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## Patenting and Innovative Startups: Putting the America Invents Act in a Broader Economic Context

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### **The importance of patents to the economy**

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Patents are at the crux of innovation in the economy. Patents provide a framework by which innovative research can take place and new technologies can be disseminated. In particular, patents provide a clear economic incentive to undertake innovative research that has the potential to substantially grow startups.<sup>1</sup> Patents protect researchers and investors with clear determinations of intellectual property rights while also providing a vehicle with which to share newly developed technologies without a fear of losing ownership of intellectual property.<sup>2</sup>

Given the significance of patents, any changes to the patenting system could potentially have widespread impacts—both positive and negative—to startups, small businesses, and by extension, to the economy as a whole. In recent years, the Leahy-Smith American Invents Act of 2011 (AIA) made significant changes to the U.S. patenting system. While it is too early to tell precisely what those impacts are, the AIA could affect the viability of innovative startups.<sup>3</sup>

### **Summarizing the possible ramifications of the AIA**

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The AIA made many notable changes to the U.S. patenting system. First and foremost, it shifted the United States from a first-to-invent-patenting system to a first-inventor-to-file system, eliminating the use of dates of invention in determining who has priority in receiving a patent. In addition to this substantial policy change, the AIA included provisions that affect the ability of small businesses and entrepreneurs to obtain and protect patents.<sup>4</sup> Earlier this month, Lerner, Speen, and Leamon released a study through the

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1. “Market Value and Patent Citations: A First Look” Bronwyn H. Hall, Adam B. Jaffe, and Manuel Trajtenberg (2000). NBER Working Paper No. 7741.

2. “Recent Research on the Economics of Patents” Bronwyn H. Hall and Dietmar Harhoff (2012). NBER Working Paper No. 17773.

3. “The Leahy-Smith America Invents Act: A Preliminary Examination of Its Impact on Small Businesses” Josh Lerner, Andrew Speen, and Ann Leamon (2015). U.S. Small Business Administration, Office of Advocacy. Available at [www.sba.gov/advocacy/leahy-smith-america-invents-act-preliminary-examination-its-impact-small-businesses](http://www.sba.gov/advocacy/leahy-smith-america-invents-act-preliminary-examination-its-impact-small-businesses).

4. Ibid.

Office of Advocacy analyzing the potential outcomes of the policy changes brought on by the AIA. Their interpretation of the AIA policy changes is summarized in the table on pages 4–6.

## **Putting the outcomes of the AIA in perspective: The nexus between patents and funding for innovative startups**

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If the AIA affects small innovators' ability to obtain and defend patents, it could have sizable effects on their ability to raise venture capital (VC). Whenever a venture capitalist considers investing in an innovative startup it must evaluate the risk brought on by uncertainty around the firm's future success. Since VC funds seek to maximize the return on their investment, if an investment appears too costly or risky, they may rationally pass on an opportunity which later turns out to be an extremely profitable innovative venture. From the startup's point of view, to obtain valuable VC funding, they need ways to show investors that they are a viable investment so they can get funding that might otherwise diminish due to risk concerns.

According to the economic literature, patents act as a signal to venture capitalists, reducing risk and increasing investments in innovative startups.<sup>5</sup> In particular, in early funding stages patents are shown to increase the likelihood of receiving VC funding.<sup>6</sup> One reason for this is that patents may act as collateral during debt financing because they represent intellectual property assets.<sup>7</sup> Furthermore, patents may be valuable in equity fundraising because they may signal the quality of a startup's innovation.<sup>8</sup> Since patents can be challenged and defended, an investor can be sure that if a startup has a patent it not only has ownership over its innovative technology but also has a valid innovation that is not infringing on anyone else's intellectual property. Therefore investors do not need to expend additional resources to find out this information.<sup>9</sup>

The idea of a patent as a signal to investors of innovation quality can be crucial because VC funding can be cyclical.<sup>10</sup> In a working paper, Nanda and Rhodes-Kropf explored the implications of periods of high and low VC activity for innovation.<sup>11</sup> The authors concluded that it becomes very difficult for innovative startups to receive funding during periods of low VC activity. Innovative startups tend to be viewed as risky because there is a lot of uncertainty around their commercial viability and profitability, which are key components in measuring return on investment. Therefore, when there is less VC activity, risk is concentrated in fewer investments and the opportunity cost of taking a chance on innovative startups increases, reducing the potential return on investment. Conversely, in times of high VC activity, investment risk is distributed amongst many startups, and VC funds may make investments that would otherwise be too risky or costly. Interestingly, because investors are more concerned with future success during times of

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5. "High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey" Stuart J.H. Graham, Robert P. Merges, Pamela Samuelson, and Ted. M Sichelman (2009). Available at: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1429049](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1429049).

6. "Patents as Signals for Startup Financing" Annamaria Conti, Jerry Thursby, and Marie C. Thursby (2013). NBER Working Paper No. 19191.

7. "Patent Signals" Clarisa Long (2002). *The University of Chicago Law Review*, 69(2): 625-679.

8. *Supra* 6; "Patents as Quality Signals? The implications for financing constraints on R&D" Dirk Czarnitzki, Bronwyn H. Hall, and Hanna Hottenrott (2014). NBER Working Paper No. 19947.

9. "Financing Entrepreneurial Experimentation" Ramana Nanda and Matthew Rhodes-Kropf (2015). Available at: [http://conference.nber.org/confer/2015/IPES15/Nanda\\_Rhodes-Kropf.pdf](http://conference.nber.org/confer/2015/IPES15/Nanda_Rhodes-Kropf.pdf).

10. "Venture Capital Investment Cycles: The Impact of Public Markets" Paul Gompers, Anna Kovner, Josh Lerner, and David Scharfstein (2005). NBER Working Paper No. 11385.

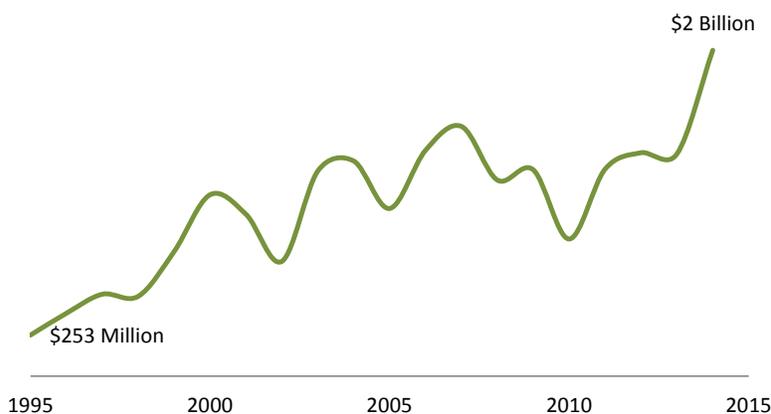
11. "Financing Risk and Innovation" Ramana Nanda and Matthew Rhodes-Kropf (2014). Harvard Business School Working Paper No. 11-013.

low activity, startups funded during those periods tend to be more successful over time.<sup>12</sup> Consequently, if an innovative startup is stuck in a negative trough in the VC market during a period of low activity, patents may be critical to receiving more limited and potentially more valuable VC funding.

The current VC environment for biotech startups offers a potential example of this principle in action, as well as the protections patents can offer existing startups seeking to maintain capital flow during downturns. Biotech startups are traditionally risky because they require an immense amount of capital and intellectual property, are research intensive, and may take a long time to yield a commercial product. Due to advances in 3D printing, changes to Food and Drug Administration policy, and recent major scientific advances, biotech startups have become increasingly more efficient. In turn, investment in biotech startups has grown substantially. These developments are creating a positive feedback loop as the increased number of investors makes investing in biotech less risky. As shown in the chart on this page, VC biotech investment is at some of its highest levels ever.

**Biotech VC investment levels fluctuate but may now be at an all-time high**  
**Annual 4th quarter VC investment in biotechnology from 1995 to 2014**

(Data from PWC Moneytree, National Venture Capital Association, and Thomson Reuters)



However, buoyed by potential overvaluations resulting from large private-equity investments and the cyclical nature of VC, it is not clear if these investment levels are sustainable.<sup>13</sup> As a result, if the VC biotech market starts to correct downward, firms that are currently receiving funding may find it difficult to show that they can still yield the (now higher than previously) necessary returns to warrant a VC investment. In such a climate, patents could be the edge an innovative startup needs not only to obtain funding in general, but also to survive contractions to the VC market.

## Conclusion

The AIA made many complex changes to the U.S. patent system. While it is still too early to understand its economic impact, it has the potential to directly affect the viability of some innovative startups. Policymakers should be concerned about the outcomes realized by these firms, since innovative startups may evolve into the fast-growing catalysts of regional economic expansion.<sup>14</sup> Specifically, patents can be at the center of the fundraising that allows these startups to develop and grow. They may act as collateral for

12. Ibid.

13. For example, “With \$500 Million Fund, Biotech Nears Venture Record” Doni Bloomfield and Caroline Chen (2015). Available at: <http://www.bloomberg.com/news/articles/2015-06-09/new-500-million-fund-pushes-biotech-closer-to-venture-record>.

14. “Why Are Some Regions More Innovative Than Others? The Role of Firm Size Diversity” Ajay K. Agrawal, Iain M. Cockburn, Alberto Galasso, and Alexander Oettl (2012). NBER Working Paper No. 17793; “Entrepreneurship and Urban Growth: An Empirical Assessment with Historical Mines” Edward L. Glaeser, Sari Pekkela Kerr, and William R. Kerr (2013). Working Paper 13-15, Center for Economic Studies, U.S. Census Bureau.

debt financing and as a signal of quality during equity financing. And they may be invaluable in obtaining VC funding as a way to hedge volatility in VC markets. Therefore, changes to the patenting system may have widespread impacts for small businesses and entrepreneurs.

### Post-AIA patent policy changes ambiguously affect small businesses (Table 1)

Patent policy area	Policy as interpreted in the Lerner-Speen-Leamon report		Potential effect on small business
	Pre-AIA	Post-AIA change	
<b>Priority rights</b>	<p>The inventor was granted priority based on invention date.</p> <p><i>Leg. cit.: 35 U.S.C. 102(a)</i></p>	<p>The first inventor to file is granted priority based on the effective filing date of the invention.</p> <p><i>Leg. cit.: 35 U.S.C. 102(a)(1)</i></p>	<ul style="list-style-type: none"> <li>• The policy shift brings the U.S. patent system more in line with the rest of the world, making it easier to do business abroad.</li> <li>• There is an incentive to file more patents earlier; this could drive up costs in both attaining and defending patents.</li> <li>• Small businesses will need to seek legal counsel to ensure that future patent applications meet new AIA requirements and standards. The costs of legal counsel have the potential to be quite large.</li> </ul>
<b>Grace period and prior art determinations</b>	<ul style="list-style-type: none"> <li>• Interference proceedings were used to discover the first true inventor.</li> <li>• “Prior art” used to challenge patent priority was limited to printed publications in the domestic market for public use or sales activity</li> <li>• A one-year grace period protected applicants from third-party disclosures of “prior art” which could invalidate a patent application based on “swearing behind a reference”</li> </ul> <p><i>Leg. cit.: 35 U.S.C. 102(b)</i></p>	<ul style="list-style-type: none"> <li>• Derivation proceedings are used to determine if the first person to file an application is a “true inventor” of the invention.</li> <li>• No geographic limits apply to “prior art.”</li> <li>• Activities that result in something “otherwise available to the public” count as “prior art.”</li> <li>• Inventors cannot “swear behind” an invention by establishing an earlier invention date to take advantage of the grace period from third-party disclosures.</li> </ul> <p><i>Leg. cit.: 35 U.S.C. 102(b)(1)(B)</i></p>	<ul style="list-style-type: none"> <li>• The weaker grace period could require iterative provisional disclosures to ensure full protection.</li> <li>• Derivation procedures and the loss of the ability to “swear behind a reference” could increase the costs to small businesses to protect IP, as well as increase disclosure risks to investors.</li> </ul>

Post-AIA patent policy changes ambiguously affect small businesses (Table 1, continued)

Patent policy area	Policy as interpreted in the Lerner-Speen-Leamon report		Potential effect on small business
	Pre-AIA	Post-AIA change	
<b>Reexamination procedures</b>	<ul style="list-style-type: none"> <li>The <i>ex parte</i> reexamination process allowed USPTO to examine an already-granted patent based on patents and other publications that established a “substantial new question of patentability” (SNQ).</li> <li>The <i>inter partes</i> reexamination process based on an SNQ standard had to be requested by a third party. This process allowed for estoppel limitations preventing third parties from challenging the same patent on previously raised issues during a prior reexamination.</li> </ul> <p><i>Leg. cit.: 35 U.S.C. sections 301-305</i></p>	<ul style="list-style-type: none"> <li><i>Inter partes</i> reexamination has been replaced with a post grant review process and <i>inter partes</i> review process.</li> <li>The post grant review allows a patent to be invalidated based on any evidence, not just on previously issued patents and publications. However, determinations are made based on a standard more stringent than SNQ, and an estoppel provision is included.</li> <li><i>Inter partes</i> review can only be initiated after a post grant review period has elapsed. It is similar to the <i>inter partes</i> reexamination but with a higher standard than SNQ and a potentially laxer estoppel provision.</li> </ul> <p><i>Leg. cit.: Fed. Reg. 76, no. 157, Aug. 14, 2012, p. 48685; Fed. Reg. 76, no. 185, Sept. 23, 2011, p. 59055; Fed. Reg. 76, no. 157, Aug. 14, 2012, p. 48828</i></p>	<ul style="list-style-type: none"> <li>Small businesses can take advantage of less costly “prioritized examinations.” This provides relatively faster decisions on non-provisional patents.</li> <li>The new review procedures are more costly, and many small businesses may find them to be prohibitively resource-intensive.</li> <li>The new post-grant reviews may favor petitioners over small patent holders.</li> <li>This increases the resources required of small businesses to protect their intellectual property claims.</li> </ul>
<b>Joinder modification</b>	<p>“Patent assertion entities” were able to join a patent infringement lawsuit covering the same patent.</p> <p><i>Leg. cit.: Federal Rule of Civil Procedure 20(a)(1). Permissive Joinder of Parties [Rule 20]</i></p>	<p>A higher standard was put in place for when a patent assertion entity could join a patent infringement lawsuit.</p> <p><i>Leg. cit.: AIA 35 U.S.C. 299. Joinder of parties</i></p>	<ul style="list-style-type: none"> <li>The change provides some protection for small businesses vulnerable to patent assertion entities.</li> <li>The change makes it more difficult for small businesses to protect patents that may be infringed upon.</li> </ul>
<b>Prior user rights</b>	<p>Prior user rights were a rarely utilized defense against patent infringement charges. They protected prior usage by entities making “internal” commercial use of intellectual property (i.e., not publicly disclosed IP).</p> <p><i>Leg. cit.: 35 U.S.C. 273. Defense to infringement based on earlier inventor</i></p>	<p>Prior user rights have been expanded to protect almost all technologies as long as prior use commenced at least one year before the earliest effective filing or publication date by a patent owner.</p> <p><i>Leg. cit.: 35 U.S.C. 273. Defense to infringement based on prior commercial use</i></p>	<ul style="list-style-type: none"> <li>This marginally increases the value of trade secrets for small businesses that rely on proprietary technologies.</li> <li>It potentially decreases the commercial value of small businesses’ patents.</li> </ul>

**Post-AIA patent policy changes ambiguously affect small businesses (Table 1, continued)**

Patent policy area	Policy as interpreted in the Lerner-Speen-Leamon report		Potential effect on small business
	Pre-AIA	Post-AIA change	
<b>Small entity incentive programs and fee modification</b>	These programs did not all exist prior to the AIA.	Lower fees and incentive programs for small entities reduce the resources required to obtain a patent.  <i>Leg. cit.: e.g., Pub. L. No. 112-29, sec. 32(a), 125 Stat. 340, 2011; Pub. L. No. 112-29, sec. 28, 125 Stat. 340, 2011</i>	While these provisions reduce the costs to apply for and obtain a patent, the cost savings may end up being marginal at best.

Source: The Leahy-Smith America Invents Act: A Preliminary Examination of Its Impact on Small Businesses, by Josh Lerner, Andrew Speen, and Ann Leamon for Bella Research Group. U.S. Small Business Administration, Office of Advocacy, 2015. Available at [www.sba.gov/advocacy/leahy-smith-america-invents-act-preliminary-examination-its-impact-small-businesses](http://www.sba.gov/advocacy/leahy-smith-america-invents-act-preliminary-examination-its-impact-small-businesses).