<sup>171</sup> Similar protections for unregistered designs have been proposed in the U.S.<sup>172</sup> but stalled,<sup>173</sup> despite the argument that such rights that would help both new and established fashion designers by dropping the registration requirement.<sup>174</sup>

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<sup>162</sup> Council Regulation 6/2002, art. 11(1), 2002 O.J. (L 3) 1 (EC); *see also* Charles-Henry Massa & Alain Strowel, *Community Design: Cinderella Revamped*, 2003 EUR. INTELL. PROP. REV. 68, 74 (2003) (providing an overview of the regulation).

<sup>163</sup> Council Regulation 6/2002, art. 11(1), 2002 O.J. (L 3) 1 (EC).

<sup>164</sup> *Id.* art. 11(2).

<sup>165</sup> *Id.* art. 4(1), 5.

<sup>166</sup> *Id.* art. 6.

<sup>167</sup> *Id.* art. 19(2).

<sup>168</sup> *Id.*

<sup>169</sup> Copyright Designs and Patents Act 1988, c. 48, § 213; Massa & Strowel, *supra* note 162, at 68 (describing the twofold structure of the EU regulation, combining registered and unregistered protection).

<sup>170</sup> *Id.* §216.

<sup>171</sup> *Id.* § 226.

<sup>172</sup> *See* Innovative Design Protection and Piracy Prevention Act, H.R. 2511, 112th Cong. (2011) (proposing adding certain protections to fashion items).

<sup>173</sup> *See* Lynsey Blackmon, *The Devil Wears Prado: A Look at the Design Piracy Prohibition Act and the Extension of Copyright Protection to the World of Fashion*, 35 PEPP. L. REV. 107, 136–37 (2007) (noting that opponents of adding fashion to copyright protections find 3 years too long).

<sup>174</sup> *See* Susan Scafidi, *IDPPPA: Introducing the Innovative Design, Protection and Piracy Prevention Act, a.k.a. Fashion Copyright*, COUNTERFEIT CHIC (Aug. 6, 2010), piracy-prevention-act.html [https://perma.cc/P44K-A6EH].

In addition to these unregistered design protections, designers can also avail themselves of registration in order to secure higher levels of protection against use of any identical or insignificantly different design, regardless of independent creation. The EU offers registered designs protection for up to twenty-five years, several times longer in duration than the three years of protection afforded to unregistered designs.<sup>175</sup> Our proposal mirrors this two-tiered structure, offering long-term protection against all infringers of registered rights and short-term protection against only knowing infringers of unregistered rights.

What is particularly salient about the EU's implementation of unregistered design rights, moreover, is that scholars have held it up as a model specifically because of its impact on distributive justice.<sup>176</sup> Registration requires awareness of the law and perhaps even the services of a lawyer, but making registration optional helps designers who are unaware of the law or unable to make the investment necessary to secure the protection of registration.<sup>177</sup> As a result of these same obstacles preventing female inventors from applying for patent protections,<sup>178</sup> patterning a regime of unregistered patent rights on the EU's unregistered design rights regime could have much the same impact on distributive justice among patent holders.

Furthermore, removing the registration requirement, arguably will not create unlimited rights (or substantial harm) since in the fashion bill proposed, for example, the rights are time limited and must meet novelty and originality standards.<sup>179</sup> Registration of rights has long been considered crucial because it both gives competitors notice of what is protected and serves as proof of ownership when rights holders attempt to enforce those rights.<sup>180</sup> That being said, scholars have shown that these functions may be served even without a registry.<sup>181</sup> When the law protects unregistered designs, competitors will presumably come to assume that any original design cannot be copied. Designers for their part keep organized and dated design portfolios, which provide sufficient evidence of either ownership of a particular design or, when defending against infringement of unregistered rights, independent

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<sup>175</sup> Massa & Strowel, *supra* note 162, at 68.

<sup>176</sup> See e.g., Susanna Monseau, *European Design Rights: A Model for Protection of All Designers from Piracy*, 48 AM. BUS. L. J. 27, at 61, 70–71 (2011).

<sup>177</sup> See *id.*

<sup>178</sup> See text accompanying notes 106–18, *supra*.

<sup>179</sup> See Susanna Monseau, *The Challenges of Protecting Industrial Design in the Global Economy*, 20 TEX. INTELL. PROP. L. J. 495, 536–37 (2012).

<sup>180</sup> See Baird & Jackson, *supra* note 123, at 303–04; Bell & Parchomovsky, *supra* note 125, at 241–42, 159.

<sup>181</sup> See SILVIA BAUMGART ET AL., INTELL. PROP. OFFICE, RESEARCH INTO DESIGN INFRINGEMENT: ATTITUDES AND BEHAVIOUR OF DESIGN RIGHTS OWNERS TOWARDS INFRINGEMENT, 31 Figure 17 (2018) (showing that scholars consider unregistered design rights to be quite robust), [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/758496/Design-Rights-Infringement-report-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/758496/Design-Rights-Infringement-report-2018.pdf) [https://perma.cc/W88B-JSPU].

creation.<sup>182</sup> Protection of unregistered designs effectively puts counterfeiters on notice that they risk legal liability if they copy any new industrial design.

Requiring registration, by contrast, tends to benefit established designers, who often have the advantage of professional legal counsel, while disadvantaging less well-funded designers. In two-tiered regimes, owners of registered rights are usually those that are more aware of IPRs.<sup>183</sup> Unregistered rights systems also can help prevent opportunistic behavior by potential free-riders: unregistered rights can deter counterfeiters from copying any new design for the duration of the right.<sup>184</sup> If protection is available only for registered rights, by contrast, counterfeiters are free to copy whatever unregistered designs they like. Rights arising automatically by operation of law rather than by registration may in this way be more equitable by protecting *all* designers against infringement, not just those who have the legal knowledge and resources to register their designs.

In fact, unregistered design rights have even been more effective than registered rights in some contexts. Research on design protections in the United Kingdom indicates that defense of unregistered rights is more often successful in court than that for registered rights.<sup>185</sup> An analysis of court decisions from the years 2013 to 2017 shows that when designers sought to assert their unregistered design rights in court, they were successful nearly 70% of the time.<sup>186</sup> Designers who attempted to defend registered design rights had a much lower rate of success, by contrast, and succeeded in only 50% of cases.<sup>187</sup> In fact, when going to court, claimants are more likely to invoke unregistered rights than they are to invoke registered ones.<sup>188</sup>

#### D. Use of Registered and Unregistered Rights in Copyright

Copyright law seeks to promote literary and artistic creativity by protecting exclusive rights for a limited time in the “Writings” of “Authors.”<sup>189</sup> Copyrightable works include: literary, musical, dramatic, pictorial, graphic and sculptural works; motion pictures and other audiovisual works; sound recordings; computer programs; and pantomimes and choreographic

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<sup>182</sup> Monseau, *supra* note 179, at 537.

<sup>183</sup> SILVIA BAUMGART ET AL., *supra* note 181, at 31.

<sup>184</sup> See Massa & Strowel, *supra* note 162, at 69 (describing the protection that unregistered rights offer against infringement).

<sup>185</sup> SILVIA BAUMGART ET AL., *supra* note 181, at 34.

<sup>186</sup> *Id.*

<sup>187</sup> *Id.*

<sup>188</sup> *Id.* at 33.

<sup>189</sup> U.S. CONST. art. 1, § 8, cl. 8 (Congress has the power “[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.”); Zechariah Chafee, *Reflections on the Law of Copyright*, 45 COLUM. L. REV. 503, 505–07 (1945); William Landes & Richard Posner, *An Economic Analysis of Copyright*, 18 J. LEGAL STUD. 325, 325–33, 344–46 (1989).

works.<sup>190</sup> Copyright protects the particular expression of ideas, not the ideas themselves.<sup>191</sup> Works must be “original” to be protectable,<sup>192</sup> but once rights are established, the author has the exclusive rights to reproduce, distribute, publicly display and perform, and make derivatives from their works, and for some fine artworks, authors also have the right to attribution or modification.<sup>193</sup>

The moment an author has created and fixed a copyrightable work in a tangible form, it automatically enjoys federal copyright protection, whether or not it has been published or registered.<sup>194</sup> Indeed, international agreements such as the Berne Convention and the TRIPS Agreement actually prohibit the requirement of formalities such as registration as a condition for protection.<sup>195</sup> No copyright notice is required or even prescribed for an unpublished work,<sup>196</sup> although owners may affix a statutory copyright notice to all publicly distributed copies of their works to give reasonable notice to others.<sup>197</sup> The general rule for a work created on or after January 1, 1978, is that copyright protection lasts for the author’s lifetime plus seventy years.<sup>198</sup> Individual authors usually own the copyrights in their works,<sup>199</sup> but an employer or party commissioning a work is deemed to be the author of a work made for hire in many circumstances.<sup>200</sup>

Copyright generally only protects against unauthorized use or copying of a work.<sup>201</sup> Unfortunately, actual copying is difficult to prove, a copyright owner must often show instead that the alleged infringer had access to the protected work and that the allegedly infringing copy is substantial similar to it.<sup>202</sup> Federal law in the U.S. nonetheless contains many detailed provisions on what does not constitute infringement such as the use of a basic idea expressed in the work,<sup>203</sup> independent creation of the work, and fair use of

<sup>190</sup> 17 U.S.C. § 102(a) (2000) (requiring protectable works to be independently created and minimally creative).

<sup>191</sup> *Id.* at § 102(b); *Baker v. Selden*, 101 U.S. 99, 100–101 (1879).

<sup>192</sup> *See* 17 U.S.C. § 102(a) (2000); *Feist Publ’ns, Inc. v. Rural Tel. Serv.*, 499 U.S. 340, 345 (1991); Benjamin Kaplan, *An Unhurried View of Copyright*, 43–45 (1967).

<sup>193</sup> 17 U.S.C. § 106 (2000).

<sup>194</sup> *Id.* at § 102(a); H.R. REP. No. 94-1476, at 52–53 (1976).

<sup>195</sup> *See* Berne Convention for the Protection of Literary and Artistic Works, art. 5(2), Sept. 9, 1886, revised at Paris July 24, 1971, 25 U.S.T. 1341, 1161 U.N.T.S. 3 (“the enjoyment and the exercise of copyright shall not be subject to any formality.”).

<sup>196</sup> 17 U.S.C. § 401(a) (2000) (stating that when a work is published, a notice of copyright may be placed on publicly distributed copies).

<sup>197</sup> *Id.* at § 401.

<sup>198</sup> *Id.* at § 302(a); H.R. REP. No. 94-1476, at 133–36 (1976); Chafee, *supra* note 189, at 719–21, 725–27, 729–30 (1945).

<sup>199</sup> 17 U.S.C. § 201(a) (2000).

<sup>200</sup> *Id.* at § 201(b) (establishing ownership rights of works made in the scope of one’s employment or by commission).

<sup>201</sup> 17 U.S.C. § 106, 501(a) (2000).

<sup>202</sup> *See, e.g., Ringgold v. Black Entm’t Television, Inc.*, 126 F.3d 70, 74 (2d Cir. 1997); Alan Latman, “*Probative Similarity*” as Proof of Copying: Toward Dispelling Some Myths in Copyright Infringement, 90 COLUM. L. REV. 1187, 1888 (1990).

<sup>203</sup> 17 U.S.C. § 102(b) (2000).



the work for transformative purposes, such as criticism, comment, news reporting, teaching, scholarship, or research.<sup>204</sup>

Although copyright protections now apply automatically, registration and other formalities were prerequisites for protection in the United States prior to 1976.<sup>205</sup> Today, registration remains an option and offers an added level of protections. For example, registration creates a presumption of constructive notice that the registered work is protected under copyright.<sup>206</sup> Registration is also a prerequisite for initiating infringement actions for works of U.S. origin.<sup>207</sup> Current law likewise limits recovery of statutory damages and attorney's fees to cases of infringement occurring after registration<sup>208</sup> but disallows the defense of non-willful infringement for works marked with copyright notices.<sup>209</sup> Recording transfers with the Copyright Office also creates a presumption of constructive notice,<sup>210</sup> but is not a prerequisite for infringement actions or a limit on infringement damages.<sup>211</sup> Copyright registration and recordation offer several advantages for copyright owners, but authors can enjoy copyright protections even absent registration. The dual structure of the copyright system thus demonstrates the feasibility of our proposed unregistered patent rights regime in that they both combine different levels of protection for registered and unregistered rights.

### E. Patent Law as the Exception

Among the different types of IPRs, patent remains the exception. Unlike copyright, design, and trademark law, patent law protects an invention only upon registration: in the case of patents, governments will issue patents only through application to and examination by a patent office.<sup>212</sup> During examination, the patent office will determine whether the patent application demonstrates that the subject invention meets the various rigorous standards

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<sup>204</sup> *Id.* at § 107; *Campbell v. Acuff-Rose Music, Inc.*, 510 U.S. 569, 579 (1994); *Harper & Row Publ'g, Inc., v. Nation Enters.*, 471 U.S. 539 (1985).

<sup>205</sup> *Id.* at § 102(a); Berne Convention for the Protection of Literary and Artistic Works, art. 5(2), Sept. 9, 1886, revised at Paris July 24, 1971, 25 U.S.T. 1341, 1161 U.N.T.S. 3 (registration is not a prerequisite for copyright protection).

<sup>206</sup> 17 U.S.C. § 410(c) (2000).

<sup>207</sup> *Id.* at § 411. A flat ban on enforcement of an unregistered copyright was believed to violate the Berne Convention. There is no registration prerequisite to bringing suit for infringement of a work of foreign origin. See *Final Report of the Ad Hoc Working Group on U.S. Adherence to the Berne Convention*, 10 COLUM.-VLA J. L. & ARTS 513, 572–73 (1986).

<sup>208</sup> 17 U.S.C. § 412 (2012).

<sup>209</sup> *Id.* at § 401(d).

<sup>210</sup> *Id.* at § 205(c). The law continues to require deposit, but punishes failure to comply with a fine, rather than with forfeiture of the copyright. *Id.* § 407(d).

<sup>211</sup> See Berne Convention for the Protection of Literary and Artistic Works, art. 5(2), Sept. 9, 1886, revised at Paris July 24, 1971, 25 U.S.T. 1341, 1161 U.N.T.S. 3 (“the enjoyment and the exercise of copyright shall not be subject to any formality.”).

<sup>212</sup> 35 U.S.C. § 111 (2012) (patent requires written application); Dan L. Burk & Mark A. Lemley, *The Patent Crisis and How the Courts Can Solve It*, Ch. 2, 9 (2009) (describing the formal requirements involved in patent application).

for patentability: (a) novelty;<sup>213</sup> (b) nonobviousness;<sup>214</sup> and (c) utility.<sup>215</sup> Only the first inventor to file a patent application is eligible for patent protection.<sup>216</sup> Inventions may be patented on a country-by-country basis, although a centralized filing procedure is available under the Patent Cooperation Treaty<sup>217</sup> or the regional European Patent Convention.<sup>218</sup>

United States law offers a variety of patents, the most well-known of which is a utility patent for new and useful processes, machines, articles of manufacture, and compositions of matter.<sup>219</sup> Design patents protect new ornamental designs for article of manufactures,<sup>220</sup> and plant patents protect new varieties of asexually reproducing plants.<sup>221</sup> Utility and plant patents usually last for twenty years from date of filing<sup>222</sup> but may expire earlier if the patentee does not pay the periodically required maintenance fees.<sup>223</sup> The patent term also may be extended under very particular circumstances.<sup>224</sup> A design patent, by contrast, lasts fifteen years from the date of issuance.<sup>225</sup>

Once granted, a patent provides the right to exclude all others from making, using, selling, or offering an invention for sale, regardless of independent invention or even awareness of the patentee's rights.<sup>226</sup> In addition it protects against the importation, use, or sale in the U.S. of a product made from a patented process without authorization.<sup>227</sup> While no criminal penalties apply to patent infringement, the following civil remedies are available under federal patent law: (a) an injunction against future infringement;<sup>228</sup> and (b) damages, in no event less than a reasonable royalty,<sup>229</sup> which may be trebled.<sup>230</sup> Notwithstanding, a patent does not necessarily provide a patentee with the affirmative right to practice her own invention because the patent may be blocked by one or more other patents on complementary or included

<sup>213</sup> 35 U.S.C. § 102 (2000) (requiring that the invention was never before publicly available); see BURK & LEMLEY, *supra* note 212, at 9 (discussing the novelty requirement).

<sup>214</sup> 35 U.S.C. § 103 (2012); Burk & Lemley, *supra* note 212, at 9.

<sup>215</sup> 35 U.S.C. § 101 (2012); Burk & Lemley, *supra* note 212, at 9.

<sup>216</sup> 35 U.S.C. § 102(A)(1) (2012); Burk & Lemley, *supra* note 212, at 10.

<sup>217</sup> Patent Cooperation Treaty art. 1, June 19, 1970, 28 U.S.T. 7645, 1160 U.N.T.S. 231 (as in force from Apr. 1 2002).

<sup>218</sup> Convention on the Grant of European Patents (European Patent Convention), Oct. 5, 1973, as amended, 1065 U.N.T.S.

<sup>219</sup> 35 U.S.C. § 101 (2012); Burk & Lemley, *supra* note 212, at 9.

<sup>220</sup> 35 U.S.C. § 171 (2012); Burk & Lemley, *supra* note 212, at 8.

<sup>221</sup> 35 U.S.C. § 161 (2012); Burk & Lemley, *supra* note 212, at 8.

<sup>222</sup> 35 U.S.C. § 154(a)(2) (2012).

<sup>223</sup> *Id.* at § 41(b).

<sup>224</sup> See, e.g., *id.* § 154(b) (allowing patent term adjustments for PTO-caused delays in patent examination).

<sup>225</sup> *Id.* § 173.

<sup>226</sup> *Id.* § 154(d).

<sup>227</sup> *Id.*

<sup>228</sup> *Id.* § 283(a).

<sup>229</sup> *Id.* § 284.

<sup>230</sup> *Id.*

technologies.<sup>231</sup> The only formality that is not mandatory in the U.S. patent system is marking the invention with the word “patent” or “pat.” and the number of the patent.<sup>232</sup> Nonetheless, while failure to mark does not invalidate patent protection, it does preclude a patentee from obtaining infringement damages, unless the patentee can prove that the infringer received notice of the patentee’s rights.<sup>233</sup>

The only alternative to applying for patent protection is trade secrecy. Under U.S. law, inventors can opt for automatic, unregistered rights under state law,<sup>234</sup> but this protection requires that the secret owner undertake reasonable measures to maintain secrecy.<sup>235</sup> Trade secrecy also provides much less robust protections than patents and protects against only “wrongful” or “improper” acquisition or use of the secret but not against independent creation or even innocent copying.<sup>236</sup> With the exception of trade secret’s fairly weak form of protection for unregistered secret inventions, however, current law offers no automatic protection for unregistered inventions.

### III. THE PROPOSED REGIME: UNREGISTERED PATENT

Despite the large body of scholarship documenting the gender gap in patent rights, we have yet to gain a full understanding of why women continue to be underrepresented in the patent system. One thing that seems clear is that women face biases in accessing patent protections.<sup>237</sup> Reform of the existing patent system could therefore help ameliorate the patent gender gap. Until we reach gender parity, which current estimates suggest will not occur until the year 2080,<sup>238</sup> we must consider ways to narrow the gender gap and protect and incentivize female innovation.

#### A. *The Operation of Unregistered Patent*

We propose a new approach for narrowing the gender gap. As a temporary measure, until such time that women no longer face such steep obstacles in obtaining access to patent protections, we propose implementing an unre-

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<sup>231</sup> Mark A. Lemley, *Patenting Nanotechnology*, 58 STAN. L. REV. 601, 618–21 (2005) (describing the problem of patent “thickets,” whereby separate patents can cover different aspects of the same product or technology).

<sup>232</sup> *Id.* § 287.

<sup>233</sup> *Id.*

<sup>234</sup> Uniform Trade Secrets Act, 18 U.S.C. § 1839; RESTATEMENT (THIRD) OF UNFAIR COMPETITION § 39 (AM. LAW INST. 1995) (defining a “trade secret” as “any information that can be used in the operation of a business or other enterprise and that is sufficiently valuable and secret to afford an actual or potential economic advantage over others”).

<sup>235</sup> See Robert G. Bone, *A New Look at Trade Secret Law: Doctrine in Search of Justification*, 86 CAL. L. REV. 241, 248 (1998).

<sup>236</sup> *Id.* at 250; see also 18 U.S.C. § 1839.

<sup>237</sup> See Jensen et al., *supra* note 72, at 307–08.

<sup>238</sup> Martinez et al., *supra* note 6, at 21.

gistered patent rights regime as an alternative for women and other disadvantaged inventors to protect their inventions. The regime would be limited in scope and term but would provide women with a degree of protection regardless of registration.

Such an approach would address many of the possible reasons for why women file fewer patent applications and receive fewer and narrower patent rights: bias, lack of funding to prepare and file patent applications, lack of knowledge about patent rights, eligibility concerns, and lack of confidence in the patentability of their inventions. As noted above, copyright, trademark, and industrial design protection law all offer two avenues of protection, one for registered rights and another for unregistered rights.<sup>239</sup> Only patent law remains a holdout in requiring registration to obtain protection, despite the fact that women inventors are disproportionately less likely to apply for patent protection.<sup>240</sup> As patent law's insistence on requiring registration likely contributes to the gender gap in patenting, an unregistered patent regime would go far in providing greater protection for female innovators.

We propose that the new regime be introduced through an amendment to the current Patent Act.<sup>241</sup> The new regime would be consistent with the IP clause of the U.S. Constitution because it would help promote progress in the useful arts by all inventors, women and men alike. Notably, the new regime would only be temporary and would require periodic evaluation to measure how much of a gender gap in patent filings still persists. The proposed unregistered patent regime also would offer inventions only a very limited form of patent protection and only as an addition to the traditional registered patent regime. As noted above, our proposal is modeled on the existing unregistered industrial design protection scheme and simply extends already familiar IP mechanisms into the area of patent law.<sup>242</sup> All inventors would be eligible for protection under our proposal, including both female and male inventors, but protection would be subject to meeting certain threshold requirements identical to those required by the current registered patents regime, including subject matter eligibility,<sup>243</sup> novelty,<sup>244</sup> utility,<sup>245</sup> and non-obviousness.<sup>246</sup>

For all inventions meeting those patentability standards protection would automatically attach as soon as the inventions are made publicly available. Public availability would occur when the invention is published,

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<sup>239</sup> See *supra* Part II.B-D.

<sup>240</sup> See Kanze et al., *supra* note 4, at 588; Milli et al., *supra* note 4; Martinez et al., *supra* note 6, at 6–8.

<sup>241</sup> 35 U.S.C.

<sup>242</sup> See *supra* Part II.C.

<sup>243</sup> 35 U.S.C. § 101 (2012) (subject-matter eligibility means the patent falls under one of the familiar categories of utility patent, design patent or plant patent).

<sup>244</sup> 35 U.S.C. § 102 (2012); Burk & Lemley, *supra* note 212, at 9.

<sup>245</sup> 35 U.S.C. § 101 (2012); Burk & Lemley, *supra* note 212, at 9.

<sup>246</sup> 35 U.S.C. § 103 (2012); Burk & Lemley, *supra* note 212, at 9.

exhibited, used in trade, or otherwise disclosed in such a way that the invention could reasonably become known to the public. For newly invented processes, the unregistered patent protections would attach once the processes are made public through publication or once the products affected by the processes have been made public. In this way, our proposed unregistered rights system would also be similar to the rules regarding “publicly available” inventions under the current patent regime’s novelty doctrine.<sup>247</sup>

In terms of protection, our unregistered patent system would grant rights only against infringers who directly and knowingly copy the subject invention. The inventor would also have the right to exclude others from unauthorized dealing—e.g., importation, possession, sale, leasing, or offering to sell or lease—any such infringing copies of the subject invention provided that the parties doing so know or have reason to believe that they are dealing with an infringing product or process. Moreover, these rights would extend to copies that are identical or substantially the same as the subject invention. Independent creation would always be an absolute defense to infringement of such unregistered patent rights, however.

Under our proposal, an inventor also would be entitled to a presumption of validity of her unregistered patent rights and would not need, at least initially, to prove that her invention meets the various patentability requirements. To enforce her rights, she would nonetheless need to establish the date on which her invention was made public, as well as the fact that the alleged infringer actually copied her invention. Once she establishes these threshold requirements, on the other hand, the alleged infringer would then have the opportunity to challenge the validity of the inventor’s unregistered rights. Moreover, the defendant would have to do so only by a preponderance of the evidence rather than by the clear and convincing evidence standard currently used in the registered patent regime.<sup>248</sup> Given that our unregistered patents would not have previously been vetted by a patent office, an adjudicating court would have no need to defer to patent office expertise under a presumption of validity rebuttable only by clear and convincing evidence.<sup>249</sup>

Similar to unregistered industrial design rights, our proposed unregistered patent protections would last for only three years from the first publication of the invention. The inventor would remain eligible to apply for registered patent protections but must do so within one year of the date on which the invention was first made public. This provision is thus consistent

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<sup>247</sup> See *Helsinn Healthcare S.A. v. Teva Pharm. USA, Inc.*, 139 U.S. 628, 684 (2019); *Metallizing Eng’g Co. v. Kenyon Bearing & Auto Parts Co.*, 153 F.2d 516, 518 (2d Cir. 1946).

<sup>248</sup> 35 U.S.C. § 282.

<sup>249</sup> See *id.* (awarding presumption of validity to issued patents); *Microsoft Corp. v. I4I Ltd. P’ship*, 564 U.S. 91, 97–98 (2011) (noting that § 282 has long been interpreted as requiring clear and convincing evidence to rebut the presumption that PTO correctly issued a patent).

with the existing U.S. patent system's one-year grace period for novelty for inventors that publicly disclose their inventions prior to filing under 35 U.S.C. § 102(b) of the America Invents Act. Under this effective "first-to-file-or-first-to-publicly-disclose" system, public disclosure up to a year before filing allows an inventor to set a *de facto* priority date that can trump the priority dates of even those who filed their patent applications before the disclosing inventor.<sup>250</sup> Allowing inventors to establish priority in this way gives both registered and unregistered rights holders the incentive to disclose their inventions publicly as soon as possible. This one-year grace period would not give inventors much time to prepare and file their patent application, but it does at least provide both registered and unregistered rights holders the right to prevent others from copying their inventions during that time.

If the inventor does opt to file for registered rights, she would be eligible for the full twenty-year patent protection term under the registered patent regime. An inventor protected under unregistered patent rights, however, would not automatically be entitled to registered patent rights, even if her unregistered patent rights were found to be valid by a court of law. Instead, the inventor would need to undergo full examination before the patent office. This process would ensure that the patent office maintains authority to issue registered patents. If an inventor does not ultimately file for registered patent protection, she would still have the full three-year period of protection under her unregistered rights.

For unregistered patents, moreover, an inventor would not have to pay any filing fees. Patent rights would attach automatically once the inventor meets the threshold requirements, protecting inventors who are not even aware of the unregistered patent regime *ex-ante*. Inventors who are or become aware of their unregistered rights can license or assign those rights in much the same fashion as registered patent rights, and the remedies for infringement would include both injunctions and damages. Our proposed unregistered patent regime could include incentives for informed inventors to mark their inventions, such as the opportunity to seek attorneys' fees.<sup>251</sup> As under the registered patent regime, such marking would have to provide the public with clear information regarding the existence of unregistered patent rights, including the duration of the rights.

Our proposed unregistered patent rights regime would overcome many of the hurdles that women face under the current registered patent regime. First, no registration, examination, or renewal fees would be required as a precondition to applying for and maintaining patent protection. Second, no lengthy, pricey, and biased patent prosecution is required. The costs of filing a patent application are prohibitively high and create a major hurdle to acquiring patent protection. Third, our system requires no awareness or moti-

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<sup>250</sup> See Merges & Duffy, *supra* note 73, at 390–91.

<sup>251</sup> Cf. text accompanying notes 199–202, *supra* (discussing similar incentives for authors to register their copyrightable works).

vation to file, thereby addressing possible knowledge gaps regarding patentability and the patent system generally. Fourth, the automatic protections under our proposed system would help attract investors to commercialize the subject inventions, as investors will have the assurance that the inventions—and hence, their investments—are protected automatically upon publication for at least three years. Fifth, such a regime could arguably provide female inventors with better leverage in the market regarding their inventions. Once protected, women inventors may more likely learn about the legal rights to which they are entitled and to enforce those rights *ex post* if necessary. Sixth, and very importantly, such a regime could bring about a major cultural change in attitudes toward female innovation. Granting automatic protection for inventions would empower female inventors and help them acquire more awareness of and motivation to enforce their rights. Seventh, implementing such an unregistered patent regime could also have educational value by creating greater awareness of the inequalities inherent in the patent system. As a consequence, market players, the government, and society at large could become more motivated to address the gender gap in innovation and patenting through other additional measures, such as educational initiatives, greater support for female inventors, and rules against discrimination.

### B. *The Costs and Benefits of Unregistered IPRs for Gender Equality*

Our proposal to create a system of unregistered rights to help level the playing field for female inventors may be seen as an overextension of patent protection in exchange for little or no effective gain. What we propose here, however, is merely an interim measure and a relatively modest one at that. In the discussion below, we address in turn the main criticisms that our proposed unregistered patent rights regime could fail to show how our proposal is narrowly tailored enough to help compensate for the disadvantages that women and others may face in protecting their inventions while avoiding undue effects on technological progress overall.

The most obvious criticism of our proposed regime is that the patent system has been the one area of intellectual property law that has steadfastly resisted the institution of unregistered rights for good reason. Over history various countries have instituted less demanding procedures for obtaining patents, but none has ever created a purely automatic, unregistered patent system. For example, prior to 1836 the United States had a “registration” system in which inventors had to file applications for protection but the applications were granted without substantive examination.<sup>252</sup> A number of countries also grant utility model protections (often referred to as “petty patents”), which also require only registration but often little or no examina-

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<sup>252</sup> Christi J. Guerrini, *The Decline of the Patent Registration Exam*, 91 NEB. L. REV. 325, 331 (2012).

tion.<sup>253</sup> Both the registration and utility model patent systems acknowledge that many patent applications may not be worth the investment necessary for full examination, but neither suggests that it is not worthwhile to invest in at least requiring patentees to apply for and record their patent rights.<sup>254</sup> Indeed, the fact that no jurisdiction has ever granted completely unregistered, “unconditional” patent rights is presumably based on concerns that the potential dangers from such a system would far outweigh any benefits.<sup>255</sup> Otherwise, the patent system would have followed already in the footsteps of copyright, trademark, design, and trade secrecy law.

Indeed, critics could argue that the differences between patents, on the one hand, and copyrights, trademarks, designs, and trade secrets on the other are significant in ways that may make unregistered rights more harmful in the patent system. All IPRs can, if improvidently granted with a scope that is too broad or in numbers that are too large, work to hinder rather than help technological progress.<sup>256</sup> Granting patents too lavishly or easily, for example, leads to hold-outs, patent thickets, patent “trolling,” and other phenomena that inefficiently deter other inventors from working on worthwhile projects for fear of infringing another’s patents.<sup>257</sup> To make matters worse, unlike other IPR forms, patent law has very few safety valves to protect inventors from opportunistic claims of infringement and from over-detering others from using and building on existing technologies.<sup>258</sup>

For instance, both copyright and trade secrecy allow independent creation as a complete defense to infringement,<sup>259</sup> but independent creation is no defense to patent infringement, which is a strict liability offense and obtains

<sup>253</sup> See, e.g., Richard H. Stern, *A Sui Generis Utility Model Law as an Alternative Legal Model for Protecting Software*, 1 U. BALT. INTELL. PROP. L.J. 108, 112 (1993); Peter A. Cummings, Note: *From Germany to Australia: Opportunity for a Second Tier Patent System in the United States*, 18 MICH. ST. J. INT’L L. 297, 300 (2010).

<sup>254</sup> See, e.g., Christopher Sprigman, *Reform(aliz)ing Copyright*, 57 STAN. L. REV. 485, 487 (2004) (noting that registration and other “formalities” lower costs of identifying rights holders).

<sup>255</sup> Cf. *Kahle v. Ashcroft*, No. C-04-1127 MMC, 2004 WL 2663157, at \*3 (N.D. Cal. Nov. 19, 2004) (referring to unregistered copyrights as “unconditional”).

<sup>256</sup> See, e.g., Robert G. Harris, *Patent Assertion Entities & Privateers: Economic Harms to Innovation and Competition*, 59 ANTITRUST BULL. 281 *passim* (2014) (explaining how overly dispersed patent ownership gives nonpracticing owners – “trolls” – leverage to demand disproportionate shares of profits); Mark A. Lemley, *Patenting Nanotechnology*, 58 STAN. L. REV. 601, 618–21 (2005) (noting how overpatenting can cause “thickets” in which patent rights are dense and overlapping); see also Jonathan M. Barnett, *The Anti-Commons Revisited*, 29 HARV. J.L. TECH. 127 *passim* (2015) (examining empirically whether markets can coordinate overly fragmented patent rights or “anti-commons”).

<sup>257</sup> Harris, *supra* note 256, at 281.

<sup>258</sup> Some scholars doubt the effectiveness of such safety valves in buffering against the negative effects of IPRs on others. See, e.g., Sprigman, *supra* note 254, at 526–27.

<sup>259</sup> See, e.g., *Feist Publications, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 345 (1991); *Procter & Gamble Co. v. Colgate-Palmolive Co.*, 199 F.3d 74, 77–78 (2d Cir. 1999); Trademark law does not allow an independent creation defense, however. See, e.g., *Blendco, Inc. v. Conagra Foods, Inc.*, 132 Fed. App’x 520, 523 (5th Cir. 2005).



even if the alleged infringer had no idea that the invention was patented.<sup>260</sup> Patent law also lacks the fair-use defense, which limit both copyright and trademark rights and allow others to copy protected marks or expression without liability in certain circumstances.<sup>261</sup> The only safety valves that patent law does possess are very narrow and seldom applicable. Prior-user right exceptions to patent infringement are common in a number of countries but apply only to those who were using an invention, often only if in a commercial setting, before another independent creator filed an application to patent that invention.<sup>262</sup> Likewise, many countries allow experimental-use exceptions to patent infringement, but only for the clinical trials needed for regulatory approval of pharmaceuticals.<sup>263</sup> A few other more specific exceptions exist, such as the U.S. patent system's Section 287(c) exemption from damages for infringement of patents on "medical activit[ies]" by "medical practitioner[s]" and "related health care entit[ies]" but these exceptions are even more constrained.<sup>264</sup> Given that patent rights are so broad, it makes sense that, although both patent and copyright rights historically had to be granted—the former through "letters patent"<sup>265</sup> and the latter through either a license from the printing guild<sup>266</sup> or, later, through registration and deposit under the Statute of Anne<sup>267</sup>—patent law has not loosened registration and examination as prerequisites in the same way that copyright has. The patent

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<sup>260</sup> *Commil USA, LLC v. Cisco Sys., Inc.*, 135 S. Ct. 1920, 1926 (2015) (recognizing that patent infringement is a strict liability offense); *Kewanee Oil Co. v. Bicon Corp.*, 416 U.S. 470, 490 (1974) (noting that independent creation is no defense to patent infringement).

<sup>261</sup> Gideon Parchomovsky & Alex Stein, *Intellectual Property Defenses*, 113 COLUM. L. REV. 1483, 1505 (2013) (explaining that fair use allows descriptive use of another's trademark); Elizabeth L. Rosenblatt, *Intellectual Property's Negative Space: Beyond the Utilitarian*, 40 FLA. ST. U. L. REV. 441, 452 (2013) (describing fair use as "use-based carve-out areas" from copyright infringement liability). Copyright law in the U.S. also contains a number of compulsory licenses, and other countries do avail themselves of compulsory licensing of patents as well, as allowed under the TRIPS agreement. In the U.S., rights holders have thus far successfully resisted compulsory licensing of trade secrets, trademarks, and patents.

<sup>262</sup> U.S. PATENT AND TRADEMARK OFFICE, REPORT ON PRIOR USER RIGHTS, 2-3 [https://www.uspto.gov/sites/default/files/ip/global/prior\\_user\\_rights.pdf](https://www.uspto.gov/sites/default/files/ip/global/prior_user_rights.pdf). [<https://perma.cc/WA2X-33WJ>].

<sup>263</sup> See Hans-Rainer Jaenichen & Johann Pitz, *Research Exemption/Experimental Use in the European Union: Patents Do Not Block the Progress of Science*, 5 COLD SPRING HARBOR PERSP. MED. (2015) (describing the status of the experimental-use exception in EU member states).

<sup>264</sup> 35 U.S.C. § 287(c) (2012); see also Cynthia M. Ho, *Patents, Patients, and Public Policy: An Incomplete Intersection* at 35 U.S.C. § 287(c), 33 U.C. DAVIS L. REV. 601, 641-45 (2000) (noting that § 287(c) gives immunity for use of only a relatively narrow range of patented medical procedures).

<sup>265</sup> On the practice of "letters patent" and its historical origins, see Hulme, E. Wyndham, *Privy Council Law and Practice of Letters Patent for Invention From the Restoration to 1794*, 33 L.Q. REV 63 (1917).

<sup>266</sup> MARK ROSE, AUTHORS AND OWNERS: THE INVENTION OF COPYRIGHT 4, 12, 51 (1995)

<sup>267</sup> 8 Ann. c. 21; or 8 Ann. c. 19.

system must provide greater notice of what constitutes infringement because it provides fewer defenses to infringement.

Similarly, because of the frequently cumulative and complementary nature of technological development, granting patent rights that are too broad, too long in duration, or too numerous would unduly deter further inventors.<sup>268</sup> The patent system therefore relies on its rather stringent patentability requirements—novelty, non-obviousness, utility, subject matter eligibility, and full disclosure—as pivotal in reducing the risks of either inadvertent infringement or hindering technological development.<sup>269</sup> Rather than creating exceptions to patent protection, patent law uses its various patentability requirements instead to reduce the number and scope of patents issued.<sup>270</sup> In addition, patent terms are far more limited in duration than those in copyright, trademark, design, or trade secret law so as to guarantee that the inventions that are protected under patents are released into the public domain sooner rather than later.<sup>271</sup> Even the patent system's novelty requirement (along with the former "statutory bars" under U.S. law) forces inventors to file their patent applications as early as possible so that their twenty-year patent terms expire as early as possible.<sup>272</sup> Unconditional patent rights granted without examination or even registration at first glance appear to completely dismantle this complex scheme of carefully cabining patent law's otherwise robust rights of exclusivity.<sup>273</sup>

Our proposal also carefully and narrowly cabins patent rights, by contrast. First, our proposed regime extends unregistered protections only to those inventions that meet all of the same stringent patentability requirements that apply to issued patents, thereby preserving the primacy of those requirements as substantive limits on the patent franchise. Second, our proposal would protect only against copying, not independent creation, thereby creating a safe harbor for most potential patent infringers.<sup>274</sup> Third, our proposed unregistered rights would last for only three years, creating another significant safe harbor for those who wait before copying another's invention. Furthermore, onset of this three-year period of protection is automatically triggered upon the first moment that the subject invention becomes

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<sup>268</sup> Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1612–13 (2003); Richard R. Nelson, *The Market Economy, and the Scientific Commons*, 33 RES. POL'Y 455, 464 (2004).

<sup>269</sup> LANDES & POSNER, *supra* note 2, at 302–08; Chung-Lun Shen, *Patent Infringement and Reasonable Allowance of New Technologies in Claim Construction*, 25 DEPAUL J. ART, TECH. & INTELL. PROP. L. 293, 308–09 (2015).

<sup>270</sup> Burk & Lemley, *supra* note 268, at 1575–6, 1612–13.

<sup>271</sup> LANDES & POSNER, *supra* note 2, at 295; Gregory N. Mandel, *The Public Perception of Intellectual Property*, 66 FLA. L. REV. 261, 267 (2014).

<sup>272</sup> See Robert P. Merges & John F. Duffy, *Patent Law and Policy: Cases and Materials* 509–10 (4th ed. 2007).

<sup>273</sup> For a description of this system of checks and balances, see Burk & Lemley, *supra* note 268, at 1575–6, 1612–13.

<sup>274</sup> Cf. JAMES BESSEN & MICHAEL J. MEURER, *PATENT FAILURE*, 123–24 (2008) (noting that most alleged patent infringers are second-in-time inventors, not copyists).

“public,” in much the same way that patent law’s novelty and former statutory bar provisions start the clock ticking for patent eligibility. These constraints establish significant safety valves to protect other inventors against unregistered patent rights placing undue burdens on their own inventive efforts.

Nonetheless, while our proposed unregistered rights regime does not extend the scope of patent protection, it might extend the effective duration of that protection. Existing issued patents offer protection for only twenty years after an inventor files her application and begins the examination process. Why should we now propose giving inventors the option of protecting their inventions for another three years before they even file their patent applications? Our proposal at most confers only one year of additional protection pre-filing, however; inventors who do not file patent applications within one year of the time their inventions become public will forfeit issued patent protection altogether, leaving them with only the remaining two years of their unregistered patent rights. In this way, our proposed regime simply mirrors what current patent laws already do under their novelty (or statutory bar) provisions. Almost all countries allow inventors to disclose their inventions publicly up to a year before filing without anticipating themselves or otherwise being barred from patent eligibility.<sup>275</sup> Both our proposal and existing law provide inventors with up to twelve months of a “grace period” before forcing them to apply for or forgo full patent protection by the patent office.<sup>276</sup> Moreover, under U.S. patent law, inventors who publicly disclose their inventions up to twelve months before filing also preempt all other, later disclosed third-party prior art,<sup>277</sup> effectively helping inventors extend their exclusive rights by as much as another year. As noted above, in many ways our proposed unregistered rights preserve the same maximum effective duration of protection allowed under existing U.S. patent law. Granted, even under U.S. patent law patentees cannot sue others for infringement occurring in that first pre-filing year, the way they would be able to under our proposal. Nonetheless, under both systems, an inventor who applies for registered patent rights within a year of publicly disclosing her invention can force others to wait to practice the invention until the twenty-first year after that initial pre-filing disclosure.

While our proposed unregistered rights regime does not enlarge or prolong patent protection but simply makes it more accessible, critics of our proposal nevertheless might argue that unregistered patent rights would cause harm by exacerbating the problem of “bad” patents. Many commenta-

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<sup>275</sup> WORLD INTELLECTUAL PROP. ORG., CERTAIN ASPECTS OF NATIONAL REGIONAL PATENT LAWS (March 2019), [https://www.wipo.int/export/sites/www/scp/en/national\\_laws/grace\\_period.pdf](https://www.wipo.int/export/sites/www/scp/en/national_laws/grace_period.pdf) [<https://perma.cc/Q2MS-V9UQ>].

<sup>276</sup> *Id.* Several countries provide grace periods of only six months and for only some types of public disclosures, however.

<sup>277</sup> 35 U.S.C. § 102(b)(1)(B) (2012). Prior art is any existing knowledge, usually in the same field as the invention, used to measure patentability.

tors argue that even under patent law's currently rigorous application and examination scheme, too many low quality patents are clogging up the system, motivated by the first-to-file system, and weighing down technological progress.<sup>278</sup> Scholars like Professors Fagundes and Masur, for example, argue that patents are much more likely to cover inventions that are of "low social value" than copyrights are to cover expressive works of low value.<sup>279</sup> For this reason, they argue, the high cost of the patent application and examination process is absolutely imperative, if not wholly sufficient, means of screening out bad patents and discouraging bad patent applications, even if those costs might cause inventors to forgo patent rights.<sup>280</sup>

An unregistered patent system could increase the number of such "bad" patents, both by bypassing patent office examination procedures and by increasing the overall quantity of patents. As with issued patents, however, our proposed unregistered patent rights would always be subject to judicial review of whether protection is warranted under the existing patentability standards. In this way, our proposal takes a page from similar proposals by Professors Kieff and Lemley for a "soft-look," registration-only approach to patent applications filed at the PTO, under which the courts (or post-grant review at the PTO) would examine the patentability of only the small minority of inventions that give rise to infringement litigation.<sup>281</sup> Just as the costs of filing for patent protection for every invention are prohibitively high for many inventors, the costs of ensuring that every patent issued is a "good" one are prohibitively high for the PTO.<sup>282</sup> Our proposal to allow patent protection without examination or registration is thus unlikely to increase the number of "bad" patents.

That being said, critics may argue that by adding to the overall volume of patent rights, whether "good" or "bad," our proposal could add to the overdeterrent effect of patent rights. Regardless of their validity, intellectual property rights can wield an *in terrorem* effect—because of the costs of litigation and the uncertainty of proving invalidity, the public will often give

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<sup>278</sup> See, e.g., Christopher A. Cotropia, *The Folly of Early Filing in Patent Law*, 61 HASTINGS L.J. 65, 69–71 (2009) (criticizing the first-to-file system and other aspects of patent law). Low-quality patents are those that do not truly meet the patentability requirements or are thought to be unnecessary.

<sup>279</sup> David Fagundes & Jonathan S. Masur, *Costly Intellectual Property*, 65 VAND. L. REV. 677, 679, 726–28 (2012). That being said, Fagundes and Masur do not specify how they measured social value for either patented or copyrighted creations and instead seem to rely on the idea that inventions of low economic value necessarily lead to patents of low social value. See, e.g., *id.* at 686 n.21 (stating that "[a] patent with low private value will have low social value, but a patent with low social value will not necessarily have low private value" because patentees can still profit from patents on "low social value" inventions by threatening and thereby extorting fees from others) (citing Jonathan S. Masur, *Costly Screens and Patent Examination*, 2 J. LEGAL ANALYSIS 687 (2010)).

<sup>280</sup> See Fagundes & Masur, *supra* note 279, at Pt. IV.

<sup>281</sup> F. Scott Kieff, *The Case for Registering Patents and the Law and Economics of Present Patent-Obtaining Rules*, 45 B.C. L. REV. 55, 58–59 (2003); Mark A. Lemley, *Rational Ignorance at the Patent Office*, 85 NW. U. L. REV. 1495, 1495–1597 (2001).

<sup>282</sup> See Kieff, *supra* note 281, at 59; Lemley, *supra* note 281, at 1497–1500.

the IPRs a much wider berth than they merit.<sup>283</sup> Patents also have even more potential to “block” others’ efforts than copyright, trade secrecy, and trademark rights do because of patent law’s lack of independent creation, fair use, and other defenses.<sup>284</sup> Technology may be more incremental, cumulative, or complementary than expressive works, trademarks, or trade secrets,<sup>285</sup> and inventive concepts are often more difficult to design around.<sup>286</sup> Patents are therefore more likely than other types of IPRs to overdeter others from using technology.

Our proposed unregistered patent rights also limit infringement liability to those who copy, not to those who independently create. Although copyists may be overdeterred, copying in itself provides little social value other than lowering prices by free-riding on others’ inventive efforts. Unlike the registered patent system, moreover, our proposed regime would not impose treble damages for knowing infringement. Competitors therefore would have even less incentive to turn a blind eye to the latest developments in their field to avoid claims of copying. Additionally, *unlike* copyright, trade secrecy, or trademark protections, our proposed unregistered patent rights are very limited in duration, greatly lowering the risk of patent trolling, nuisance suits, thickets, and hold-outs. Finally, because unregistered inventions must meet the requirements for patentability, which are arguably more strenuous than the requirements for copyright, trademark, or trade secrecy protection,<sup>287</sup> even unregistered patent rights will be less numerous and narrower in scope than other types of IPRs.

Nevertheless, critics may object that our proposed unregistered patent regime could undermine the public-notice function of patent registration, increasing the informational costs of establishing freedom to operate within a particular technological space. These costs are attenuated to some extent by the knowledge requirement for infringement, however: in order to prove infringement, an inventor must first show that the infringer in fact copied her invention and was aware that it might enjoy unregistered rights. Moreover, our proposed patent rights would apply only to inventive concepts that have

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<sup>283</sup> See Bert I. Huang, *Surprisingly Punitive Damages*, 100 VA. L. REV. 1027, 1046–47 (2014) (discussing *in terrorem* effects of copyright law); see also Christopher R. Leslie, *The Anticompetitive Effects of Unenforced Invalid Patents*, 91 MINN. L. REV. 101, 117–18 (2006) (discussing *in terrorem* effects of patents).

<sup>284</sup> See Fagundes & Masur, *supra* note 279, at 713–15 (comparing patents to other IP regimes, and highlighting the greater protection offered through patents, since those are not subject to fair use and similar defenses).

<sup>285</sup> John Shepard Wiley Jr., *Copyright at the School of Patent*, 58 U. CHI. L. REV. 119, 146, 167, 182 (1991) (arguing that authorship is much less incremental than invention).

<sup>286</sup> See Fagundes & Masur, *supra* note 279, at 712–14.

<sup>287</sup> See *Alfred Bell & Co. v. Catalda Fine Arts*, 191 F.2d 99, 101 (2d Cir. 1951) (stating the legislator imposed “less exacting standards in the case of copyrights,” as compared to patents); see also *Re-Alco Indus., Inc. v. Nat’l Ctr. for Health Educ., Inc.*, 812 F. Supp. 387, 393 (S.D.N.Y. 1993) (“copyright law, unlike patent law, recognizes protectable originality at a very low threshold, including works that reproduce or derive from information, material, or previous works”).

been made public. In this way our proposed rights would be similar to unregistered trademark and copyright rights, under which works must be used in commerce or fixed in tangible media to be protected, thereby providing the public at least some notice of the existence and boundaries of the protected work. Downstream inventors will have to examine the inventions they encounter in order to verify whether they are protected under unregistered rights, which requires the expense of determining the date the invention was first publicly available. Such inquiries are not always simple or cheap, especially if the inventor's identity is not readily apparent. Discovering exactly when an invention became public, however, is likely no more difficult than determining the effective date of prior art that can be used to invalidate an issued patent;<sup>288</sup> both inquiries depend on determining when previous technology became "public." In addressing the risk of infringing an issued patent *or* unregistered patent rights, downstream users will often have to engage in the same type of research and analysis.

In fact, even in cases not involving prior art searches, patent registration does not in practice do much in terms of giving notice to others. Although registered patent infringement is a strict liability offense, inventors and other PHOSITAs often do not check patents for fear of being accused of willful infringement,<sup>289</sup> and even if they did, the clearance costs of identifying and reviewing all of the patents relevant to one's research project can often be astronomical.<sup>290</sup> Given that infringers of unregistered patent rights will always know exactly which unregistered patents they might be accused of infringing (because they will of course know which invention(s) they have copied), their informational costs may, in many if not most cases, actually be lower than the costs of those who infringe registered patents (because registered patents protect not only against copying but also against independent creation). The simple act of copying another's invention would put copyists on notice that they might be infringing (unregistered *or* registered) patents.

Critics may nonetheless point out that, despite its clearance costs and strict liability infringement standard, the current patent registration system does at least provide the putative benefit of the peripheral claiming system.<sup>291</sup> Peripheral claiming refers to the fact that all registered patents must end with "claims" that give notice of the patent's boundaries by "particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention."<sup>292</sup> With unregistered rights, downstream inventors and courts are left only with what is more akin to the

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<sup>288</sup> Burk & Lemley, *supra* note 212, at 14 (patent examiners will conduct a search of the patent against "prior art": existing patents and publications that might be similar to the invention defined in the claims).

<sup>289</sup> Lemley, *supra* note 231, at 1510 n.63.

<sup>290</sup> See generally Christina Mulligan & Timothy B. Lee, *Scaling the Patent System*, 68 N.Y.U. ANN. SURV. AM. L. 289 (2012) (arguing discovery costs associated with patents are "prohibitively high").

<sup>291</sup> 35 U.S.C. § 112(b).

<sup>292</sup> *Id.*

former central claiming system, under which a patent contained no claims specifying the patent's boundaries.<sup>293</sup> Infringement suits under the old central claiming system instead relied on equivalence between the allegedly infringing device and any examples of the patented invention described in the patent.<sup>294</sup> Any reversion to a more central-claiming approach to infringement may seem to be an inefficient move toward greater unpredictability and higher information costs for all parties involved.<sup>295</sup> It is not clear that the central claiming system is significantly more unpredictable than the peripheral claiming system, however.<sup>296</sup> Modern-day patent claims, despite their purpose to provide notice, are notoriously difficult to interpret.<sup>297</sup> Moreover, a central-claiming approach to infringement is arguably no more vague than measuring non-obviousness, which also depends on unstructured comparisons with the claimed invention, in this case with what may be multiple prior art references rather than a single infringing device.<sup>298</sup> All central-claiming analyses must also take into account the limits on patent scope represented by the prior art, in much the same way peripheral claiming must do.<sup>299</sup>

Perhaps the most salient objection to our proposal would be that, even if the costs of an unregistered patent rights system were not inevitably prohibitive, there is a remaining question of whether the unregistered patent rights proposed here will truly help female inventors and others who are similarly disadvantaged. For example, Professor Wiley asserts that, unlike the copyright system, the patent system does not need unregistered rights.<sup>300</sup> Wiley reasons that because inventors are less numerous than authors of expressive works, the registration and examination requirements under the current patent system do not disenfranchise as many inventors as a similar screening system would do under copyright law.<sup>301</sup> This argument overlooks exactly what we have pointed out here, however. In reality, a significant

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<sup>293</sup> Martin J. Adelman, *Patent Claiming in the United States: Central, Peripheral, or Mongrel?* 1 IP THEORY 71, 72-5 (2010) (describing the difference between peripheral and central patent systems, the historical trend towards peripheral systems, and the advantages and disadvantages of each system).

<sup>294</sup> See MERGES & DUFFY, *supra* note 73, at 651, 711 (comparing and contrasting the peripheral and central claiming systems).

<sup>295</sup> Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743, 1747 (2009).

<sup>296</sup> *Id.* at 1751-61.

<sup>297</sup> Janet Freilich, *Patent Clutter*, 103 IOWA L. REV. 925, 925 (2018) (describing the different issues that make patents difficult to read and understand).

<sup>298</sup> Burk & Lemley, *supra* note 295 at 1758. The central claiming analysis is similar to what courts continue to do under the doctrine of equivalents ("DOE") approach to construing patent claims in the peripheral claiming system. *Id.* at 1763 (noting that although the DOE is arguably more structured than infringement analyses under a central-claiming system).

<sup>299</sup> *Id.* at 1746.

<sup>300</sup> WILEY, *supra* note 285, at 182-83 ("Patent law requires that a federal agency negotiate a precise and acceptable statement of applicants' rights as a condition of the property grant. Copyright law makes protection of an unspecified character commence with a work's creation.").

<sup>301</sup> *Id.*

number of inventors are disenfranchised by the costs and complexities of the patent registration and examination system as well as its inherent biases,<sup>302</sup> and, importantly, that disenfranchisement falls disproportionately on women.<sup>303</sup>

In the copyright context, however, Professor Sprigman argues that even if failure to comply with copyright formalities such as registration is inadvertent, the solution is not unregistered rights but rather to make the copyright registration system less expensive and more accessible.<sup>304</sup> Sprigman's concern is that the current system of unregistered copyrights not only protects works that do not need protection but also creates classes of orphaned or "spent" copyrights whose owners are unknown and are therefore impossible to license.<sup>305</sup> As mentioned above, however, our proposal for unregistered patent rights would create no such burdens because those rights would be far more limited in duration than unregistered copyrights—three years, as compared to copyright's life of the author plus seventy years.<sup>306</sup> The benefits of removing the onus of having to register for protection, especially for female inventors who may not be aware that their inventions may be protectable at all, would for this reason outweigh any potential risks of burdening other inventors.

Professors Fagundes and Masur nonetheless argue that, if inventions have social value high enough to warrant the cost of patent prosecution, inventors will always find it worthwhile to file for patent protections under the current system.<sup>307</sup> They seem simply to assume that all inventors are rational, rent-maximizing market participants, an assumption that we have shown here is not entirely accurate or fair, especially amongst female inventors.<sup>308</sup> Female inventors may not be aware of the intricacies of the patent system or have the wherewithal to gamble on applying for patent protection. Even for inventors who are aware that their inventions might be patentable, determining whether an invention is patentable is inherently difficult because the standards for protection are much stricter than those in copyright, trademark, or trade secrecy. Because patentability also requires identification and analysis of relevant prior art, the information costs for calculating the odds of success in applying for a patent rise even further. Predicting the commercial value of an invention is also immensely difficult, adding to the

<sup>302</sup> Milli et al., *supra* note 4 (describing common barriers inventors face in their efforts to patent their inventions).

<sup>303</sup> Kanze et al., *supra* note 4, at 588 (women entrepreneurs miss out on investment and profit opportunities because of VC bias); Milli et al., *supra* note 4 (pointing out gender gaps in patent applications and the economic and social impact of this gap); Martinez et al., *supra* note 6, at 6-8.

<sup>304</sup> SPRIGMAN, *supra* note 258, at 517.

<sup>305</sup> *Id.* at *passim*.

<sup>306</sup> See 17 U.S.C. at § 302(a) (2000); H.R. REP. NO., *supra* note 198, at 133-36; Chafee, *supra* note 189, at 719-21, 725-27, 729-30.

<sup>307</sup> FAGUNDES & MASUR, *supra* note 279, at 701 (appearing to measure social value in purely commercial terms).

<sup>308</sup> See *supra* Part I.



gamble in deciding whether to invest in the process of applying for patent protection, even if through a provisional patent application.<sup>309</sup> The benefits of unregistered patent protection, even if for a relatively brief period, could thus be quite significant.

A similar concern could be that the proposed unregistered patent rights regime does not do enough to help disadvantaged inventors because enforcement costs can be exorbitant. If an inventor cannot afford patent prosecution, how can she afford the much greater expenses of infringement litigation? Similarly, given that the PTO displays bias against women, what is to say that courts would not also be biased? These concerns may be misplaced, however. While the value of investing in obtaining protection for an invention is often speculative at best, once the invention has been copied, the value of investing in enforcing rights against copying the invention become less speculative. Even inventors who are not aware of their rights will be more motivated to learn about them and enforce them once infringement is detected. Likewise, although we are unaware of any evidence of judicial bias against female intellectual property rights owners, courts may be less biased against recognizing an invention as protectable if they know that it is valuable enough to be copied.<sup>310</sup> Comparison with unregistered design rights suggests that this has not been the case: a recent UK study suggests that litigation based on unregistered design rights succeeds more often than based on registered rights.<sup>311</sup>

One last potential criticism of our proposed regime lies in the fact that the value of IPRs lies not just in enforcement and protecting incentives to invent, however. Investors may not treat unregistered rights with the same *gravitas* as registered and issued patent rights. Our proposed unregistered rights would be much shorter in duration and would not benefit from the PTO's imprimatur of validity or a presumption of validity rebuttable only by clear and convincing evidence. As a result, unregistered patent rights might not have the same signaling effect on investors.

Most technologies do not need twenty years of patent protection, however. The three years of protection provided under our proposed unregistered patent rights would be more than enough to recoup investments in invention and commercialization in industries like computer software and electronics,

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<sup>309</sup> Provisional patent applications are typically less expensive to file because they do not undergo examination and simply preserve the applicants' filing date. 35 U.S.C. §111(b)(4). Provisional applications must be converted to nonprovisional status within a year, however, so applicants must eventually assume the full cost of prosecuting their applications; 35 U.S.C. §111(b)(5).

<sup>310</sup> Other than the UK study mentioned above, see text accompanying notes 173–81 *supra*, judicial bias as compared to PTO bias is an area that has yet to be empirically explored as far as we are aware.

<sup>311</sup> See text accompanying notes 173–81, *supra*.

for example.<sup>312</sup> Similarly, the proposed unregistered rights may be more than sufficient to attract investors. Once they make their inventions public, unregistered patent owners effectively establish priority for themselves should they opt to apply for registered rights within the one-year grace period allowed under U.S. patent law.<sup>313</sup> This combination of three years of unregistered protection and priority in filing for the more robust protections of a registered patent could provide investors with the strong positive signals that they want. Admittedly, investors may be put off by the fact that our proposed unregistered patent rights would not enjoy as strong a presumption of validity, as registered patents do, but even issued patents have only probabilistic validity under the clear and convincing evidence standard.<sup>314</sup> Although PTO approval may give some assurance that a patent will withstand court scrutiny, the judiciary, particularly the U.S. Federal Circuit Court of Appeals, has become notorious for disagreeing with the PTO and the lower courts on questions of patent validity and scope.<sup>315</sup> Investing in unregistered patents therefore may not be significantly riskier than investing in registered patents.

Overall, although not a first-best solution, which would require much more far-reaching changes not only to standards for patentability but also in empowering women more generally, our proposed unregistered patent regime would serve as a significant stop-gap measure. We do not purport to eliminate all of the problems facing female inventors but only to mitigate some of their effects. Our proposal cannot create total equality but may nonetheless function to reduce inequality and is thus a good step in the right direction.

#### CONCLUSIONS

Patent law is currently gender-biased. Research shows that the share of women among patent holders is still low, and despite some positive trends, the patent gender gap is not expected to disappear in the coming decades. The causes for this gender gap are myriad and involve many factors having little to do with patent law, but as we point out, the patent system also contributes to the gender gap. Current patent law requires inventors to undertake a time-, money-, and expertise-intensive registration and examination process that puts women and other groups of inventors at a distinct disadvan-

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<sup>312</sup> Verne A. Luckow & Steven C. Balsarotti, *Statistical Analysis of Federal District Court Cases Seeking Longer Patent Term Adjustments in the Wake of Wyeth v. Kappos*, 10 J. MARSHALL REV. INTELL. PROP. L. 1, 3 (2010).

<sup>313</sup> See Martinez et al., *supra* note 6, at 21.

<sup>314</sup> Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, 19 J. ECON. PERSPECTIVES 75, 75 (2005) (explaining that patents are not actually rights to exclude, but provide holders only with a probabilistic right to try and exclude).

<sup>315</sup> E.g., David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223, 259 (2008).

tage, which in turn fosters a gender gap in patent protection even in technologies otherwise nearing gender-parity. The costs of this gap, and the underrepresentation of women among patent-holders, cannot be overstated. The absence of patent protection not only stifles innovation but also further deepens socio-economic gaps between men and women. To remedy these problems, we advocate the implementation of an unregistered patent regime that would grant patent protection automatically, without the various costs imposed by the current registered rights regime. Although this unregistered patent regime could not by itself achieve gender parity in patenting, we believe this temporary relaxation of the registration requirement, together with the safeguards our proposed regime introduces, is a step in the right direction to expedite closure of the patent gender-gap and remedy its detrimental consequences.

