

## The Leahy-Smith America Invents Act: A Preliminary Examination of Its Impact on Small Businesses

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### Purpose

The Leahy-Smith America Invents Act of 2011 (AIA) may be the largest change in U.S. patent policy in over half a century. Among other things, the AIA shifts the U.S. patenting system from a first-to-invent (FTI) to a first-inventor-to-file (FITF) basis. This eliminates the use of dates of invention in determining who receives a patent. This policy change has the potential to have widespread impacts on how patents are acquired, utilized, and protected.

The intricacies of the AIA and the complex way in which patents contribute to the broader economy mean that this change could yield different economic impacts to businesses of different sizes and industries. While the FITF shift took effect in 2013, only a modicum of post-AIA patenting data is available for analysis because of the length of the patenting process and expected legal challenges. As a result, the positive and negative economic outcomes of the FITF shift are still uncertain.

The magnitude of these outcomes is particularly important to small businesses since some rely on patents to raise capital, and intellectual property is central to some business plans. Given the uncertainty and importance of the economic outcomes resulting from the shift to the FITF system, the AIA included a provision directing the Office of Advocacy to study how this policy shift could affect small businesses. In 2014, the Bella Research Group was awarded a contract to carry out this study. Their report employs a literature review and three quantitative analyses to assess the potential small business impacts of policy changes resulting from the AIA.

### Background

**The importance of patents to small businesses and the larger economy.** Patents are a key part of innovation and, therefore, of economic growth at the regional, industry, and firm level.<sup>1</sup> Patents promote innovation by granting intellectual property rights and disseminating technologies.<sup>2</sup> Clear intellectual property rights protect innovators, and by extension they offer an incentive to conduct important research. Without an assurance that an innovator could profit from the commercialization of his or her technology, there would be little incentive to invest in substantial resource-intensive research. Moreover, patents provide a vehicle to publicly disseminate technologies without losing ownership over the intellectual property. Over time, entrepreneurs, business owners, researchers, and innovators leverage previous research to use or improve newly developed technologies, contributing to greater innovation and efficiency in the economy. Therefore, the patent system provides both an incentive to conduct innovative research and a mechanism by which to circulate its results.

Patents are of particular importance to small businesses. Small innovative firms often heavily leverage patents in their early stages of development to acquire capital. This reliance on intellectual property

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.

to acquire capital is even more important for small firms in research-intensive industries. For example, the 2008 Berkeley Patent Survey found that 97 percent of biotech companies and 94 percent of medical device companies backed by venture capital held either a patent or a patent application.<sup>3</sup> Patents are especially critical for innovative startups looking for funding because they can cut through some of the uncertainty and risk inherent in the decision to invest in these high-risk/high-reward entrepreneurs.<sup>4</sup> Given that venture capital markets can be highly volatile,<sup>5</sup>

3. “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).

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

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

patents may provide value to innovative startups as a way to somewhat hedge investors’ risks when funding may not be as readily available and become more risk averse.<sup>6</sup>

**The AIA’s policy changes and potential small business impacts.** Many observers regard the AIA’s shift from FTI to FITF system as the most substantial change to the U.S. patenting system in over half a century. Beyond this significant shift in patenting policy, the AIA yielded additional policy changes with potentially ambiguous and uncertain effects on small businesses. Chart 1 summarizes the prominent post-AIA patent policy changes as interpreted in this report and their potential small business impacts. The full report contains detailed discussions of these policy changes and their associated small business impacts.

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

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

Patent policy area	Policy as interpreted in this report		Potential effect on small business
	Pre-AIA	Post-AIA change	
<b>Priority rights</b>	The inventor was granted priority based on invention date.  <i>Leg. cit.: 35 U.S.C. 102(a)</i>	The first inventor to file is granted priority based on the effective filing date of the invention.  <i>Leg. cit.: 35 U.S.C. 102(a)(1)</i>	<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>

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

Patent policy area	Policy as interpreted in this report		Potential effect on small business
	Pre-AIA	Post-AIA change	
<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>
<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>

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

Patent policy area	Policy as interpreted in this report		Potential effect on small business
	Pre-AIA	Post-AIA change	
<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>
<b>Small entity incentive programs and fee modification</b>	<p>These programs did not all exist prior to the AIA.</p>	<p>Lower fees and incentive programs for small entities reduce the resources required to obtain a patent.</p> <p><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></p>	<p>While these provisions reduce the costs to apply for and obtain a patent, the cost savings may end up being marginal at best.</p>

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.

## Findings and Policy Recommendations

The AIA instructed Advocacy to study the effects of the shift from an FTI system to an FITF system. Given the short time frame between the law's enactment and the start of the report, little post-AIA patent data was available. Instead, this report looked at the small business impacts through a literature review and three quantitative analyses.

**Literature Review.** A review of the literature from academic, business, and government sources found no consensus among experts as to how the AIA will affect small businesses. Many potential positive, negative, and neutral outcomes were identified. Depending on the relative magnitude of each outcome and the individual size and industry of small businesses, individual businesses would be affected differently. The researchers found four major reasons for this lack of a clear conclusion:

1. The law is complex in nature, and its various reforms will likely have different impacts on small businesses.
2. The language of certain provisions is ambiguous and leaves the magnitude of the consequences of the reforms uncertain until courts clarify the interpretation.
3. Achievement of the goals established in the law is still uncertain.
4. Certain provisions may improve the innovative capabilities of small businesses in certain industries while impeding or not affecting them in other industries, especially given inter-industry differences in patenting behavior in the pre-AIA patent system.

**Quantitative Analysis 1: Public Company Event Study.** The research team conducted an event study analysis to determine if investors expected the AIA to be advantageous or disadvantageous to publicly owned small businesses in patent-intensive industries. That is, if investors believed that the AIA would be a boon to small patent-intensive businesses relative to larger businesses, one would expect their relative stock prices to rise while the opposite would happen if investors believed that the AIA would be harmful overall. This report found no statistically significant differences between small and larger businesses in the market's reaction to the AIA.

**Quantitative Analysis 2: Venture Capital Funding Study.** The researchers studied whether the AIA would affect the ability of small patent-intensive businesses to obtain venture capital funding. The researchers analyzed the changes in venture capital financing for patent-intensive and non-patent intensive industrial sectors in the United States around the enactment of the AIA. These same industries' financing patterns in Europe were used as a control group. If the AIA was found to be harmful to small businesses then one would expect patent-intensive small businesses to receive relatively less funding as investing in them became riskier. The opposite would be true if one expected the AIA to greatly help patent-intensive small businesses. This report found no statistically significant differences in venture capital funding in terms of the patent intensity of industry subsectors.

**Quantitative Analysis 3: Canadian First-to-File Study.** Similar to the AIA's shift from FTI to FITF, Canada underwent a change from an FTI to a first-to-file (or FTF) system in 1989. Given Canada's similarities to the United States, the researchers analyzed Canadian patenting almost as a case study. Specifically, they examined whether there were any differences in the patenting activity of small businesses relative to larger firms before and after the Canadian patent policy shift. Patenting activity in the UK was used as a control. If small businesses received less or more patents than larger firms one would expect that small businesses would be negative or positively affected respectively. This report found that after this policy change there was a statistically significant increase in the disparity in patent ownership between large and small firms.

**Policy Implications.** Based on the lack of available post-AIA patent data, the absence of expert consensus in the literature review, and the inconsistent and inconclusive results of empirical analyses, this report concluded that it is too early to determine the impact of the AIA on small businesses. Considering this extreme uncertainty—especially as provisions of the law are still being enacted and may be subject to future legal challenges—this report proposed three projects that in the future could clarify small business impacts:

1. A series of interviews with independent Canadian VC fund managers operating before

and after the Canadian switch to first-to-file to help predict the future response of U.S. VC fund managers.

2. An update to the quantitative analysis on VC financing in the United States in three to five years to account for a potential lag in the response from the U.S. VC community.
3. A study of the changes in patenting activity of small and large U.S. businesses to be conducted in roughly five years, using the same methodology as the quantitative analysis on the Canadian switch to an FTF patent system.

## Scope and Methodology

This report was subject to many data limitations and challenges. Until there are more complete post-AIA patent data, researchers are limited as to how they can appropriately utilize research methodologies and data sources. Some of the significant limitations and challenges which the research team faced are noted below.

**Limited patent data under AIA policies.** The AIA became operational in March 2013, therefore few patents had been issued under AIA policies. Without reliable data on granted patents and patent quality, the meaning of patent application data are hard to interpret. For example, decreased patent activity from small firms relative to large firms could be either a signal of greater selectivity in patent decisions (i.e., higher quality patents) or diminished patenting abilities. On the other hand, increased patent activity from small firms relative to large firms could signal lower selectivity in patent decisions (i.e., lower quality patents) or improved patenting abilities.

**Uncertainty surrounding the implementation of the AIA.** The complexity of the law still leaves uncertainty regarding the eventual interpretation of certain provisions in federal court. This lack of clarity not only impairs the ability to examine the law's theoretical impact, but also complicates "market responses," as small businesses and small business investors likely had varying reactions to the law based on their own interpretations.

**Magnitude and scope of AIA economic impacts.** There are many provisions in the law, including priority rules, joinder rules, prior use rules, and prioritized examination procedures, whose effects on specific industries may be masked by greater scale complexities for small businesses. As a result,

when looking at the small business community as a whole it can be difficult to differentiate the economic impact of the AIA.

**Difficulty in attributing impacts to AIA policy changes.** Since patenting and innovative activity reflect the impact of many macroeconomic variables, it is extremely difficult to define with high precision the changes which can be fully attributed to the AIA. It is important to note, however, that this study employed various methods in each quantitative analysis in an attempt to overcome this barrier.

**Different data sets requiring different determinations of firm size.** This report's quantitative analyses employed various definitions to differentiate small businesses from large ones. The event study analysis considered differential market reactions among patent-intensive publicly traded companies along the spectrum of employee counts and market capitalizations. The VC analysis proxied for small businesses given that VC firms generally target the startup community. Finally, the Canadian patent policy analysis looked at firm size by number of successful patent applications prior to the reform.

## Data Sources and Methodologies

This report relied on a variety of different data sources and research methodologies for its quantitative analyses. Chart 2 summarizes these data sources and methodologies.

**Advocacy data quality guidelines.** This report was peer reviewed consistent with Advocacy's data quality guidelines. More information on this process can be obtained by contacting the director of economic research at [advocacy@sba.gov](mailto:advocacy@sba.gov) or (202) 205-6533.

## Additional Information

This report is available on the Office of Advocacy's research webpage at [www.sba.gov/advocacy](http://www.sba.gov/advocacy). To be informed of Advocacy's future research, visit the office's email subscription webpage at [www.sba.gov/content/connect-us-0](http://www.sba.gov/content/connect-us-0). By subscribing to the Small Business Regulation & Research category, you can choose to receive email notices of new Advocacy research, news releases, regulatory communications, publications, or the latest issue of *The Small Business Advocate* newsletter.

## Data sources and research methodologies utilized in quantitative analyses (Chart 2)

Quantitative Study	Data Source(s)	Research Methodology
<b>Public company event study</b>	<ul style="list-style-type: none"> <li>• Firms analyzed in the study came from the 2010 USPTO “Patenting by Organization” report</li> <li>• Firm demographic information from S&amp;P Capital IQ</li> <li>• Stock market information from the University of Chicago’s CRSP database</li> </ul>	Event study focusing on the passage of key provisions of the AIA three and five days before and after the date of passage.
<b>VC financing study</b>	<ul style="list-style-type: none"> <li>• Patenting by industry from 2012 USPTO data</li> <li>• Venture capital data over a 10-year quarterly stretch (ending Q2 2014) from Thomson Reuters VentureXpert</li> </ul>	Difference in differences regressions on venture capital financing among different industry sectors based on industry patent-intensity before and after the AIA was enacted.
<b>Canadian FTI to FTF study</b>	Patent data from four to five years before and after Canadian patent reform in 1989 from the NBER Patent Data Project	Difference in differences regressions on the differential patenting activity of small and large businesses before and after an AIA-like patenting reform in Canada.