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## NOTE

# Poverty and Patents: Intellectual Property Policy and Economic Inequality

Wenkai Tzeng\*

## INTRODUCTION

The America Invents Act of 2011 (AIA) transitioned America's patenting system away from a first-to-invent system to a first-to-file system.<sup>1</sup> A consequence of this change is that economically disadvantaged inventors that are under-resourced may be priced out of the costly patenting process and unable to protect their intellectual property. One might view this as a loss of constitutionally granted rights. In an effort to mitigate this problem, Congress incorporated a number of provisions including section 32 into the Leahy-Smith America Invents Act to aid individual inventors and smaller entities by encouraging patent pro bono prosecution by practitioners.<sup>2</sup> There are two important questions raised by the AIA: (1) how pronounced has the loss of protection been to this class of inventors that in the past relied on automatic protection, and (2) how effective is section 32 and the other accommodations included in the AIA in protecting inventors that had previously relied on automatic protection under the first-to-invent system. This Note will highlight the reasons for studying this issue and the problems with switching to a first-to-file system, develop an approach for further research, and recommend methods for encouraging innovation from under-resourced inventors to combat increasing inequality.

### I. IN PURSUIT OF ECONOMIC EQUALITY

Examining the impact of intellectual property policy on American society is key to understanding the nature and causes of economic inequality. Inequality has expanded significantly over the years and the gap between the wealthy and the poor has continued to widen. Inequality of this nature is a problem for society. Social mobility is frustrated when capital and the means of production are concentrated in a few members of society.<sup>3</sup> Those with the least amount of resources tend to have

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1 A first-to-invent system effectively grants inventors automatic protection and monopoly rights for their inventions while a first-to-file system requires inventors to apply for patent protection through the United States Patent Office. See Leahy-Smith America Invents Act, Pub. L. No. 112-29, sec. 3, § 102, 125 Stat. 284, 285-86 (2011).

2 *Id.* at 340.

3 See generally Roy van der Weide & Branko Milanovic, *Inequality Is Bad for Growth of the Poor (but Not for That of the Rich)* (World Bank Grp., Working Paper No. 6963, 2014), <http://documents.worldbank.org/curated/en/888731468331207447/pdf/WPS6963.pdf>.

higher costs of living.<sup>4</sup> The financial cost-of-living constraint prevents access to important resources such as education and healthcare. The social barriers the poor face result in a drag on the growth of labor productivity and ultimately the national standard of living. Without remedy, the burdens of poverty function as a social trap and will span generations, slowing the rate of societal growth.<sup>5</sup> An intellectual property policy regime granting monopoly rights to a select few leads to a high concentration of capital in the hands of a few inventors. Understanding the impact of intellectual property policy allows for appropriate reformation of the system to maximize the economic benefits of innovation for all of society but requires balancing individual fairness with optimal social benefit.

The history of intellectual property rights in the United States places the current policy in context. Intellectual property policy in the United States began with the framers of the Constitution. Following a legacy of protecting inventors in Europe, the framers incorporated an important provision authorizing and requiring Congress to “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.”<sup>6</sup> Congress acted by establishing a patent system, among other protections, designed to protect the “heroic inventor.”<sup>7</sup> The individual “garage inventor” has since become an American icon promulgating the idea of the American dream that anyone, no matter what background, can become successful through ingenuity and perseverance.<sup>8</sup> The patent system, managed by the United States Patent and Trademark Office (USPTO), is an integral part the American dream and enables the government to carry out the objective of protecting innovation and individual entrepreneurial activity in the United States.<sup>9</sup>

Fairness and equality are the foundation of American culture, and the courts have reiterated this underlying principle.<sup>10</sup> The patent system, however, can at times present a difficult juxtaposition that requires a careful balancing act between various opposing views. On the one hand, there are concerns such as providing fair means for anyone to protect their intellectual property. This objective must be aligned with the incentivizing of innovation for economic growth. The combination of these two goals must also not lead to social ills and economic disparities. Sometimes these objectives manifest themselves as competing goals. The fees for applying for a patent can price

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4 Derek Thompson, *Total Inequality*, ATLANTIC, (Apr. 1, 2016), [http://www.theatlantic.com/business/archive/2016/04/total-inequality/476238/?utm\\_source=SFFB](http://www.theatlantic.com/business/archive/2016/04/total-inequality/476238/?utm_source=SFFB).

5 *Id.*

6 U.S. CONST. art. 1, § 8, cl. 8.

7 Mark D. Janis, *Patent Abolitionism*, 17 BERKELEY TECH. L.J. 900, 909–14 (2002).

8 David S. Abrams & R. Polk Wagner, *Poisoning the Next Apple? The America Invents Act and Individual Inventors*, 65 STAN. L. REV. 517, 518 (2013).

9 See Partnership for American Innovation, *Patents Fuel the American Dream*, YOUTUBE (July 19, 2015), <https://www.youtube.com/watch?v=1VTOXCOaSF4>; see also Daniel A. Tagliente, *Shooting Blanks: The Ineffectiveness of the Executive Branch's Entrance into the Great Patent Troll Hunt*, 45 SETON HALL L. REV. 311, 312 (2015).

10 See Janis, *supra* note 7, at 913 (quoting *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558 (Fed. Cir. 2000), *cert. granted*, 533 U.S. 915 (2001)).

out many poorer inventors with marketable inventions. Granting monopoly rights to parties with wide economic disparities raises concerns of fairness.

There are competing views on intellectual property policies. Traditional views in favor of the patent system typically present multiple rationales.<sup>11</sup> The “instrumental” view centers on real world benefits.<sup>12</sup> This economic, utilitarian-based theory focuses on maximizing happiness of society at large as opposed to the individual inventor.<sup>13</sup> Granting inventors monopoly rights for a period of time benefits society by encouraging inventors to devote resources to developing novel and useful technologies. Other arguments in favor of a patent system involve disclosing knowledge to the public and rewarding inventors.<sup>14</sup> The public disclosure function is thought to help advance technological innovation by teaching others new ideas. Invention and innovation would, in theory, add upon one another resulting in an evolution of technological development.

The key to balancing technological advancement with minimal social harms is creating a publication system and a set of rules that the average inventor can follow without having to resort to financing the exorbitant legal costs required. Historically, these “economic freedoms,” as economist and author Edmund Phelps puts it, “were of key importance in enabling processes of innovation.”<sup>15</sup> Phelps contends that “patents were the key—the open sesame—to innovation in the nineteenth century.”<sup>16</sup> Building on the past successes of intellectual property protection systems therefore presents a sound and logical path for public policy to follow.

Some modern day proponents of the current intellectual property policy regime laud the benefits of the system, in some cases, controversially. On the other hand, some argue that economic inequality is a good thing, and to eliminate the ensuing inequality that comes from innovation and technological development (that some argue that result from patent systems) would necessarily mean eliminating one of the major driving forces of innovation in the modern economy—the startup.<sup>17</sup> While reactions to the idea that monopoly rights for intellectual property are controversial, there is some plausibility to the notion that measures taken to prevent the inevitable economic gap from forming would also necessarily eliminate incentives to invent. Creating disincentives for devoting resources to invention could deter inventors from contributing to the economy and growing and expanding economic wealth, even if for a limited group of people. Economic growth, even if initially formed in a small subset of the population, eventually ripples outwards to the rest of society.

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11 Jonathan Porat, SMALL BUS. OFF. OF ADVOC., *Patenting and Innovative Startups: Putting the America Invents Act in a Broader Economic Context* 2 (June 25, 2015), <https://www.sba.gov/sites/default/files/advocacy/Issue-Brief-9-AIA-Patents-Small-Biz.pdf>.

12 ROGER SCHECHTER & JOHN THOMAS, *PRINCIPLES OF PATENT LAW* 9 (2007).

13 JANICE M. MUELLER, *PATENT LAW* 32–35 (4th ed. 2012).

14 *Id.*

15 EDMUND PHELPS, *MASS FLOURISHING: HOW GRASSROOTS INNOVATION CREATED JOBS, CHALLENGE, AND CHANGE* 81 (2013).

16 *Id.* at 85.

17 Paul Graham, *Economic Inequality*, PAUL GRAHAM (Jan. 2016), <http://paulgraham.com/ineq.html>.

On the opposite end of the spectrum, there are theories that inequality stemming from the patent system is considered “morally repugnant.”<sup>18</sup> From one perspective, it is thought that “intellectual property regimes that create monopoly rents that impede access . . . create inequality and hamper growth more generally” and that superior methods, such as government grants, foundations, and prize systems for discovery, that do not exhibit “the inequality-increasing disadvantages of the current intellectual property rights system” are viable alternatives.<sup>19</sup> There is some support for these ideas, and in light of alternatives, perpetuating an unfair system that also inhibits innovation and economic growth is questionable. Intellectual property policy considered in this light suggests that the existing system institutes widespread and harmful repercussions on society. There have been several studies that have examined the problem of innovation leading to greater inequality.

The rapid increase of economic inequality worldwide over the past decade has led to significant research into the nature and causes of this growing problem. Some studies suggest that the disparity is partly attributable to the patent system and other intellectual property policies.<sup>20</sup> Researchers conclude that “the top 1% income share in a given US state in a given year, was positively and significantly correlated with the state’s degree of innovativeness,”<sup>21</sup> and that there is a “causal effect of innovation-led growth on top incomes.”<sup>22</sup> In a recent study, researchers examining labor share decline determined that the deterioration of the portion of wages paid to workers in national income, commonly referred to as the labor share of income, can be entirely explained by the rise in use of intellectual property products.<sup>23</sup> The effects of a breakdown in the equal distribution of the benefits of innovation can be both profound and apparent. For example, historically the largest companies by capital assets also employed the most people, but increased productivity as a result of incorporation of new technologies has changed the landscape.<sup>24</sup> By the 21st century, companies with the greatest capital assets—measured by market capitalization—employ significantly fewer people, and most are technology-related firms.<sup>25</sup>

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18 Joseph E. Stiglitz, Opinion, *How Intellectual Property Reinforces Inequality*, N.Y. TIMES (July 14, 2013, 9:04 PM), <http://opinionator.blogs.nytimes.com/2013/07/14/how-intellectual-property-reinforces-inequality/>.

19 *Id.*

20 Philippe Aghion, Ufuk Akcigit, Antonin Bergeaud, Richard Blundell & David Hémous, *Innovation and Top Income Inequality 2* (Nat’l Bureau of Econ. Research, Working Paper No. 21247, 2015); see ESTELLE SOMMEILLER & MARK PRICE, *THE INCREASINGLY UNEQUAL STATES OF AMERICA: INCOME INEQUALITY BY STATE, 1917 TO 2012*, 3 (2015), <http://www.epi.org/files/2014/IncreasinglyUnequalStatesofAmerica1917to2012.pdf>.

21 Aghion et al., *supra* note 20, at 3.

22 *Id.*

23 Dongya Koh, Raül Santaaulàlia-Llopis, & Yu Zheng, *Labor Share Decline and the Capitalization of Intellectual Property Products*, (Feb. 29, 2016), <http://r-santaaulalia.net/pdfs/IPP-and-USLaborShare-short.pdf>.

24 Paul Krugman, Opinion, *Is Vast Inequality Necessary?*, *The Opinion Pages*, N.Y. TIMES (Jan. 15, 2016), <http://www.nytimes.com/2016/01/15/opinion/is-vast-inequality-necessary.html>.

25 Gillian B. White, *The Age of the Ghost Company*, ATLANTIC (Jan. 7, 2016), <http://www.theatlantic.com/business/archive/2016/01/the-age-of-the-ghost-company/423138/> (citing Jerry Davis, *Capital Markets and Job Creation in the 21st Century*, CTR. EFFECTIVE PUB. MGMT.

The bottom line is that technological advancements have increased productivity so much that far fewer people are needed to maintain such businesses. The level of labor productivity in society is sometimes thought to be incongruous to profits of the businesses that benefit from it. Once achieving a level of capital size, these companies can then leverage their assets toward research and development, unlike smaller entrepreneurs, leaving those without sufficient resources behind. Advancement in technology and the intellectual property rights that protect them create systemic social problems.

Beyond just pricing out poorer inventors from participating in technological advancement, a decline in labor share of income worsens inequality and leads to a corresponding decline in consumption among consumers.<sup>26</sup> As the owners of intellectual property corner the market on their revenue streams, their consumption habits largely do not maintain the same pace as their wealth status. The implications are far-reaching and widespread throughout the economy. While some argue that inequality is required for continued economic prosperity, the counter-argument that new business formation and the startup culture are only a minor driving force of economic inequality is plausible. Regardless of where the disparity is coming from, there exists a strong correlation between new technological developments, startup or not, and it will lead to wealth gaps. Rising income inequality remains “a significant barrier to economic growth and full employment.”<sup>27</sup> Despite this connection, relating these issues to real world effects is notoriously difficult. Intellectual property largely remains a subject confined to a tiny segment of the population, usually inventors. Unlike other hotbed issues such as poverty or civil rights, anecdotes of struggling inventors rarely get the spotlight of societal attention, particularly in light of the macro-economic perspective of ongoing research. Finding struggling entrepreneurial inventors outside of corporate research and development centers can be challenging, especially if their economic circumstances are constrained. Despite the paucity of information over the specific sources of a widening wealth gap, it is clear that the trend of continuing imbalance remains a problem.

The problems of economic inequality caused by innovation are not limited to the United States. In a study focusing on urban and rural income disparities in China, researchers found that large amounts of innovation could worsen inequality in any country.<sup>28</sup> The demographics of inventors alone indicate substantial economic disparities. For example, like China, the United States also exhibits an imbalance of inventors in metropolitan areas with some eighty percent of inventors living in cities

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BROOKINGS (Dec. 2015), [http://www.brookings.edu/~media/research/files/papers/2015/12/30-21st-century-job-creation-davis/capital\\_markets.pdf](http://www.brookings.edu/~media/research/files/papers/2015/12/30-21st-century-job-creation-davis/capital_markets.pdf).

26 Bruce Bartlett, *National Income: Paying Work, Not Capital*, 29 DEMOCRACY (Summer 2013), <http://democracyjournal.org/magazine/29/national-income-paying-work-not-capital/>.

27 Jim Tankersley, *A Big-Shot Venture Capitalist Says We Need Inequality. What Do Economists Say?*, WASHINGTON POST:WONKBLOB (Jan. 14, 2016) (referencing Barry Z. Cynamon & Steven M. Fazzari, *Inequality, the Great Recession and the Slow Recovery*, 40 CAMBRIDGE J. ECON. 373 (2015)).

28 See Qingchun Liu & C.-Y. Cynthia Lin Lawell, *The Effects of Innovation on Income Inequality in China*, U.C. DAVIS (Oct. 2015), [http://www.des.ucdavis.edu/faculty/Lin/China\\_innovation\\_inequality\\_paper.pdf](http://www.des.ucdavis.edu/faculty/Lin/China_innovation_inequality_paper.pdf).

since 1976 and eighty-two percent since 2005.<sup>29</sup> Sophisticated inventors are more likely to have access to resources in urban areas, and as success catapults urban inventors to higher wealth, disparities between the economically constrained living in rural areas widens.

Narrowing the issue to intellectual property policy, the research on the impact of innovation policies on income inequality indicates that stronger patent protections lead to greater increases in income inequality.<sup>30</sup> Research suggests that policy decisions have contributed to the recent trend of inequality in the United States.<sup>31</sup> The pre-AIA era of first-to-invent system is generally more conducive to innovation than first-to-file.<sup>32</sup> The idea that first-to-invent systems are better is supported by studies of Canada's recent switch in 1989.<sup>33</sup> The opportunity to discover insight into similar problems of intellectual property policies leading to inequality elsewhere around the world should not be ignored.

Academics from other fields have also weighed in on the dubiousness of the patent system. The ethical considerations of patent systems dispose of many of the traditional theories supporting patent and other intellectual property protection systems.<sup>34</sup> The research conducted in this area lends credence to the argument that innovation should be encouraged among low-income inventors and that the current intellectual property protection systems designed to stimulate innovation are largely leaving the small inventor behind. Abandoning the garage inventor in favor of mega-corporate research and development is unquestionably immoral.

While the debate over economic inequality rages on, within the context of intellectual policy there are very clear concerns that have been considered by legislatures. The AIA was designed to bring the United States into harmony with the international community.<sup>35</sup> This meant converting the United States patent law system from first-to-invent to the international community's first-to-file system. The changes included a number of provisions designed to accommodate small inventors, such as updating the definition of prior art, adjusting joinder requirements, introducing new *inter parte* proceedings, and reducing fees for a new class of inventors

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29 JONATHAN ROTHWELL, JOSÉ LOBO, DEBORAH STRUMSKY & MARK MURO, METRO. POLICY PROGRAM AT BROOKINGS, PATENTING PROSPERITY: INVENTION AND ECONOMIC PERFORMANCE IN THE UNITED STATES AND ITS METROPOLITAN AREAS, 1, 12 (2013), <http://www.brookings.edu/research/reports/2013/02/patenting-prosperity-rothwell>.

30 Angus C. Chu, *Effects of Patent Policy on Income and Consumption Inequality in a R&D Growth Model*, 77 S. ECON. J. 336, 337 (2010).

31 *Id.* at 338.

32 Kaz Miyagiwa, *The 2011 America Invents Act: Does it Undermine Innovation?*, 24 J. ECON. & MGMT. STRATEGY 211, 212 (2015).

33 *Id.*

34 See generally, Sigrid Sterckx, *The Moral Justifiability of Patents*, 13 J. EUR. ETHICS NETWORK 249 (2006) (arguing that the traditional theories of natural rights, distributive justice, and consequentialist views are all flawed).

35 Eric P. Vandenburg, *America Invents Act: How it Affects Small Businesses*, 50 IDAHO L. REV. 201, 207 (2013); Melissa Cerro, *Navigating a Post America Invents Act World: How the Leahy-Smith America Invents Act Supports Small Businesses*, 34 J. NAT'L ASS'N ADMIN. L. JUDICIARY 193, 202 (2014).

called “micro entities.”<sup>36</sup> Legislative considerations included a variety of concerns for under-resourced inventors, but the full impact of the changes outlined may not have been clearly understood.

Examining the congressional reasons for establishing mechanisms to accommodate the under-resourced inventor in the AIA may shed light on how significant the issue of inequality was for legislatures. Advocates and detractors have expressed a variety of concerns that are captured in the legislative history of the AIA. For example, discussion over the need for the provisional patent system found support by a legislator who argued that “[a] move to first-to-file system, which is what this bill would do, without a corresponding 1-year grace period in other countries dramatically undermines the patent protection of American inventors.”<sup>37</sup> A provisional patent allows inventors to protect their ideas for a year without fully disclosing the details of their invention. This allows for further development without risk of losing out on protection. Other legislators argued that there were sufficient safeguards built into the legislation, such as supplemental examination and potentially reduced litigation.<sup>38</sup> Opponents posited the important notion that “small inventors—the backbone of the American spirit of innovation—who do not have the funding or the legal staff to race to the PTO to file a patent will without question lose inventions to well-funded and well-staffed corporations.”<sup>39</sup> Furthermore, in debate it was suggested the AIA violated the constitutional provision granting Congress the authority to establish a patent system as a strategy for defeating the Bill.<sup>40</sup> In the end, however, the AIA survived the attack and failed to garner additional support for smaller inventors.

Congressional discussion in support of the small inventor appears to revolve around a variety of mechanisms designed to protect the small inventor, such as a special classification called the micro-entity status, which allowed reduced fees,<sup>41</sup> provisional applications<sup>42</sup> granting a year of additional protection before fully publishing the invention, and data collection for a Small Business Administration (SBA) study.<sup>43</sup> There remained, however, little discussion about the patent pro bono program in the record.<sup>44</sup> The provision directing the USPTO to coordinate efforts among law associations across the country to establish the pro bono program “to

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36 Cerro, *supra* note 35, at 196; *see also* Donald S. Chisum, *America Invents Act of 2011: Analysis and Cross-References*, CHISUM.COM (Dec. 5, 2011), <http://www.chisum.com/wp-content/uploads/AIAOverview.pdf>; Sasha Rao & Daniel Keese, *Aftershocks from the AIA: A Seismic Shift in Patent Law?*, LAW360 (Mar. 26, 2012, 1:02 PM), <http://www.law360.com/articles/317549/aftershocks-from-the-aia-a-seismic-shift-in-patent-law>.

37 157 CONG. REC. H4480, 4482 (daily ed. June 23, 2011) (statement of Rep. Conyers).

38 Joe Matal, *A Guide to the Legislative History of the America Invents Act: Part I of II*, 21 FED. CIR. B.J. 435, 445–51 (2012).

39 157 CONG. REC. E1191-03 (daily ed. June 23, 2011) (statement of Rep. West).

40 *Id.*

41 Matal, *supra* note 38, at 495.

42 *Id.* at 455–56.

43 156 CONG. REC. S1312, 1313 (daily ed. Mar. 9, 2010) (statement of Sen. Landrieu).

44 *See* Matal, *supra* note 38, at 499; *see generally* PATRICK A. DOODY, COMPREHENSIVE LEGISLATIVE HISTORY OF THE LEAHY-SMITH AMERICA INVENTS ACT (2012).



assist financially under-resourced independent inventors and small businesses” appears as merely a footnote in the law.<sup>45</sup> Yet the potential for the patent pro bono program could be substantial if given sufficient support and funding. The legislative concern over the problems exacerbated by the intellectual property regime has been nearly silent. As the income gap widens, moves to improve intellectual property policy, such as the the pro bono program, has failed to significant garner support.

The variety of perspectives present in the ongoing intellectual discourse raises concerns over whether inventors with limited resources are being “encouraged to promote the progress of science and useful arts” or if Congress has unconstitutionally limited this clause to only well-funded entities. Creating a system that only wealthy inventors can access is inherently an unfair system. Closing off invention to smaller entities and entrepreneurs also means eliminating a significant source of potential economic growth, technological innovation, and social progress. Addressing the issue of inequality is of paramount importance for multiple reasons and has widespread implications for the economy, social justice, and constitutional legal theory. Ensuring rigorous investigation into these questions will allow legislators to enact laws from a well-informed standpoint and lead social, cultural, and economic development toward an equitable and productive future. Although the AIA only took effect on March 16, 2013,<sup>46</sup> a number of researchers have already begun exploring its effects. The following discussion examines research conducted by scholars and recommends a variety of continuing efforts to steer society toward an intellectual property regime that is equally accessible to every creative effort regardless of economic status or level of wealth.

## II. RESEARCHING POLICY DECISIONS

Determining if intellectual property policy such as the AIA will lead to more inequality and if the tacked on remedies provided are effective in providing equal opportunities for everyone is critical to proper evolution of intellectual property policy. There are a number of notable works that provide comprehensive surveys of literature and legal thought on the considerations of the impact of the AIA, though the field of economics has largely left the impact of the AIA to legal scholars to examine. The impact of the AIA on small businesses and inventors suggests that there are many possible problems that inventors will face, including issues largely related to companies with greater capital and legal resources holding significant patenting advantages over smaller inventors.<sup>47</sup> Closer examination of the complex proceedings and new fee structure also has some impact on intellectual property policy.<sup>48</sup>

It is estimated that “minor provisions of the AIA targeted at helping small businesses and micro entities are overcome by the indirect harm done to them by

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45 Leahy-Smith America Invents Act, § 32(a), 125 Stat. 284, 340 (2011).

46 *See id.* at 293.

47 Cerro, *supra* note 35, at 223.

48 *Id.*

other general provisions targeted at all patentees.”<sup>49</sup> The research goes on to suggest that damage caused by the AIA will affect the entire patent system by discouraging public disclosure via the patent system and by increasing the patent backlog.<sup>50</sup> Even before the AIA was enacted, small entities faced significant hurdles, some of which extend beyond just the process of filing a patent.<sup>51</sup> Litigation involving infringement post-AIA still represents a costly battle for patentees. Non-practicing entities have all but openly abused the poor inventor over the high cost of defending against accusations of infringement.<sup>52</sup> For the moment, the jury is still out on the impact to small inventors of post-grant reviews.<sup>53</sup> Some legal theories suggest that there are some unstated benefits to the AIA that go beyond just the minor accommodations, such as higher joinder standards forcing non-practicing entities to adjust their litigation strategies.<sup>54</sup>

Credibility, and ultimately, the usefulness of studies performed hinges on the approach used by researchers; understanding the deficiencies allows work to progress on more precise ways to illuminate the important details of the impact of intellectual property policies. The traditional research methodologies examining the level of innovation occurring in the economy originate from a long history of analysis incorporating the examination of expenditures in research and development at companies, as well as employment figures. Scholars have correlated this data with patent issuances to extrapolate the level of inventiveness at a given time.<sup>55</sup> Current methods of study involve venture capital financing studies, public market studies, and empirical studies with data collected from the USPTO. While helpful, these methods may miss the finer microeconomic details and the importance of gathering information from sources that are more difficult to obtain, such as independent inventors.

A recent in-depth empirical study published by the SBA examines the impact of the AIA on small businesses.<sup>56</sup> The study employs three approaches: a public event study, a venture capital financing study, and an evaluation of the Canadian switch.<sup>57</sup> While the authors highlight many of the problems with investigating the impact of

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49 Jay M. Mattappally, *Goliath Beats David: Undoing the Leahy-Smith America Invents Act's Harmful Effects on Small Businesses*, 58 LOY. L. REV. 981, 1012 (2012).

50 *Id.* at 1020–25.

51 Jeff A. Ronspies, *Does David Need a New Sling? Small Entities Face a Costly Barrier to Patent Protection*, 4 J. MARSHALL REV. INTELL. PROP. L. 184, 184 (2004).

52 Tagliente, *supra* note 9, at 314.

53 Filip De Corte, Tom Irving Tridico, Stacey D. Lewis & Gervas Christina N., *AIA Post-Grant Review and European Oppositions: Will They Work in Tandem, or Rather Pass Like Ships in the Night?* 14 N.C. J.L. TECH. 93, 135–36 (2012).

54 See Xun (Michael) Liu, *Joinder Under the AIA: Shifting Non-Practicing Entity Patent Assertions Away From Small Businesses*, 19 MICH. TELECOMM. & TECH. L. REV. 489, 489 (2012).

55 Dennis C. Mueller, *Patents, Research and Development, and the Measurement of Inventive Activity*, 15 J. INDUS. ECON. 26, 26–27 (1966).

56 JOSH LERNER, ANDREW SPEEN & ANN LEAMON, SMALL BUS. ADMIN., THE LEAHY-SMITH AMERICA INVENTS ACT: A PRELIMINARY EXAMINATION OF ITS IMPACT ON SMALL BUSINESSES 1 (2015).

57 *Id.* at 42–43.

converting from a first-to-invent to a first-to-file system, the study leads to largely inconclusive results.<sup>58</sup>

Other approaches to examining the impact of the AIA on small inventors involve comparative studies with the recent Canadian transition from first-to-invent to first-to-file in 1989. In one such study, it was found that the switch led to a skewing of ownership of patents toward large corporations and away from independent and small businesses.<sup>59</sup> Other scholars report that the change generally harmed individual inventors.<sup>60</sup> In reviewing the Canadian transition, using the number of patent grants as a proxy for inventor size and applying a difference-in-differences regression found that larger firms saw an increase in patenting activity relative to smaller firms and suggest that larger firms received a greater benefit than did smaller entities.<sup>61</sup> More focused studies also seem to propagate the idea that small inventors are harmed. The patent system “appears significantly stacked against small entity participation.”<sup>62</sup> The level of harm is significant and the differences between the well-funded and the under-resourced can be staggering, with evidence that small entities are seven times more likely to have their petitions for *inter partes* review denied than large entities.<sup>63</sup> Arguments in favor of the AIA, however, include discussion on how the new grace period protects small inventors.<sup>64</sup> But there remains a number of issues with the AIA, such as prior art searches becoming cost prohibitive.<sup>65</sup> In addition to incurring numerous hefty expenses in the patenting process, uncertainty of disclosures and multiple methods for challenging patentees create costly problems for small inventors.<sup>66</sup> These burdens could easily price out inventors that are unable to secure sufficient financing regardless of the AIA’s special tools.

Though it appears that scholarly works in the literature lean toward a finding that small inventors are largely harmed by the changes, some, citing a number of technological advances and tools that have given inventors effective means for commercializing their creations, suggest that the United States is experiencing a golden age for inventors.<sup>67</sup> The Internet, for instance, has facilitated both ease of

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58 *Id.* at 119–20.

59 Shih-tse Lo & Dhanoos Sutthiphisal, *Does It Matter Who Has the Right to Patent: First-To-Invent or First-To-File? Lessons From Canada* 5–6, 27–28 (Nat’l Bureau of Econ. Research, Working Paper No. 14926, 2009).

60 Abrams & Wagner, *supra* note 8, at 521.

61 LERNER ET AL., *supra* note 56, at 91, 118.

62 Steve Moore, *The Small Practicing Entity Bears the Brunt of USPTO IPR Challenge Procedures*, IPWATCHDOG.COM, (Dec. 19, 2013), <http://www.ipwatchdog.com/2013/12/19/the-small-practicing-entity-bears-the-brunt-of-uspto-ipr-challenge-procedures/id=46838/>.

63 *Id.*

64 Michael A. Shinall, *Priority and Disclosure: Challenges and Protections to Small Inventors in a First-to-File World*, 94 J. PAT. & TRADEMARK OFF. SOC’Y 362, 362 (2012).

65 Patricia E. Campbell, *Coping with the America Invents Act: Patent Challenges For Startup Companies*, 8.2 OHIO ST. ENTREPRENEURIAL BUS. L.J. 356, 362 (2013).

66 *Id.*

67 Adam Davidson, *Search for the Next Snuggie: Is this Really the Golden Age for Inventors?* N.Y. TIMES (April 17, 2012), <http://www.nytimes.com/2012/04/22/magazine/is-this-really-the-golden-age-for-inventors.html>.

access to markets as well as spread of knowledge and communication. Others argue that the tools incorporated into the AIA will sufficiently protect small inventors.<sup>68</sup> The pro bono program is one additional tool that the AIA has created to aid inventors, but the question remains as to how useful these tools are—both technologically and bureaucratically.

There is limited inquiry into the effectiveness of the patent pro bono program itself. Previous attempts at establishing patent pro bono work encountered difficulties at the intake, screening, and referral service stages.<sup>69</sup> Ongoing coordination and creation of centers for pro bono work will aid in growth of the system as well as collecting information related to the successes achieved, but because the infancy of the program, the impact will not be well known for some time.<sup>70</sup> Research in this area has been constrained by a number of factors, but while alternative approaches have been suggested, rigorous and specific collection of data is the best method for determining the results of patent pro bono work.

There has been limited empirical research in the area of fairness and equality in the patent system for a number of reasons. Part of the problem with research in this area is the limitation on collecting aggregate economic data. The USPTO's system is not easily accessible to researchers. While there exists ways to peruse patent data, such as the number of patents granted by geographic location,<sup>71</sup> obtaining income data for inventors for patents is much more time consuming.<sup>72</sup> In some cases, third-party data mining companies may be required.<sup>73</sup> Ultimately, however, the AIA has had limited time to take effect, as it has not been around for long enough for extensive sets of relevant data and data analysis to be performed. Despite the AIA specifically requiring data collection and research for issues like this,<sup>74</sup> collecting broad sets of data for analysis remains problematic.

While finer granularity of data is preferred for examining if under-resourced inventors are harmed, in some cases, the USPTO's categorization of its inventors can provide sufficient basis for at least some study. Data collected for a study conducted by a former USPTO directory examining the advantage small entities retained over larger patentees in a first-to-invent system employed the use of the USPTO's four

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68 Shinall, *supra* note 64.

69 John Calvert, *Pushing Ahead with the Pro Bono Assistance Program*, 12 J. MARSHALL REV. INTELL. PROP. L. 286, 286 (2013).

70 *See id.*

71 Press Release, USPTO, New USPTO Tool Allows Exploration of 40 Years of Patent Data (Sept. 17, 2015), <http://www.uspto.gov/about-us/news-updates/new-uspto-tool-allows-exploration-40-years-patent-data>.

72 Anthony Trippe, *Are Small Entities More Likely to Abandon US Granted Patents as than Large Ones?*, PATINFORMATICS.COM (Mar. 4, 2013), <http://www.patinformatics.com/are-small-entities-more-likely-to-abandon-us-granted-patents-than-large-ones/>; *see also* Dennis Crouch, *Small Entity Status*, PATENTLY-O (Feb. 12, 2013), <http://patentlyo.com/patent/2013/02/small-entity-status.html>.

73 *Id.* at 2.

74 Abrams & Wagner, *supra* note 8, at 522.

categories defining inventor size.<sup>75</sup> The analysis led to the conclusion that first-to-invent systems granted no particular benefit to the small inventor.<sup>76</sup>

Experts studying this interdisciplinary area are few and far between. While economists may develop models that examine inventiveness correlated with inequality, they are less familiar and speak less often of the type of policy considerations that the judiciary or Congress understand.<sup>77</sup> Conversely, legal practitioners more familiar with the intricacies of the law, and the policies underpinning statutory implementation often have limited exposure to complex econometric methodologies. Examining the impact of legal changes using comparative analysis methodologies such as difference-in-difference frameworks may require joint participation from experts of different fields to fully explore the breadth of the issues.

Researchers often set aside the difficult task of acquiring the best information and settle for more comprehensive data sets for analysis. But to answer important questions that will lead to better policy decisions, specific information must be extracted from ongoing activity. Sources of information are varied and gathering sufficient data from each category to glean insight present unique challenges. Notable sources of data that could glean important trends include: examining the USPTO defined inventor classes and their economic circumstances; looking at the volume of patent pro bono prosecution work being conducted; querying attorneys in patent litigation on demographic data and economic backgrounds of their clients, income and wealth levels of participants in court cases, and other court documents identifying the parties; surveying patent owners settling prior to disputes; acquiring data from non-practicing entities or patent trolls; and contacting entrepreneurs and start-up companies developing new technologies.

While data collection may provide significant insight, each source may contain certain disadvantages or biases that could skew the perspective. For instance, the problem with relying on venture capital activity or research and development expenditures by public companies represents a limited basis for illuminating the plight of the small inventor. Startups that are funded in this manner typically consist of experienced or well-connected entrepreneurs. Smaller groups or individual inventors are typically not well prepared to present their pitch to investors and face many challenges in this arena. Information gathered from venture capital studies may be of limited use in examining the status of small inventors. Careful consideration of the source of data would need to be accounted for to isolate and prevent introducing bias into the results.

Studying the impact of the provisions of the AIA is particularly difficult because of the lack of historical data, as the AIA took effect in 2013. In general, evaluating the effectiveness of the patent system has involved either conducting studies that examine venture capital finance and public company behavior or

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75 Gerald J. Mossinghoff, *The U.S. First-To-Invent System has Provided No Advantage to Small Entities*, 84 J. PAT. & TRADEMARK OFF. SOC'Y 425, 427 (2002).

76 *Id.* at 428.

77 Stiglitz, *supra* note 18 (suggesting on a broader level that over protection of inventions leads to stifling natural economic market forces).

analogizing macroeconomic data with other countries that have recently converted to first-to-file systems. Researchers focus on these particular areas because of the relative ease of access to relevant data and then analogize back to the present inquiry. However, research on specific social and economic inequalities using this approach presents a complex problem. “[T]aken as a whole, what comes out of a patent office is at best representative of the technological potential of a given number of innovations, but certainly not of their technological actuality.”<sup>78</sup> The report outlined the flaws of using patents as a means of extrapolating broader social implications.<sup>79</sup> Others argue that equating patents with innovation is flawed, and in the real world beyond the ivory towers, the business world has moved away from its use, yet, in the legal and social sciences community, the theory persists.<sup>80</sup> Examining patent prosecution data inherently excludes inventors that either could not afford the process or operated under the assumption that their invention would be protected. While data regarding litigation might present a viable source of information, many threats of suits will lead uninformed and under-resourced inventors to settle. Extracting data from non-participating entities therefore remains a difficult proposition.

The traditional methodology employed may not present a clear path for determining the level of harm to small inventors. For instance, although research suggests greater innovation under a first-to-invent system, taken in consideration with the assertion that small inventors do not receive any particular benefit in such a system, the level of innovation in either system may be a moot point when examining the inequalities created by the switch. Innovation may be a poor measure of benefit from the patent pro bono program. The flaws in research are numerous, but expanding our understanding of the impact of intellectual property policies is a critical component to addressing an important factor contributing to economic inequality and social justice.

### III. RECOMMENDATIONS

Encouraging innovation and invention among small inventors allows the economy and society to reap the greatest gains. In order to enact effective laws to achieve these goals, higher quality data is needed to help understand the current circumstances and impact of policy decisions. A well-informed legislature will help shape effective policy. Readily accessible sources of data include USPTO inventor classifications, pro bono prosecutions from regional centers, attorneys involved in patent litigation, court case and documents that provide sufficient information about the parties, and venture capital financing activities. These sources of data center around financial activity, patent prosecution, and patent litigation but do not provide a complete picture and may be biased towards well-financed businesses and may not be very representative of the problems related to inequality. To achieve sufficient

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78 Pierre Desrochers, *On the Abuse of Patents as Economic Indicators*, 1 Q. J. AUSTRIAN ECON. 51, 52 (1998).

79 *See generally id.*

80 Jackie Hutter, *We're Measuring the Wrong Things: Inventiveness Patents Do Not Equal Innovation*, IP ASSET MAXIMIZER BLOG (October 31, 2010), <http://ipassetmaximizerblog.com/were-measuring-the-wrong-things-inventiveness-and-patents-do-not-equal-innovation/>.

understanding of the social impact of the patent system requires collecting information from small inventors that operate out of the garage and, though difficult to locate, will provide highly valuable information. Additionally, requiring entities involved in disputes to report settlement data will allow researchers to collect aggregate data that is currently missing from analysis. Informed decisions by legislators will produce less uncertainty for inventors, and use of comprehensive data is a fundamental part of this process.

Beyond increasing the collection of data to determine the impact and causes leading to inequalities as a result of the patent system, there remains the question of how society should foster inventiveness for the under-resourced population. Although some believe abolishing the patent system would be the better solution,<sup>81</sup> more practical alternatives may provide real results. The AIA maintains a number of tools, such as reduced fees and the patent pro bono program; however, additional methods for increasing inventive activity from small inventors should be added to the arsenal. Reducing fees to zero-cost or otherwise establishing a free-to-invent system for qualified inventors may spur growth in this category of inventors.

A better informed community of inventors and patent attorneys will benefit under-resourced inventors by allowing them to use the tools that have been provided to them. In many cases, inventors may not be fully aware of the existence of or cognizant of the special procedures and reduced costs that have been created for them. The patent pro bono program will help in this regard, but attorneys need to also be aware that an organized patent pro bono program is available. Improved marketing of pro bono programs across the country will simultaneously serve the community by helping inventors prosecute their patents but will also serve as a marketing and educational platform for the patent system. Expanded use of the services necessitates an increased awareness of the availability of the option.

Investment in research and development such as existing scientific grants for academic studies is an important factor in encouraging innovation.<sup>82</sup> This is one method for encouraging innovation among under-funded inventors. Government-financed research initiatives typically involve grants to institutions, however, investment grants for the small inventor is another viable avenue that would spur innovation among entrepreneurial Americans that lack the necessary resources for protecting their ideas. In addition, government funding can be targeted for certain categories that see limited growth but may have substantial social benefits. Government financing for research and development is critical for certain areas of innovation.

A reduction in the length of time patent protection lasts may reduce the drag on innovation. Monopoly rights held on technology create a lag on advancement by preventing new, creative ideas from improving social well-being and labor productivity. Certain areas of technology, such as pharmaceuticals, are dependent on

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81 See Stiglitz *supra* note 18.

82 Jonathan Hopkin, Victor Lapuente & Lovisa Moller, *Lower Levels of Inequality are Linked with Greater Innovation in Economies*, USAPP: LSE USCENRE (Jan. 23, 2014), <http://blogs.lse.ac.uk/usappblog/2014/01/23/lower-levels-of-inequality-are-linked-with-greater-innovation-in-economies/>.

longer time-frames for patent protection. Other areas, such as computer microprocessors, evolve so rapidly that prolonged patent protection can stifle its natural evolution. Cutting the length of time for which protections are granted for certain categories will significantly benefit new entrants into the market.

Reducing the amount of damages that can be recovered in intellectual property disputes can also help to close the gap between the well-funded and the under-resourced inventor. This change can have a multitude of benefits. For example, the current system inherently attracts trolls. By reducing the possible profits trolls can recover, fewer resources will be wasted on fighting these entities and lining their pockets with settlement dollars. In addition, large organizations will be less incentivized to pursue expensive litigation to settle infringement disputes but will still engage in litigation in courts to obtain injunctions if there are significant technologies to protect.<sup>83</sup> In addition, reducing damages will lead to fewer intellectual property infringement cases and will subsequently reduce the incentive for companies to pursue the common practice of constructing large portfolios of patents as a defensive measure.

Instituting a free or reduced-fee licensing system for qualified inventors would encourage development and marketing of technologies. Cross-licensing of technologies would be increased under such a policy. Reducing barriers to entry for newly-formed, cash-strapped entrepreneurs will encourage investment into new ventures. These new ventures will in turn employ labor and lead to further economic growth.

There are a variety of ways to improve the current deficiencies with the current intellectual property regime. Conducting additional research into the nature of the problem is a critical starting point. But other measures to encourage invention by independent inventors and entrepreneurs will help to close the gap between the well-funded and the under-resourced. From government funded research projects to more patent pro bono work, these tools may have significant impact if inventors are able to locate and take advantage of these resources. Other policy measures can be implemented as well. All of these resources can significantly improve the problems of economic inequality.

## CONCLUSION

Maintaining conformity with the rest of the world in the interest of harmonization while simultaneously preserving protections for individual inventors and other underfunded creators is a challenging balancing act. With increasing globalization and wealth inequality, corporate intellectual property strategies add significant pressure for the poor, under-resourced, or otherwise disadvantaged innovators. Protecting this class of inventors and encouraging innovation at the microeconomic scale is essential to protecting American ingenuity and entrepreneurial activity, as well as broadening the scope of benefits that comes with technological innovation. Despite the problems associated with researching the

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83 Vivek Wadhwa, *Ending Patent Wars Will be a Huge Boon to the Tech Industry*, TECHCRUNCH (Mar. 10, 2016), <https://techcrunch.com/2016/03/10/ending-patent-wars-will-be-a-huge-boon-to-the-tech-industry/>.



issues, it is critical to the economy and to social development that the inquiry is pressed forward so that the heroic American inventor can continue the dream.