

The State of Innovation and Entrepreneurship in the Capital Region



Baton Rouge Area Chamber®

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Introduction

In 2014, the Baton Rouge Area Chamber (BRAC) released an **inaugural report** on the state of innovation and entrepreneurship in the Capital Region, the nine-parish metropolitan statistical area (MSA) comprised of East Baton Rouge and the adjacent parishes. That report measured the region's progress in innovation and entrepreneurship, and highlighted some of the exciting innovation and entrepreneurship developments taking place. Since that time, the region has received additional accolades, including its selection as the twenty-first highest-performing city in the country in Milken Institute's 2014 Best Performing Cities Index.ⁱ This ranking was largely due to the explosive high-tech GDP growth from 2012-2013 (sixth in the nation) and short-term job growth from 2013-2014 (eleventh in the nation). The Capital Region was also named one of Investopedia's top eight under the radar tech hubs for investing in 2015, based on assets such as the Louisiana Technology Park, Louisiana Business and Technology Center (LBTC), Louisiana Emerging Technology Center, Innovation Catalyst, and IBM's recently completed downtown center, as well as the recent growth of tech startups like Mastery Prep.ⁱⁱ In combination with a strong local entrepreneurial network, encouraged by Louisiana's top five small business friendliness ranking, the Capital Region is poised to continue its fast-paced development.ⁱⁱⁱ

However, the Milken Institute index that rightly applauds the rapid growth of the area's local high-tech sector also points out that the Baton Rouge MSA still ranks a disappointing 176th in the country for high-tech GDP concentration, and remains overly reliant on industries that are vulnerable to fluctuations in commodity prices. The purpose of BRAC's 2015 innovation and entrepreneurship report is to update and analyze the Capital Region's continuing progress within a broader national context, and provide insight into how the region compares to its peers. Towards this end, BRAC has revisited the innovation metrics used, and will be benchmarking the Baton Rouge Area against five other metropolitan areas from across the country with similar economies and demographics: Birmingham, Alabama; Columbia, South Carolina; Little Rock, Arkansas; Louisville, Kentucky; and Memphis, Tennessee.

As outlined in the 2014 report, the Baton Rouge Area has taken enormous strides recently in developing an innovation-focused economy, including:

- 42 percent growth in patents between 2009-2011
- 27 percent increase in worker productivity between 2009-2013, as measured by GDP per worker
- Approximately 20 percent increase in innovation field educational completions between 2009-2013
- More than doubling LSU's computer science program enrollment between Fall 2009 and Fall 2014

In the 2015 report, BRAC will revisit some of last year's metrics while introducing others that better illustrate the region's challenges and opportunities in this sphere.

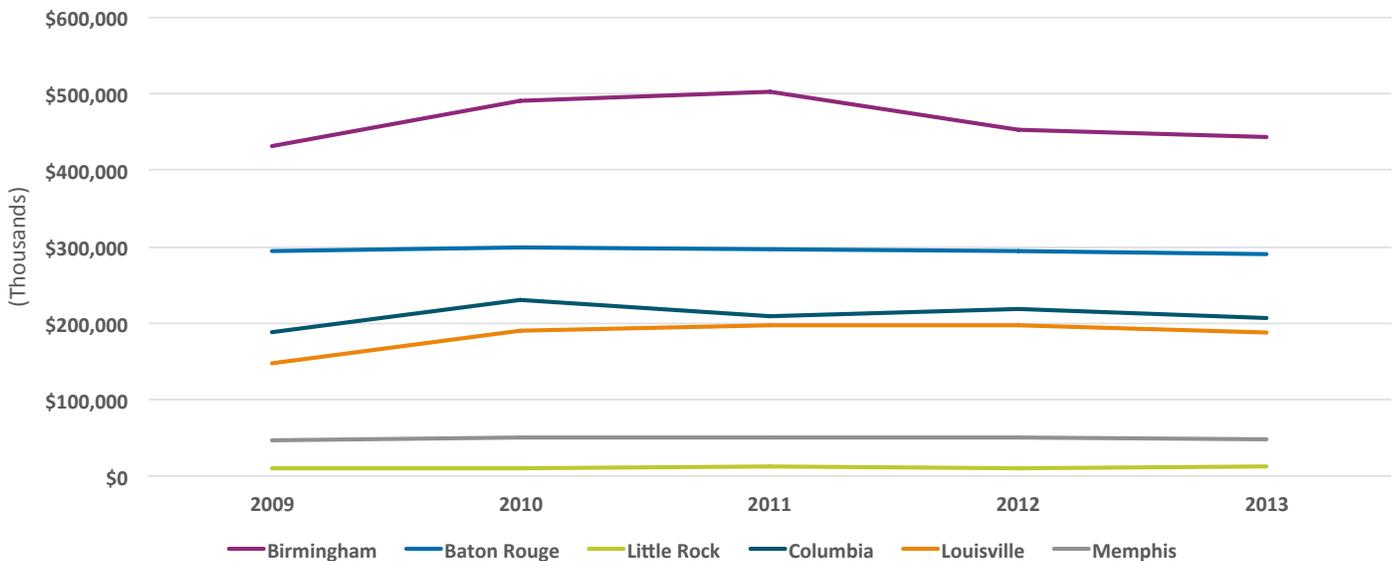
Innovation

Metropolitan innovation comes in many forms, from water system improvements to congestion management strategies. For the purposes of this report, BRAC will focus on economic innovation, the development of new products and technologies for the purpose of commercialization. Such activities are vital to the success and prosperity of the Capital Region, as economic innovation is widely considered the single-most-important contributor to the long-term health of the economy. Estimates vary, but innovation activity is cited as accounting for anywhere from 65 percent to 85 percent of an economy’s growth.^{iv, v} At the same time, innovation-focused economies benefit from increased productivity, a competitive edge on domestic and international rivals, and the ability to attract high-tech, high-wage jobs. Such jobs not only have higher average wages than other private sector jobs, they also provide a significant “job multiplier” effect - every tech sector job supports five other jobs in the broader economy.^{vi, vii}

Research Spending

Spending on research and development is a primary input of economic innovation. This research is the foundation through which new technologies and products are developed, and vital to entrepreneurial activity and high-skill jobs. Data on private industry research is difficult to access, with 2011 numbers the most recent available. This data is also collected at the state level rather than by metropolitan area, making it impossible to compare cities directly. However, data on research spending at academic institutions is readily accessible through the National Science Foundation, and provides a valuable look at the level of innovation investment in competing regions. This research, often funded by or in partnership with private industry, can also serve as an indicator of research activity in the broader economy.

Annual Academic Research Spending



Source: National Science Foundation

The Capital Region ranks as second among its peers in academic research, spending over \$290 million on

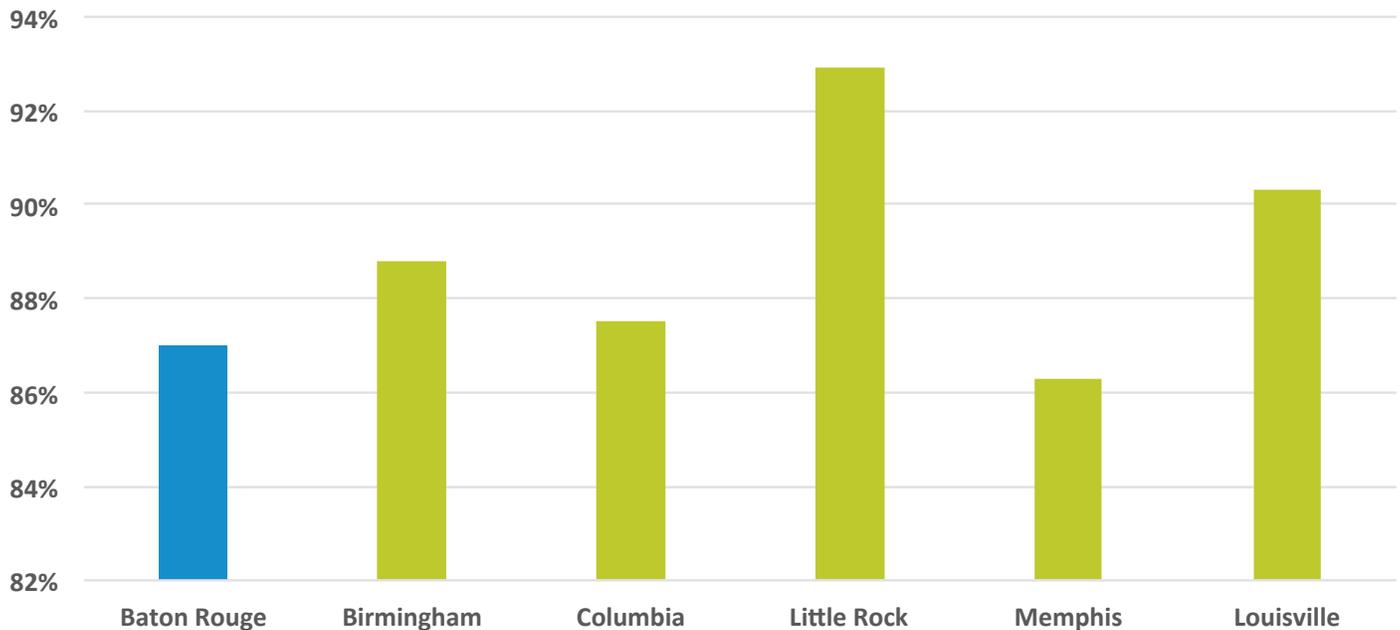
research in 2013. This amounts to an impressive 41 percent lead over Columbia, the third-ranking metro. LSU, which accounts for around 94 percent of Capital Region academic research spending, is also a primary driver of innovation through its many research commercialization and entrepreneurship programs such as the LIFT² fund, Louisiana Business and Technology Center, AgCenter Food Incubator, Stephenson Entrepreneurship Institute, and more. The presence of such a research and development powerhouse is a great asset to the Capital Region, as is LSU's recent success in ramping up the commercialization of the research done by its faculty. However, the Baton Rouge Area is the only metropolitan area to see a reduction in total research dollars from 2009-2013, falling roughly 1 percent over five years. In stark contrast, Oklahoma City saw major new investments in academic research over this time period, with 30 percent increase. The Baton Rouge Area must continue to prioritize local research activity to maintain a competitive edge in this important innovation driver.

Education

A key aspect of a region's ability to capitalize on the innovation done by local universities and private firms is the availability of a skilled workforce. This is affected not only by local residents' level of education, but also which areas of study students pursue training in.

The percentage of Capital Region residents twenty-five to thirty-four who had a high school diploma or higher in 2014 ranks near the bottom compared to its peers. This makes it nearly 6 percent lower than Little Rock, and is even a drop of 1 percent from 2009.

25-34 Year Olds with a High School Diploma or Higher, 2014

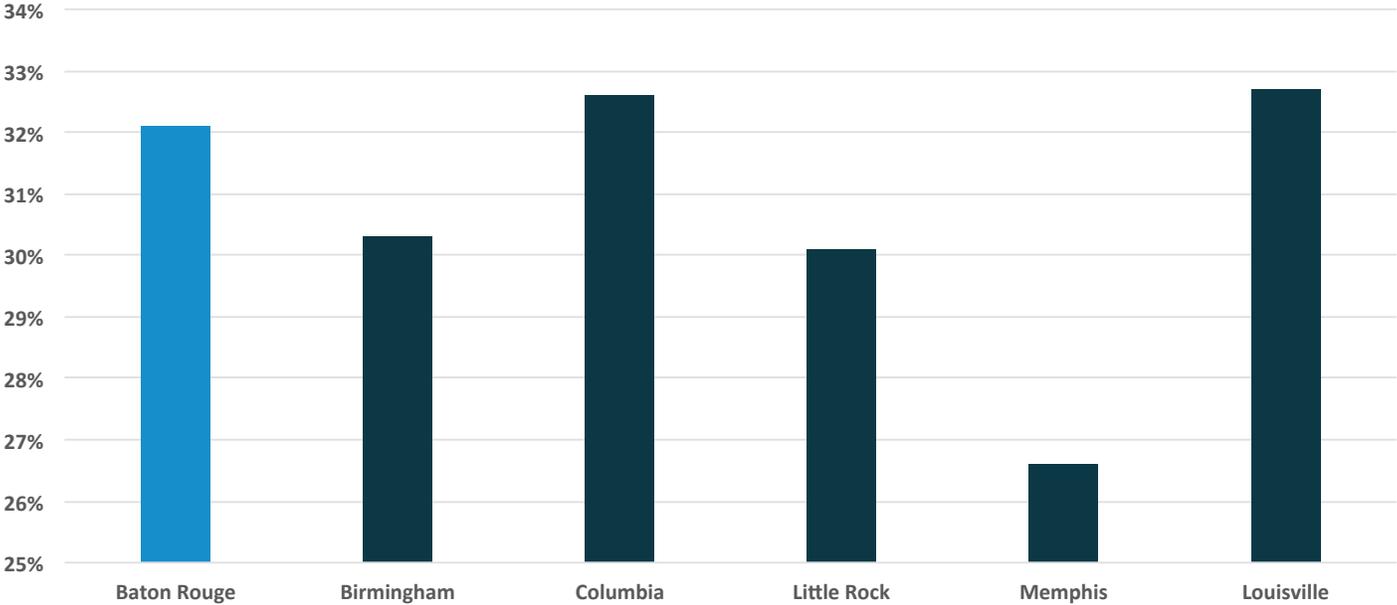


Source: EMSI

High school education is important not only as a prerequisite for higher education, but also as a primer for entrepreneurship in its own right. A growing number of educational experts are emphasizing the importance of ensuring that students graduate from high school “innovation ready,” equipped with the skills and knowledge necessary to bring new ideas and problem-solving techniques into the economy.^{viii} Towards this effort, BRAC and its Small Business Council have partnered with the Louisiana Department of Education and other regional stakeholders to create a Micro-Enterprise Jump Start credential. This credential is aimed at providing high school students with the necessary fundamentals to start their own businesses, and to be effective small business employees. This kind of education is vital to ensuring that students who do not enter into higher education are able to enter into the workforce, and that those who do continue on to higher education do so equipped with practical skills. And it is in high school education that the Capital Region has the greatest opportunity to improve.

Even with some of the lowest high school graduation rates, the Baton Rouge MSA’s 32 percent of residents 25-34 with a bachelor’s degree or higher – an increase of 1 percent since 2009 – puts it in third place among the peer metros in this report, less than 1 percent behind Louisville. It is this area that the presence of two universities – LSU and Southern University – clearly provides the Baton Rouge MSA with an edge. Were the region to improve its high school graduation rate to the peer metro average of 89 percent, a proportional 3 percent increase in bachelor’s degrees would put the Capital Region easily ahead of its peers in that category.

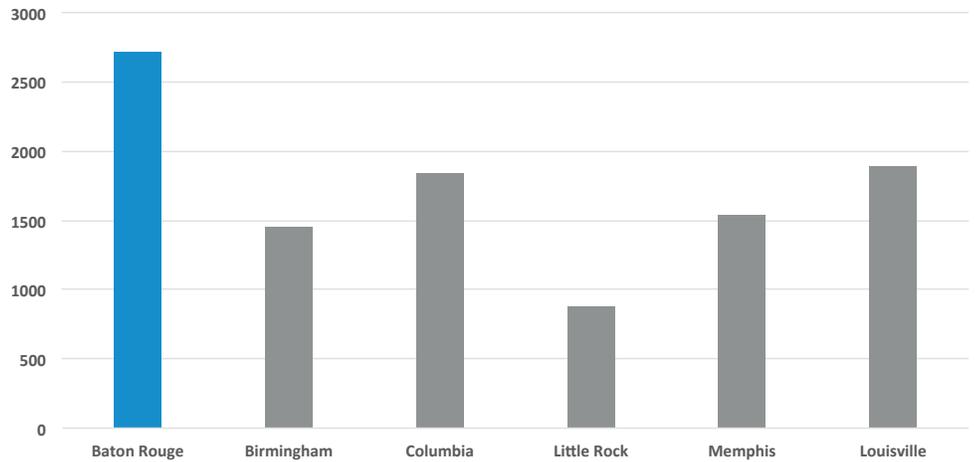
25-34 Year Olds with a Bachelor’s Degree or Higher, 2014



Source: EMSI

Perhaps even more important than having an educated population is promoting specific innovation-focused fields of study; “Innovation fields” such as engineering, computer science, mathematics, and other science, technology, engineering, and math (STEM) fields.¹ And it is in this area that the Capital Region has its greatest advantage.

Completions in Innovation Fields, 2014



Source: EMSI

The Baton Rouge metropolitan area saw 2,719 innovation field completions in 2014, including

certification programs and academic degrees.² This puts the region well ahead of its peers, with a 44 percent lead over Louisville, its closest rival. The importance of providing a workforce with innovation-focused skillsets cannot be overstated. STEM is good for the economy. And while rapid technological changes and global developments may change the outlook for particular jobs, the skillsets taught in these innovation fields are always in demand. As an example particularly relevant to the Capital Region, projections of chemical manufacturing sector decline – projections that have not been realized locally – will not necessarily affect the demand for chemical engineers, who are increasingly sought after in the rapidly growing nanotechnology and biotechnology fields.^{ix} Encouraging further expansion of these programs is critical to continuing the region’s growth, and there remains unmet local demand. The 2,719 innovation completions in 2014 was several hundred short of the 3,144 job openings within those fields that year, according to data compiled by Economic Modeling Specialists, International.

Patent Activity

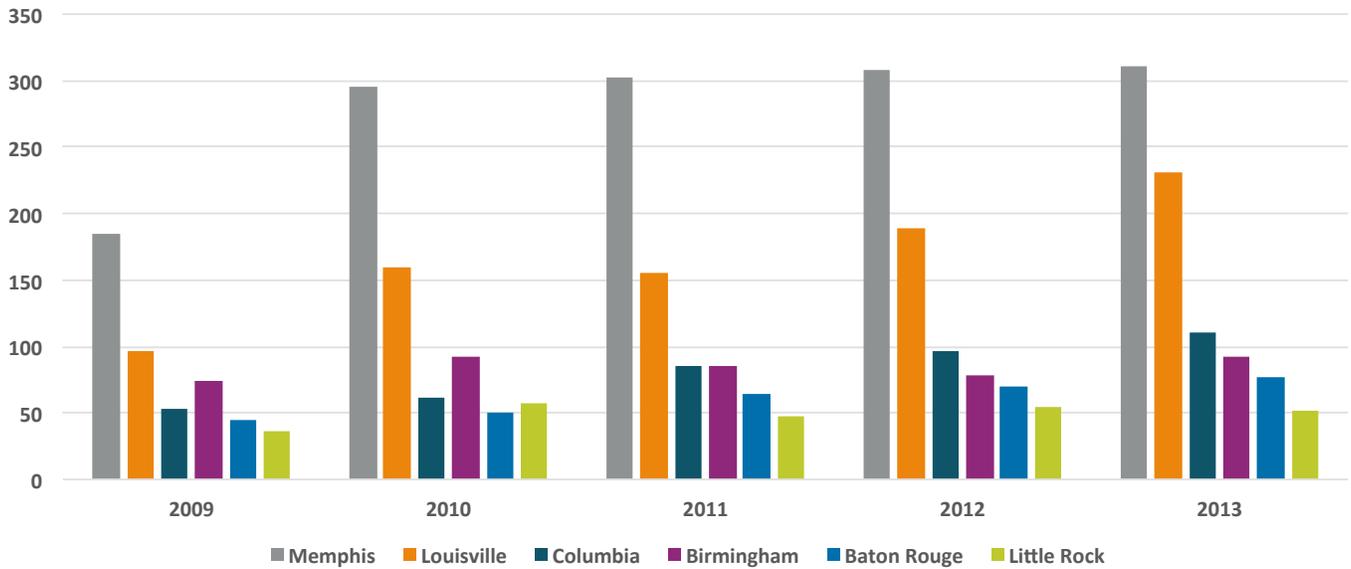
Perhaps the most commonly used and most widely recognized statistic on economic innovation is patent data. However, patent data as a measure of innovation is not without its limitations, nor is the value of the patents themselves universally agreed upon. Patents provide businesses with exclusive rights to their inventions for a period, in exchange for a public disclosure of that invention. This legal monopoly, though temporary, is a powerful tool for innovators to protect and profit from their inventions. However, the growing problem of international intellectual property theft reduces the utility of patent protection, and adds additional dangers to public disclosure of new technologies and designs. At the same time, the long, ponderous patent application process, which often takes several years, is at odds with the increasingly rapid pace of modern innovation. This, along with the growing problem of “patent trolls” who aggressively buy up and stockpile large numbers of patents with the hope of filing lawsuits somewhat limits the value of patents to inventors, and their value as a measure of innovation.^x

¹For the purpose of this study, “innovation fields” are defined as SIP codes 04, 11, 14, 15, 26, 27, 40 41, and 48.

²“Completions” includes certification programs taking less than two years of study, as well degree programs. In 2014, approximately 80% of completions in the Capital Region awarded two year degrees or higher.

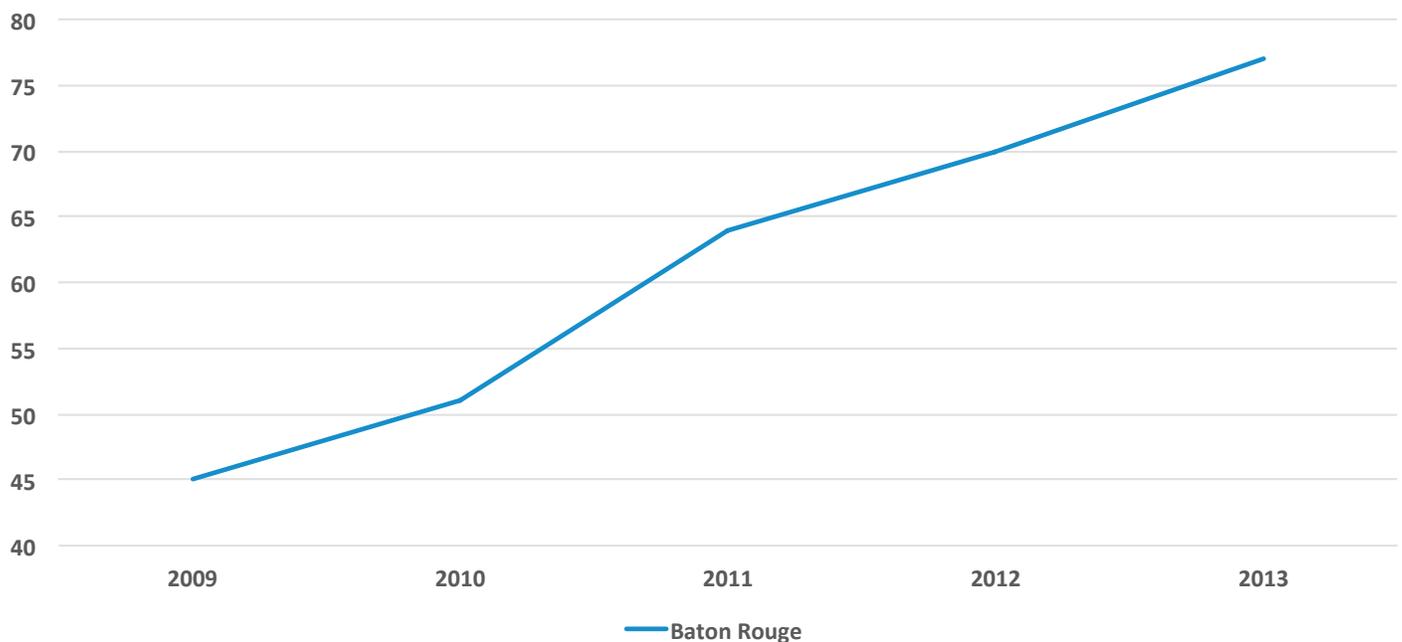
This being said, patents exert a powerful influence on modern economies, and retain an extremely important role. While the thousands of dollars in fees associated with patent applications make patent protection difficult for small firms to pursue, such protection provides legitimacy to lenders and potential investors, and provides legal recourse against larger companies who may try to appropriate their technology. Among inventors and entrepreneurs, it is largely agreed that the patent system needs to be reformed, but intellectual property protection is critical to incentivizing the creation of new and better innovations.^{xi} With that in mind, the Capital Region’s low number of patent awards is a concern, far outpaced by its peers.

Patents Issued by Metro



Source: U.S. Patent Office

Capital Region Patent Issuing



Source: U.S. Patent Office

The Capital Region did, however, see an impressive 71 percent increase in patent issuing from 2009 to 2013. This is the third-highest increase among peer metros, an excellent sign for the region moving forward. This increase is also nearly 10 percentage points higher than the nation as a whole. The region still lags far behind its peers in total patents issued, however, with the Memphis area receiving over four times as many patents in 2013. If the region is to establish a thriving innovation economy, the development of new intellectual property – and ensuring it is legally protected – must be a top priority. Research by the Brookings Institution shows that innovative cities with high patent counts have a significantly higher GDP per worker than those with lower patenting activity. Low-patenting metro areas like Baton Rouge could add approximately \$4,300 per worker to their regional GDP each decade by becoming a high-patenting area. In the Capital Region, this could amount to a \$1.8 billion increase in GDP over ten years.^{xii}

Productivity Increases

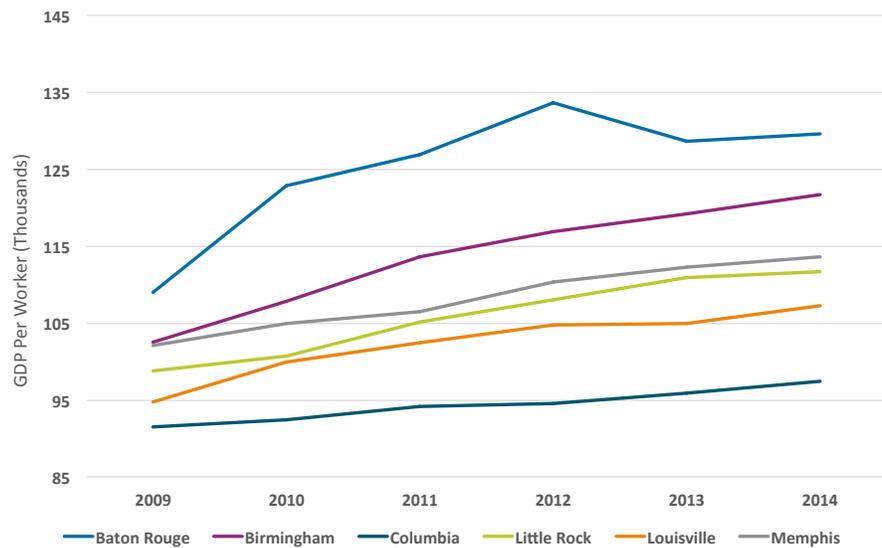
There are many challenges to using patents as a measure of innovation. The use of trade secrets is common within many industries, which means that a large amount of innovation isn't reflected in patent statistics. Patents also don't ensure that a good is produced, merely that no entity other than the

inventor is allowed to produce it, and lots of valuable innovation comes in the form of difficult-to-patent process improvements rather than new inventions. Combined with the fact that patent applications can take anywhere from three years to a decade to be granted, and the difficulty in tracking innovation activity through patents is clear. However, one way to avoid many of these is to look at increased productivity as the output of innovation, the end product of the inventions, improvements, and efficiencies developed in a region.

Increased productivity, measured here by growth in GDP per worker, can be said to be the single-most-important measure of innovation.^{xiii} Through per-worker economic growth, one can see the actual impact of local innovation on the real economy. These productivity increases also provide context for the quality of the innovation taking place; innovations without commercial value do not distort this measure as they can patent counts, while studies have shown new inventions and products tend to increase productivity more than improvements to existing processes, with an average of 43 percent productivity increase at firms that introduce new products.^{xiv, xv}

The Baton Rouge Area clearly has a clear advantage when it comes to leveraging local innovation to increase worker output. Not only does the average Capital Region worker contribute nearly \$8,000 more towards the local economy than the region's closest competitor, but the nearly 20 percent increase in productivity between 2009 and 2014 is also first among its peers. This is not only a compelling demonstration of local firms creating

Worker Productivity



Source: Bureau of Labor Statistics, Bureau of Economic Analysis, BRAC analysis

and implementing valuable innovations, but an excellent indicator of the region's potential for future growth. Productivity increases, coming largely through innovative new products and processes, are also estimated to amount for as much as 70 percent of economic growth from 2010 through 2020, and as such are of paramount importance to the region's long-term economic development.^{xvi}

Entrepreneurship

Entrepreneurship is both a mechanism through which innovations are brought to the market, and an output of innovative activity – increased entrepreneurship, and its associated economic growth, serves as an important measure of how successful a region leverages local innovation. Entrepreneurship and the success of small firms is vital to a region's prosperity, and is particularly relevant to job growth. According to research done by economist Tim Kane, "Startups create an average of three million new jobs annually. All other stages of firms, including companies in their first full years of existence up to firms established two centuries ago, are net job destroyers, losing 1 million jobs net combined per year."^{xvii} This underscores the unique importance of entrepreneurship to the economic health of metropolitan areas.

Access to Capital

Access to capital is among the first challenges faced by entrepreneurs. To have a successful entrepreneurial culture, capable of taking advantage of local innovation, startup founders must be able to capitalize their ventures, whether through small business loans or other means. Despite the attention given in recent years to angel investment, venture capital, and nontraditional mechanisms such as crowdfunding, the vast majority of entrepreneurs still rely on traditional lending. According to the National Venture Capital Association, 82 percent of U.S. startup funding comes from entrepreneurs' personal savings, loans, or credit lines, with 24 percent of funding provided by friends and family, 3 percent from crowdfunding efforts, and less than 1 percent coming from angel investment and venture capital firms.

However, while an overwhelming majority of startups will not receive venture capital or angel funding, venture capitalists and angel investors do have a very valuable role in startup capitalization and small business growth. Angel investment in the U.S. was estimated to amount to \$24.1 billion in 2014, with venture capitalists investing an additional \$48.3 billion – together, angel and venture capital investors injected \$72.4 billion into new and growing businesses last year. This is a substantial amount of investment into the nation's economy, and, more importantly, comes without many of the restrictions that come with traditional lending. Angel investors and venture capital firms are able to make higher-risk investments into high-potential startups at early stages. It is important, therefore, to monitor and encourage investment of this kind at the local level.

Angel investors are typically wealthy individuals, with a minimum of \$1 million in liquid assets, who provide capital to startups, usually in exchange for ownership equity. Due to the individual nature of angel investment, reliable data on their activity is difficult to gather. However, as more and more angel investors are collaborating in organized groups, the ability to track angel investment – and the ability of entrepreneurs to connect with investors – is increasing. In this area, there have been positive developments for the Capital Region. The New Orleans-based NO/LA Angel Network, founded less than two years ago, has now grown to over one hundred members. According to the NO/LA Angel Network, their rapid expansion over the last two years makes them among the fastest-growing angel investor networks in the world.

Recently, Baton Rouge residents have joined the NO/LA group, with the intent to eventually form an independent regional angel network in Baton Rouge. The Baton Rouge membership is currently at eleven, and is expected to grow to thirty by the end of 2015. Seeking to bridge the gap between angel investors and large venture capital firms is Innovation Catalyst, a recently formed nonprofit with the goal of accelerating Louisiana entrepreneurs and their businesses. This includes both providing connections and advice, as well as the capital necessary for startups to scale up. To date, the Catalyst Fund – the evergreen capital fund operated by Innovation Catalyst – has reviewed over ninety high-growth startups seeking to raise capital and invested \$565,000 into three technology-focused companies with a fourth investment currently in progress. The Catalyst Fund plans to invest another \$2.1 million over the next eighteen months into technology-based startups, with any proceeds on the invested capital returned back into the evergreen fund, to be reinvested into more startups.

While venture capital funding is rare for startups – even more so than angel investment – it has a particularly important place in helping existing small businesses reach the next stage of growth, and firms like the Louisiana Fund and BVM Capital (Louisiana Ventures, Themelios I and II) have been active in the Capital Region. According to National Venture Capital Association data, \$31.8 billion of the \$48.3 billion in venture capital invested in 2014 – 66 percent – went into expansion and late-stage deals, with only 33 percent going into early stage companies, and just over 1 percent into seed stage investments. Data on venture capital investment can be difficult to access, but the National Venture Capital Association recently compiled data on 2014 venture capital activity by metro area. Unfortunately, but unsurprisingly, the Capital Region was among the lowest-performing areas in the country last year. The region ranked 152nd out of 160 metropolitan areas based on number of deals and total dollars invested, with only .38 million in venture capital invested in 2014.

VC Investment, 2014

	Rank	Deals	Total Invested (Millions)
Louisville	54	5	46.01
Memphis	106	23	7.92
Little Rock	120	2	4.27
Birmingham	146	2	0.89
Baton Rouge	152	1	0.38
Columbia	160	1	0

Source: National Venture Capital Association

With organized angel investment still in its infancy in the Capital Region, and the area struggling to attract venture capital, it is discouraging to see traditional small business lending having fallen in recent years. The Capital Region is not alone in this, as this trend can be seen in most of its peers across the country through the same period, but the Baton Rouge Area’s 9 percent decrease in lending per capita since 2009 is a worrying sign for the future.

Small Business Lending

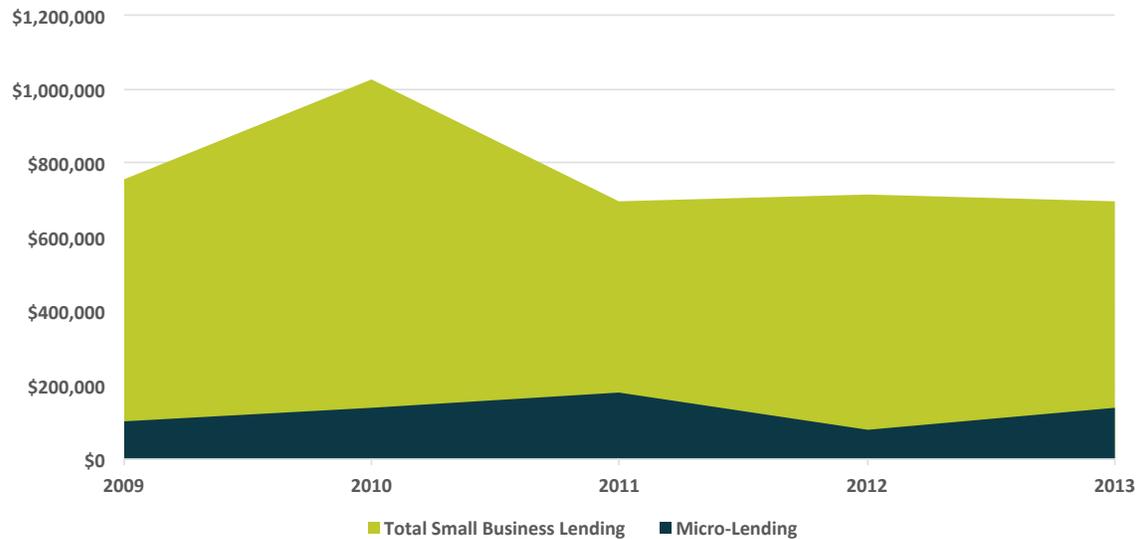
	2009		2013		% Change
	Small Business Lending	Lending Per Capita	Small Business Lending	Lending Per Capita	Change in Lending Per Capita
Baton Rouge	\$757,433,000	\$935.31	\$696,451,000	\$849.17	-9%
Birmingham	\$15,977,915,000	\$15,184.70	\$11,226,205,000	\$9,876.57	-35%
Columbia	\$1,224,050,000	\$1,594.65	\$1,929,888,000	\$2,078.80	30%
Little Rock	\$1,327,645,000	\$1,897.29	\$1,160,780,000	\$1,602.44	-16%
Louisville	\$1,344,613,000	\$1,068.36	\$1,284,305,000	\$1,011.50	-5%
Memphis	\$2,205,314,000	\$1,689.99	\$1,661,608,000	\$945.22	-44%

Source: Small Business Association (SBA), Census, BRAC analysis

This further emphasizes the need for an improved and better connected entrepreneurial and small business ecosystem within the Capital Region. Recent activity in this area – such as the hiring of Byron Clayton as the new CEO of the Research Park Corporation, and his work in bringing together stakeholders to actively cultivate the local entrepreneurial ecosystem – are a great start. An urgent next step in the process of developing this ecosystem is providing more robust Small Business Development Center (SBDC) services in the Capital Region. The Southern University SBDC has provided business consulting services to small businesses and entrepreneurs in the Capital Region for nearly thirty years, with over 70 percent of their “pre-venture” clients going on to successfully start a business. However, the Southern University office has struggled to meet the large regional demand on its own since the closing of the LSU center.

SBDC business consulting services are offered for free to entrepreneurs and small businesses, and, most critically to the Baton Rouge Area’s capital access challenges, provide assistance with financing. SBDC business consultants help put together loan packages, reconcile finances, and get business owners and entrepreneurs “bank ready.” In fact, Greater New Orleans SBDC Director Carmen Sunda describes the consulting on finance issues as the SBDC’s greatest service. Emulating the New Orleans regional model – a collaborative partnership between several educational institutions and community partners, rather than several separate offices – would allow for much greater regional coverage, and more efficient leveraging of the federal funds available to match local contributions. This regional model must also include a strong local host capable of marshalling additional resources, and meeting the SBDC’s extensive back office needs. In addition to providing more robust SBDC services in the region, other assets such as the LSU Innovation Park, a valuable resource to Capital Region entrepreneurs, must also be supported, with additional investment where required to provide for necessary infrastructure and capacity increases.

Capital Region Small Business Lending



Source: SBA

Lending within the Capital Region over time roughly mirrors the establishment growth patterns of the last several years, described in more detail below.

Startup Growth

Following the national trend, regional startup activity has slowed significantly since 2009, with nearly 40 percent fewer startups founded in 2013 than in 2009. As noted in the 2014 report, entrepreneurial activity was extremely volatile following the Great Recession. After a dramatic increase in 2010, startup creation has slowed considerably in the years since. The Capital Region has followed this nationwide trend, as have its peers.

As outlined in the 2014 Kauffman Index of Entrepreneurial Activity, the slowdown of startup activity following 2010's increase can be seen as a positive sign in some respects, as it has been largely caused by an improved economy and more favorable labor market conditions. This has resulted in an increase in "opportunity" entrepreneurship rather than the employment-related "necessity" entrepreneurship observed when those who cannot find work start businesses as a way to generate income in a poor labor market.

However, while entrepreneurship has been flattening out since the Great Recession, the Capital Region's exceptionally strong small business culture – supported by organizations like the Louisiana Technology Park, Louisiana Business and Technology Center, and others – give the area a valuable advantage when it comes to the survival and expansion of small companies. This can be seen in the table below, where the Baton Rouge Area is the only metropolitan area with more business expansions in 2013 than in 2009, and one of only two areas that experienced a net gain in total establishments during this time period.

Data on establishment growth is a vital measure of how well the local economy is capitalizing on innovation. The creation of new, innovative businesses, and encouraging their growth must be among the primary goals of Capital Region elected officials and community leaders if the region is to stay competitive with peers across the country.

Recommendations

BRAC has made prioritizing and incentivizing innovation a key piece of the organization's 2015 gubernatorial platform. Implementing these and other recommendations will be critical to ensuring the region's continued economic growth.

- Appoint a director of Louisiana innovation to coordinate across state agencies, and refocus existing university resources to applied research
- Reinstate the Research & Development Tax Credit
- Elevate the state's programs that support entrepreneurship
- Encourage further structural changes in higher education to expedite and increase technology transfer and research commercialization
- Adopt the Micro-Enterprise Jump Start credential at the high school level
- Build a more robust regional SBDC office
- Map and cultivate the regional entrepreneurial ecosystem, strengthen the entrepreneurial network, and expand entrepreneurship events and education

	2009	2013	% Change
Baton Rouge			
Total Establishments	62,500	68,700	10%
New Startups	7,200	4,400	-39%
Expansions	2,700	3,300	22%
Birmingham			
Total Establishments	75,900	72,800	-4%
New Startups	7,100	4,800	-32%
Expansions	3,300	2,700	-18%
Columbia			
Total Establishments	45,400	44,800	-1%
New Startups	4,400	3,300	-25%
Expansions	2,300	1,600	-30%
Little Rock			
Total Establishments	51,400	52,400	2%
New Startups	5,600	3,600	-36%
Expansions	2,800	2,300	-18%
Louisville			
Total Establishments	91,900	90,500	-2%
New Startups	10,300	5,700	-45%
Expansions	5,100	3,300	-35%
Memphis			
Total Establishments	87,200	75,400	-14%
New Startups	10,700	5,400	-50%
Expansions	4,000	3,100	-23%

Source: youreconomy.org, BRAC analysis

Appendix

The Capital Region has developed a strong network of entrepreneurship and innovation assets, including:

- [Louisiana Technology Park](#)
- [Pennington Biomedical Research Center](#)
- [LSU Innovation Park](#)
- [Louisiana Emerging Technology Center](#)
- [Stephenson Entrepreneurship Institute](#)
- [Louisiana Business & Technology Center](#)
- [LSU AgCenter](#)
- [Southern University Small Business Development Center](#)
- [SCORE Baton Rouge](#)
- [Innovation Catalyst](#)

For more information about local programs and organizations that can help entrepreneurs and small business owners accelerate their businesses, see [BRAC's Business Guide](#).

ⁱ Milken Institute, "Best Performing Cities Index, 2014," <http://assets1c.milkeninstitute.org/assets/Publication/ResearchReport/PDF/Milken-Institute-Best-Performing-Cities-Index-2014.pdf>

ⁱⁱ Brett Relander, "Top Under the Radar Tech Hubs for Investing," Investopedia 2015 <http://www.investopedia.com/articles/investing/063015/top-under-radar-tech-hubs-investing.asp>

ⁱⁱⁱ *Shreveport Times*, "La. scores an A for small business friendliness, ranks in Top 5 nationwide," <http://www.shreveporttimes.com/story/money/2015/08/18/louisiana-small-business-friendliness/31919529/>

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^v Nesta, "The Case for Innovation-Led Growth," http://www.nesta.org.uk/sites/default/files/plan_i.pdf

^{vi} TechAmerica Foundation, "Cyberstates 2013"

^{vii} Enrico Moretti, *The New Geography of Jobs*, Mariner Books 2013

^{viii} Thomas Friedman, "Need a Job? Invent it," *New York Times* 2013 <http://www.nytimes.com/2013/03/31/opinion/sunday/friedman-need-a-job-invent-it.html>

^{ix} Lynne Holt, David Colburn, Lynn Leverty, *Innovation and Stem Education*, Florida Bureau of Economic and Business Research, <https://www.bebr.ufl.edu/content/innovation-and-stem-education>

^x Steven Levy, "The Patent Problem," *Wired Magazine* 2012 <http://www.wired.com/2012/11/ff-steven-levy-the-patent-problem/>

^{xi} John Villasenor, "Why Patents and Copyright Protections Are More Important Than Ever," *Scientific American* 2013 <http://www.scientificamerican.com/article/why-patents-copyright-protections-are-more-important-than-ever/>

^{xii} Brookings Institution, "Patenting Prosperity: Invention and Economic Performance in the United States and its Metropolitan Areas," [Brookings.edu](http://www.brookings.edu)

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^{xiii} Lipsey, R. G. and K. I. Carlaw. "Total factor productivity and the measurement of technological change," *Canadian Journal of Economics* 37.4 (2004)

^{xiv} Francesco Bogliacino and Mario Pianta, "The impact of innovation on labor productivity growth in European industries," *Institute for Prospective Technological Studies* 2009

^{xv} European Bank for Reconstruction and Development, "Transition Report 2014; Chapter 2, Innovation and Firm Activity," 2014 <http://www.ebrd.com/downloads/research/transition/tr14b.pdf>

^{xvi} Dale Jorgenson, Mun Ho, and Jon Samuels, Jorgenson, "What Will Revive U.S. Growth? Lessons from a prototype industry-level production account for the United States." *Journal of Policy Modeling* 2014

^{xvii} Tim Kane, "The Importance of Startups in Job Creation and Job Destruction," *Kauffman Foundation* 2010

^{xviii} Statistic Brain Research Institute, *Angel Investor Statistics 2015* <http://www.statisticbrain.com/angel-investor-statistics/>

^{xix} *The Advocate*, "Angel investors network grows to 100-plus members," 2015 <http://theadvocate.com/news/13513446-70/angel-investors-network-grows-to>