2020 INDICATORS OF INNOVATION

NJBIA
New Jersey Business & Industry Association

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New in 2020

NJBIA IS COMMITTED to conducting and providing high-quality, factual research and analysis. As such, NJBIA is always looking for ways to enhance our research. The indicators listed below are either new sources of information altogether or are modified sources from 2019. Because of the modifications made in the 2020 updated study, this report cannot and should not be compared to the 2019 report. The following modifications were made to the 2020 analysis:

INDICATOR 1

VENTURE CAPITAL, ASSETS UNDER MANAGEMENT

In 2019, NJBIA originally reported on venture capital deal flow. According to the National Venture Capital Association (NVCA), deal flow measures the number of potential investments a fund reviews in any given period. In order to better understand the entirety of the impact that venture capital funds have within the Garden State and region, NJBIA updated Indicator 1 to assets under management (AUM). According to NVCA, AUM measures the value of all assets being managed by venture capital funds.

INDICATOR 4

NATIONAL SCIENCE FOUNDATION AWARD TOTALS – ALL GROUPS

In 2019, NJBIA originally reported on National Science Foundation College/University Award Totals. By expanding this analysis to award totals for all groups the analysis is considering awards that were granted to colleges/universities as well as federal, industry, small business and others. The award total consists of monies granted for research support, education & human resources, and major research equipment.

INDICATOR 10

RATE OF NEW EMPLOYER BUSINESS ACTUALIZATION

In 2019, NJBIA analyzed the region's startup density as reported by The Kauffman Index. This statistic measured the number of startups per 1,000 employer businesses. In an effort to understand how many businesses are hiring employees upon their founding, the Rate of New Employer Business Actualization (which is found in the same set of indicators in the Kauffman Index) uses the U.S. Census Bureau's Business Formation Statistics to calculate the percentage of all new businesses that make a first payroll within eight quarters of business application.

INDICATOR 11

NET BUSINESS GROWTH

In 2019, NJBIA analyzed U.S. Census Bureau data to calculate the percentage of new businesses generated from 2015 to 2016. Given the delay in Census reporting for this statistic, NJBIA modified the sourcing for this indicator. The 2020 report analyzes U.S. Bureau of Labor Statistics private sector establishment births and deaths (seasonally adjusted) to determine net business growth for a year.

INDICATOR 12

BUSINESS TAX CLIMATE

In 2019, NJBIA reported our own research, titled the "Regional Business Climate Index." While NJBIA's analysis reports very similar findings to other sources, to conduct consistent analyses among indicators, NJBIA is reporting the Tax Foundation's State Business Tax Climate. According to the Tax Foundation, the index is a hierarchical structure built from five components: Individual Income Tax, Sales Tax, Corporate Income Tax, Property Tax, and Unemployment Insurance Tax.

Reclaiming New Jersey's Stature as the Innovation State

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Author's Note about the Coronavirus: *At the time this updated report was researched and written, the novel coronavirus pandemic was causing havoc on New Jersey's public health and economy. The pandemic caused government-mandated non-essential business closures and stay-at-home orders that were in effect from mid-March to mid-June 2020 in the Garden State. This resulted in record high unemployment rates and record contraction in GDP. Unfortunately, real-time data is not available for the indictors studied in this report. As such, the impacts from the coronavirus are not reflected in this analysis and will be reflected in future releases of this study.*

In the days of Thomas Edison, Nikola Tesla, and Alexander Graham Bell, the Garden State reigned as the "Silicon Valley" of the East, acting as a model of growth and innovation for other states to mirror.

Today, the Garden State is at a crossroads. New Jersey possesses all the qualities that are needed to reinvent and grow an innovation ecosystem: an ideally centralized location, nationally recognized K-12 academics, quality higher education institutions, and a highly educated, highly skilled workforce. However, the state's inability to retain and attract top-tier talent, along with a difficult tax climate, are hindering the Garden State from reclaiming its previous glory.

A robust innovation ecosystem requires coordination and a willingness to make tough decisions in order to realize both short-term and long-term benefits. Together, government, academia, and business can make the vision of revitalizing New Jersey's innovation ecosystem a reality if we collectively address key indicators of innovation.

NJBIA's vision is for the Garden State to reclaim its stature as the innovation state; the home of economic vitality, business prosperity, workforce skill excellence and a great quality of life for

New Jersey businesses and individuals. To that end, NJBIA has spent years studying key components of successful innovation ecosystems. Our extensive analyses have led us to conclude that creating a successful innovation ecosystem requires the strong presence of three categorical indicators: capital, talent, and business.

CAPITAL

Capital is the lifeblood of any business. The amount of cash flow in and to a state dictates the opportunities available to individuals and businesses. Key capital indicators for purposes of analyzing an innovation ecosystem are a state's ability to attract: 1) venture capital investment; 2) Small Business Innovation Research (SBIR) & Small Business Technology Transfer (STTR) awards; and 3) National Science Foundation awards. In addition, states must commit to making investments in themselves through 4) state research & development (R&D) expenditures.

TALENT

Talent is also critical to a state's ability to create an innovation ecosystem. A highly educated, highly skilled workforce plays a significant role in creating an innovation ecosystem. Top-tier institutions serve as incubators for innovation. In order understand the various talent networks throughout New Jersey and the region, a number of factors are taken into consideration: 1) the number of institutions ranked in the top 100; 2) net migration of first-time college students; 3) the percentage of a population with a graduate or professional degree; and 4) the rate of new entrepreneurs.

BUSINESS

Without business there is no economy. Having a competitive business climate can make or break a state's ability to attract and retain innovative businesses. A healthy/competitive business climate can spur innovation, while an unhealthy/uncompetitive climate can deter innovation in a state. In addition to GDP, there are various indicators to analyze when trying to understand a state's business climate, including: 1) the number of patents granted; 2) the rate of new employer business actualization; 3) net business growth; and 4) business tax climate.

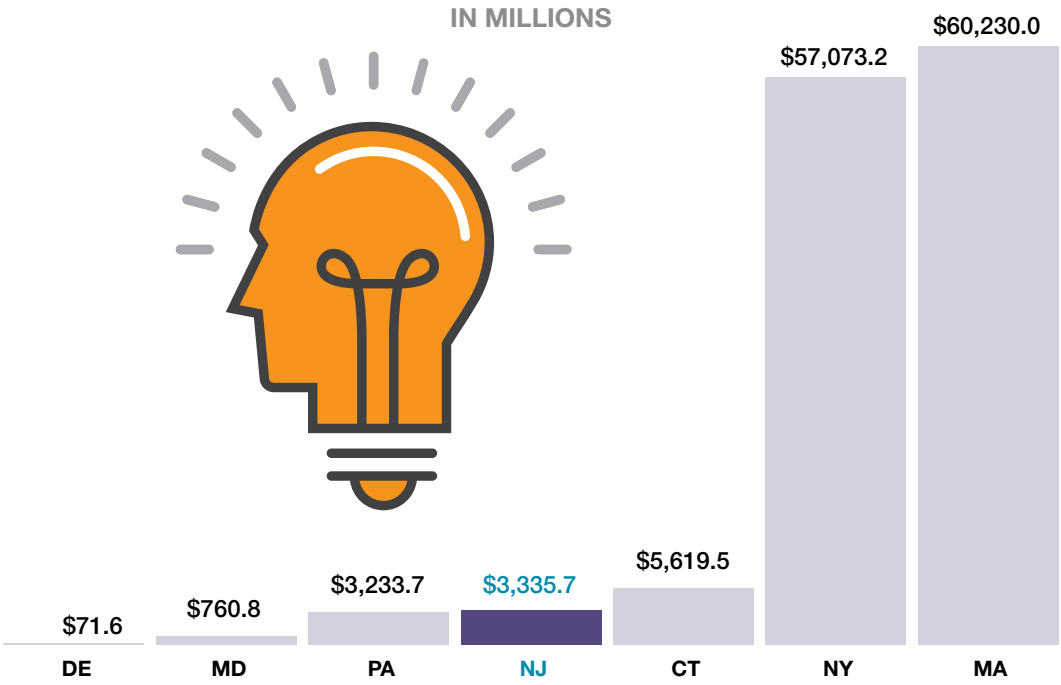
As part of our innovation research, NJBIA released the first "Indicators of Innovation" report in 2019. The study looked at 12 indicators of innovation (as stated above) and scored them among our regional states in order to understand the presence of an innovation ecosystem throughout the region. The 2019 study found that New Jersey's overall regional innovation score ranked fifth, behind Maryland, Pennsylvania, Massachusetts, and regional leader New York.

The findings of the updated 2020 study, suggests that New Jersey's overall innovation score has moved little since the original study. Massachusetts and New York continue to be regional leaders, while New Jersey finds itself competing with Maryland to claim the 4th seed.

Like the scoring system in 2019, states are scored from 1 (least competitive in the region) to 7 (most competitive in the region). Because this study does not seek to determine which category or indicator is the most important component of an innovation ecosystem, the indicators are not weighted. In total, a score of 84 points is possible. Achieving a sore of 84 would mean that a state earned a score of 7 for each of the 12 indicators.

INDICATOR 1

Venture Capital – Assets Under Management



Regional Score*	
Connecticut	5
Delaware	1
Maryland	2
Massachusetts	7
New Jersey	**4**
New York	6
Pennsylvania	3

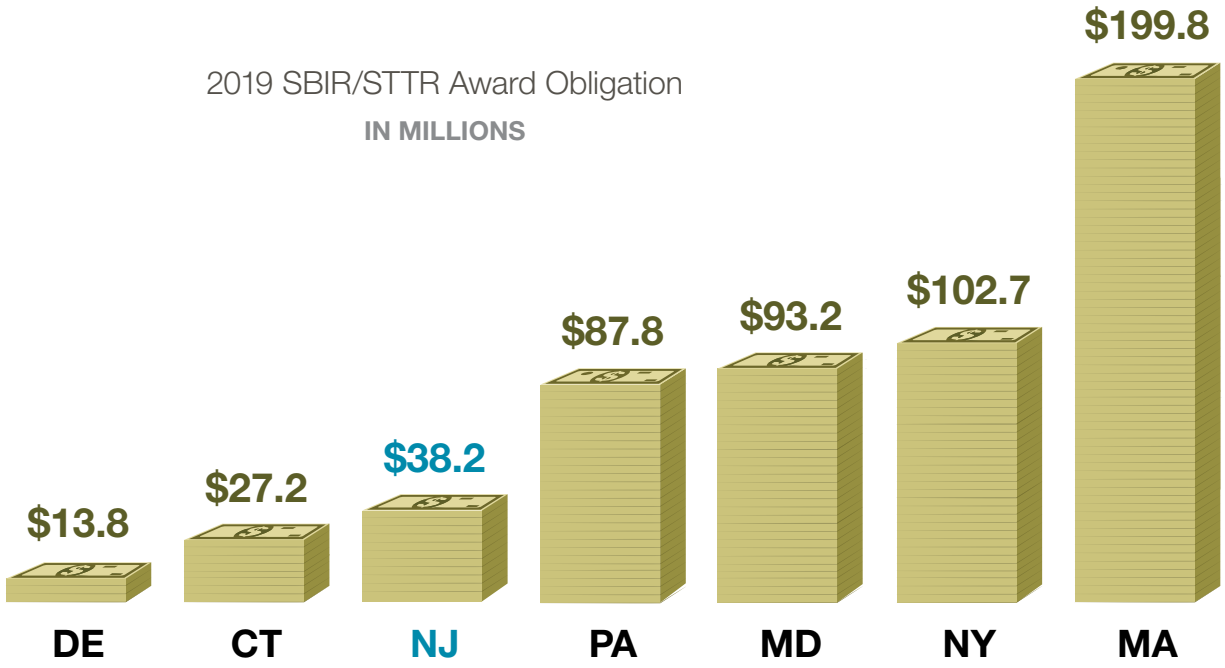
VENTURE CAPITAL CONTINUES to play an enormous role in creating and expanding innovative concepts from startups to commercialization. According to the National Venture Capital Association (NVCA), Assets Under Management (AUM) measures the value of all assets being managed in a state by venture capital funds. In 2019, Massachusetts and New York led the region with $60.2 billion and $57.1 billion in AUM, respectively. Connecticut's AUM was worth $5.6 billion, followed by New Jersey ($3.3 billion), Pennsylvania ($3.2 billion) and Maryland ($760 million). Delaware had the smallest portfolio in the region with $71.6 million in AUM.

An 11-year analysis of NVCA AUM data shows that Massachusetts and New York have consistently led the region in total AUM. Notably, Delaware and New York have seen the largest growth from 2008 to 2019, increasing their AUM by 466% and 169%, respectively. Four states experienced a decline in AUM: Pennsylvania (-10%), Connecticut (-41%), New Jersey (-43%), and Maryland (-64%). Historical data for AUM can be found in Appendix A.

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

INDICATOR 2

SBIR/STTR Award Obligation



Regional Score*	
Connecticut	2
Delaware	1
Maryland	5
Massachusetts	7
New Jersey	**3**
New York	6
Pennsylvania	4

ACCORDING TO THE Small Business Administration (SBA), the Office of Investment and Innovation (OII) (which is housed within the SBA) "leads programs that provide the high-growth, small business community with access to financial capital and R&D funds to develop commercially viable innovations." The Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) are two key funding programs housed in the OII. The goal of the programs are to meet federal R&D needs, increase private sector commercialization of innovation derived from federal R&D dollars, stimulate technological innovation, and foster participation in innovation by socially and economically disadvantaged persons.

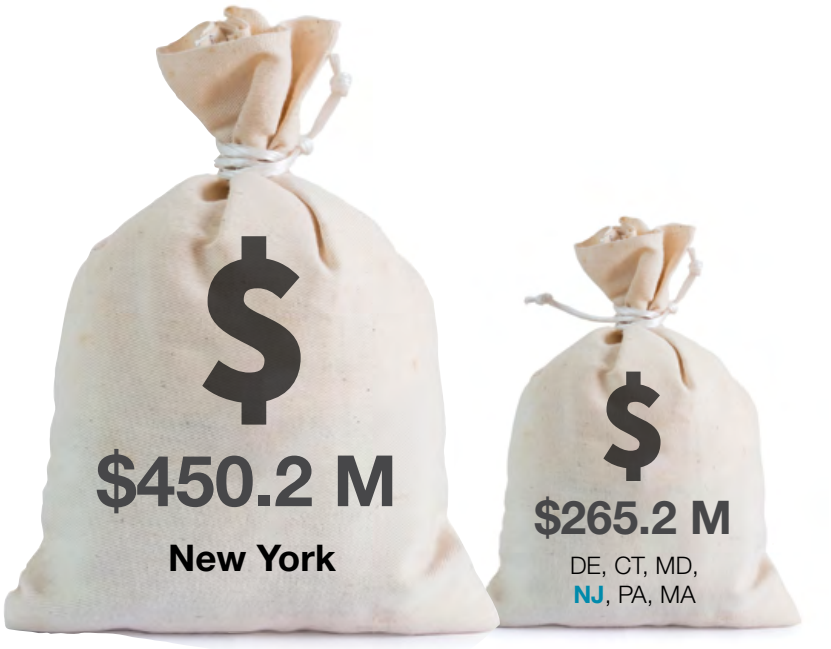
In 2019, Massachusetts led the region in total SBIR/STTR award funding, earning $199.8 million. New York earned the second largest sum of awards, totaling $102.7 million, followed by Maryland ($93.2 million) and Pennsylvania ($87.8 million). New Jersey was awarded $38.2 million, ranking fifth in the region. Connecticut and Delaware earned the least in the region, receiving $27.2 million and $13.8 million, respectively.

An 11-year analysis of SBIR/STTR data shows Massachusetts, again, consistently led the region in total award obligations from 2008 to 2019. Notably, six states experienced a decrease in total award obligation during the 11-year span; including, Massachusetts (-35%), New Jersey (-31%), Connecticut (-20%), Maryland (-17%), and Pennsylvania (-16%). Only Delaware (+29%) experienced an increase in total award obligation. Historical data for SBIR/STTR funding can be found in Appendix B.

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

INDICATOR 3

State R&D Expenditures



2018 State Government R&D Expenditures:
New York vs. Rest of Region

Regional Score*	
Connecticut	5
Delaware	1
Maryland	3
Massachusetts	2
New Jersey	**4**
New York	7
Pennsylvania	6

WHILE STATE R&D expenditures are small compared to federal expenditures, state governments should be eager to invest in and promote innovative activities within their borders. According to the National Science Foundation, R&D investment at the state level is a key contributor to creating a successful innovation ecosystem.

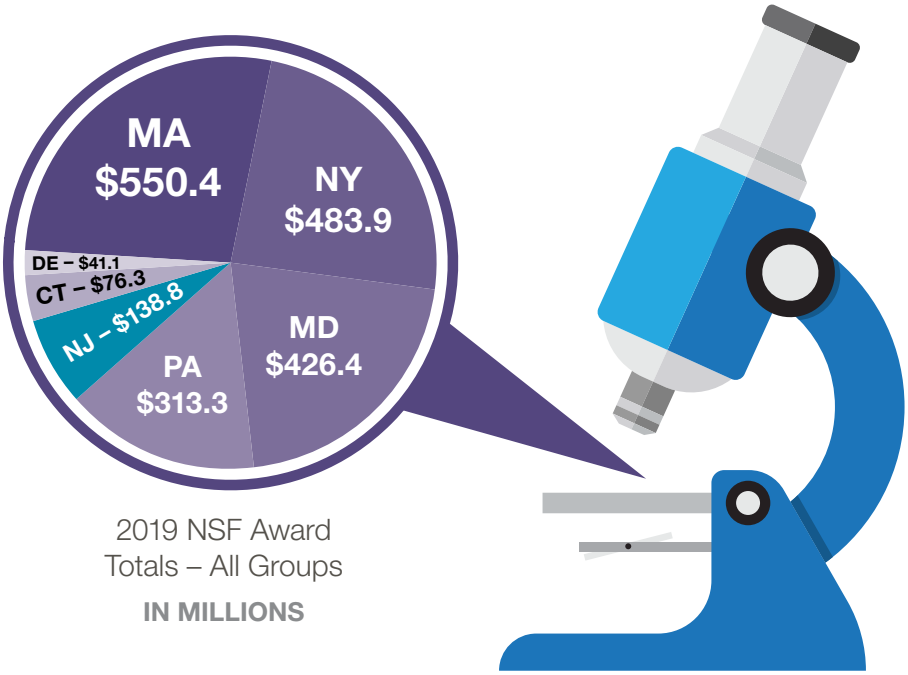
In 2018, New York far exceeded the investment of all regional states combined, spending over $450.2 million. Pennsylvania ranked second in the region, spending $101.6 million, followed by Connecticut ($54.5 million), New Jersey ($51.3 million), Maryland ($31 million), and Massachusetts ($23 million). Delaware spent the least in state government R&D expenditures, a mere $3.86 million in 2018.

An 11-year analysis of state expenditures finds that Massachusetts experienced the largest increase (311%) in investment, up from $5.6 million in 2007 to $23 million in 2018. Regional leader New York experienced the second largest growth rate, up 251% from 2007. New Jersey increased R&D expenditures by 157% during the same time span, from nearly $20 million in 2007 to $51.3 million in 2018. Maryland (-23%) and Pennsylvania (-2%) were the only two states in the region to experience a reduction in state R&D investment from 2007 to 2018.

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

INDICATOR 4

National Science Foundation Award Totals – All Groups



Regional Score*	
Connecticut	2
Delaware	1
Maryland	5
Massachusetts	7
New Jersey	**3**
New York	6
Pennsylvania	4

TASKED WITH KEEPING the United States at the leading edge of discovery, the National Science Foundation (NSF) funds research, education, and research equipment in the fields of science and engineering. While the NSF funds federal, industry, and small businesses projects, the main goal of the foundation is to fund institutions that support top-tier innovation.

An analysis of NSF funding finds that Maryland experienced the largest increase in award totals, up 162% from $162.6 million in 2010 to $426.4 million in 2019. New Jersey was the only state in the region to experience a decline in total awards during the same time span, with total funding decreases of over 12% from nearly $158 million in 2010 to $138.8 million in 2019.

Despite having the largest percentage increase in total awards from 2010 to 2019, Maryland ranked third in the region in 2019 when accounting for actual dollars awarded. Regional leader Massachusetts received $550.4 million in funding in 2019. New York ($483.9 million) and Pennsylvania ($313.3 million) ranked second and fourth in the region, respectively. New Jersey's total award ranked fifth in the region in 2019, with funds totaling $138.8 million. Connecticut and Delaware continued to receive substantially less awards in comparison to the region's leaders in 2019, receiving $76.3 million and $41.1 million, respectively. More information on NSF Award Totals can be found in Appendix D.

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

INDICATOR 5

Number of Institutions Ranked in the Top 100

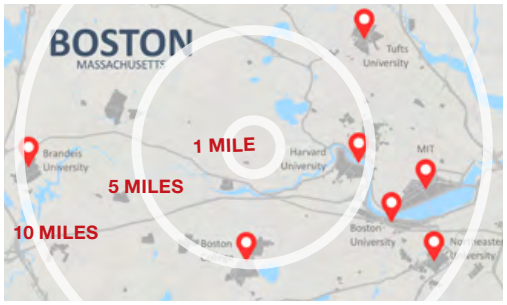
2020 Number of Institutions Ranked in the Top 100

Regional Score*	
Connecticut	T3
Delaware	1
Maryland	T3
Massachusetts	6
New Jersey	**4**
New York	7
Pennsylvania	5

WHETHER A STUDENT is seeking an undergraduate degree, a master's degree, or a doctorate degree, attracting top-tier candidates to postsecondary institutions is an essential component in creating an innovation ecosystem. The 2020 U.S. News & World Report rankings indicate that New York has the most top-tier institutions in the region with 11, followed by Massachusetts (10), Pennsylvania (7), New Jersey (4), Maryland (2), Connecticut (2), and Delaware (1).

As originally reported in 2019, of the 10 ranked universities in Massachusetts, seven are located within a 10-mile radius of Boston and are ranked among the Top 40 universities in the country. The proximity of numerous Massachusetts institutions located with a major urban city provides an ideally centralized location for competition to thrive, ultimately stimulating an innovation ecosystem. By comparison, New Jersey's four top-ranked institutions are geographically dispersed throughout the state. For a complete list of Top 100 institutions by state, review Appendix E.

Top 100 Institutions in Boston, MA
in 10 mile radius

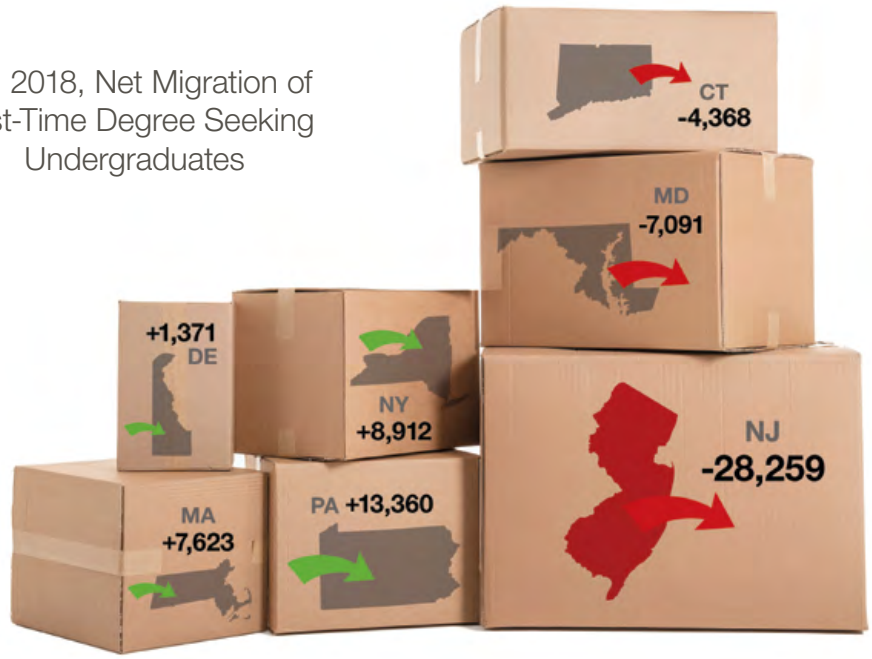


*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

INDICATOR 6

Net Migration of First-Time Degree Seeking Undergraduates

Fall 2018, Net Migration of First-Time Degree Seeking Undergraduates



Regional Score*	
Connecticut	3
Delaware	4
Maryland	2
Massachusetts	5
New Jersey	**1**
New York	6
Pennsylvania	7

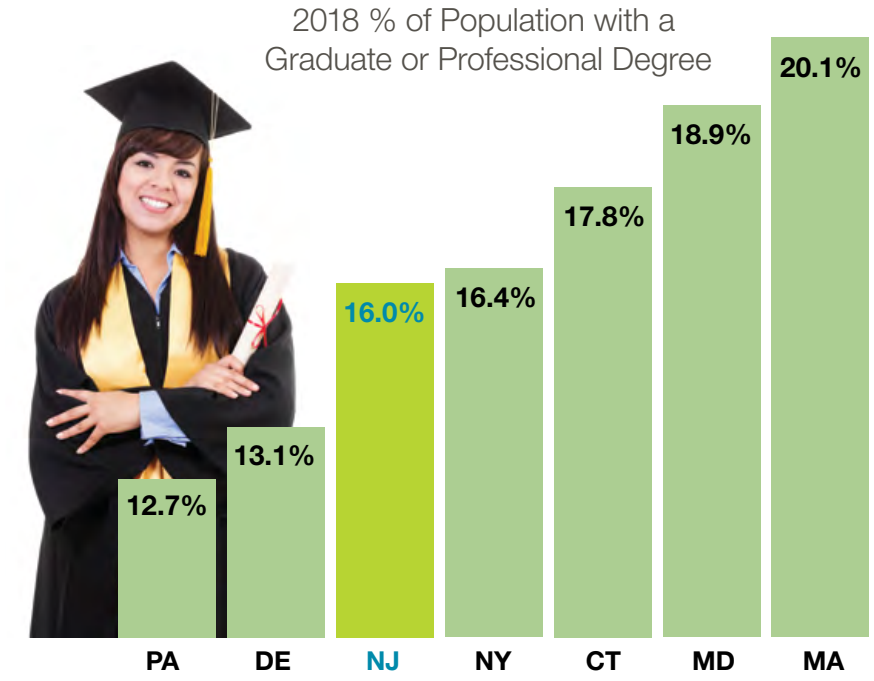
GIVEN THAT NEW Jersey offers top-tier K-12 public education, the migration of New Jersey's first-time college students greatly impacts the state's innovation ecosystem. A net loss in migration patterns signifies a loss in top-tier talent which results in a negative return on investment. Typically, two primary factors motivate the migration decisions of young adults: where to continue their post-secondary education and where to begin their careers.

According to the National Center for Education Statistics (NCES), in the fall of 2018 (the most-recent data available), New Jersey experienced the largest net loss of first-time students both regionally and nationally: –28,259 students. In comparison, regional leader Pennsylvania experienced a net gain of 13,360 students. New York and Massachusetts also experienced net gains in first-time college students, gaining 8,912 and 7,623 students, respectively. Delaware experienced a slight net increase in first-time students, gaining 1,371. Connecticut (-4,368) and Maryland (-7,091) were the only other states in the region (besides New Jersey) to experience a net loss in first-time college students. For more information on net migration of first-time, full-time college students, review Appendix F.

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

INDICATOR 7

Percentage of Population with a Graduate or Professional Degree



Regional Score*	
Connecticut	5
Delaware	2
Maryland	6
Massachusetts	7
New Jersey	**3**
New York	4
Pennsylvania	1

A HIGHLY EDUCATED, highly skilled workforce is a significant aspect of an innovation ecosystem. According to McKinsey & Company, the demands of innovators have never been greater; thus, innovative leaders need to hire individuals who possess diverse skill sets and are able to work on multiple projects simultaneously. Often, those possessing the qualities needed to work within innovation industries are individuals with graduate and professional degrees, including, but not limited to, a master's degree or a doctoral degree.

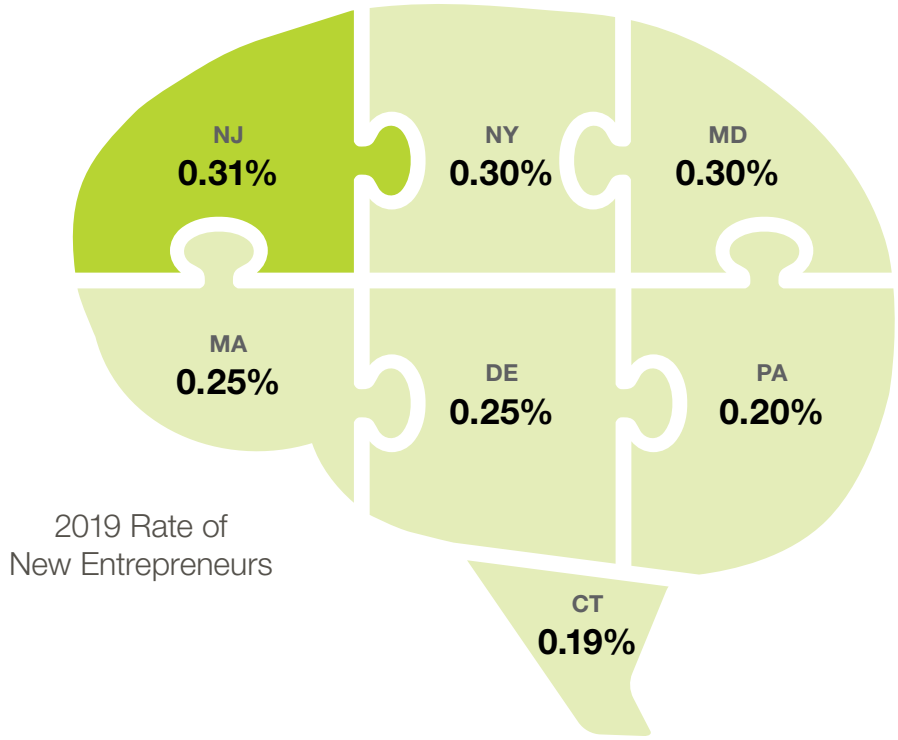
According to the U.S. Census Bureau, Massachusetts is home to the highest percentage population with a graduate or professional degree, with 20.1%. Maryland (18.9%) and Connecticut (17.8%) ranked second and third in the region, followed by New York (16.4%), New Jersey (16.0%), Delaware (13.1%), and Pennsylvania (12.7%).

From 2010 to 2018, Pennsylvania experienced the largest percentage increase (+22.1%) in population with a graduate or professional degree. Massachusetts and New Jersey followed closely behind with 20.4% and 20.3% increases during the same time span. In fact, every state in the region experienced a percentage increase of over 15% in population with a graduate degree from 2010 to 2018. For more information on the percentage of population with a graduate or professional degree, review Appendix G.

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

INDICATOR 8

Rate of New Entrepreneurs



Regional Score*	
Connecticut	1
Delaware	T4
Maryland	T6
Massachusetts	T4
New Jersey	**7**
New York	T6
Pennsylvania	2

THE EWING MARION Kauffman Foundation releases annual "Indicators of Entrepreneurship" for all 50 states; one of which is the Rate of New Entrepreneurs, which utilizes the Census Bureau's Current Population Survey to estimate the percentage of the population in each state that starts a new business. According to Kauffman, the Rate of New Entrepreneurs indicator "captures all new business owners, including those who own incorporated or unincorporated businesses, and those who are employers or non-employers" for each state.

In 2019, New Jersey led its regional competitors in Rate of New Entrepreneurs, with 0.31% of the state's population meeting the criteria of a New Entrepreneur. New York and Maryland tied for second in the region with a new entrepreneur rate of 0.30%. Massachusetts and Delaware had a 0.25% rate of new entrepreneurs, followed by Pennsylvania (.20%) and Connecticut (0.19%).

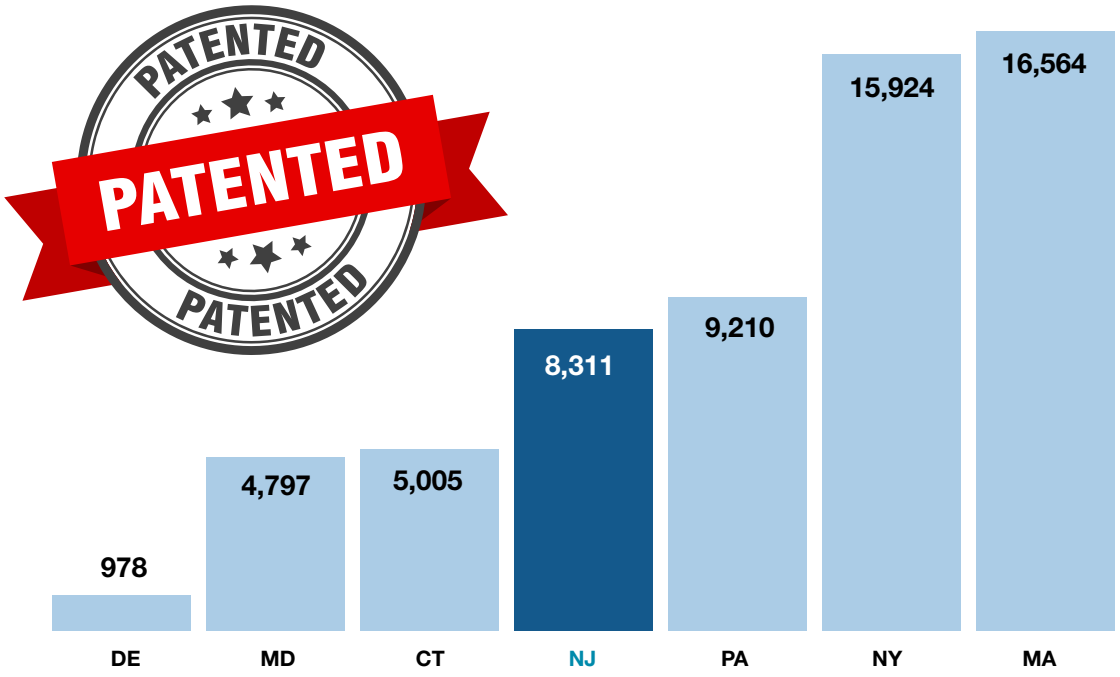
An analysis from 2009 to 2019 shows an annual fluctuation in the rate of new entrepreneurs in New Jersey. In 2013, the Garden State experienced a 10-year low in rate of new entrepreneurs at 0.22% which ranked second to last in the region. However, just three years later in 2016, New Jersey experienced a 10-year high at 0.34%. This rate earned the State the second-best ranking in the region. Historical data can be found in Appendix H.

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

INDICATOR 9

Number of Patents Granted

2019 U.S. Patents Granted



Regional Score*	
Connecticut	3
Delaware	1
Maryland	2
Massachusetts	7
New Jersey	**4**
New York	6
Pennsylvania	5

HIGH LEVELS OF patent activity indicate a healthy and active innovative ecosystem. Patent activity signifies a successful translation from research ideas to commercialization. Not surprisingly, patents today are the primary form of legal codification and ownership of innovative ideas and their application.

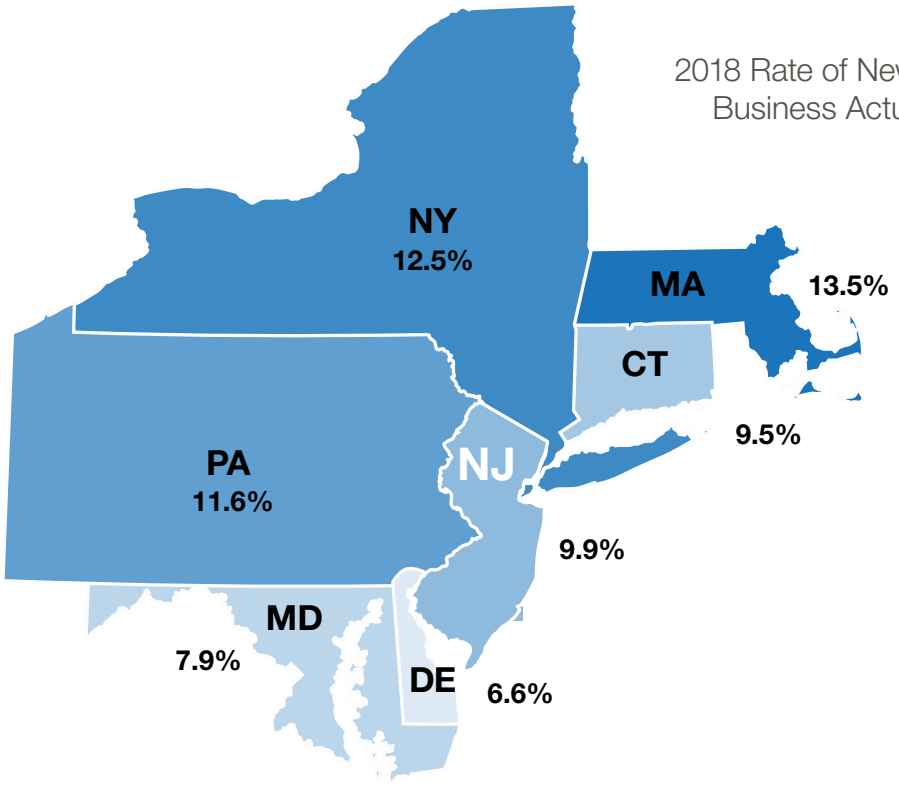
According to the U.S. Patent and Trademark Office (USPTO), Massachusetts led the region with 16,564 total patents granted to investors and assignees in 2019. New York ranked second with 15,924, followed by Pennsylvania (9,210), New Jersey (8,311), Connecticut (5,005), Maryland (4,797), and Delaware (978).

While all regional states experienced an increase in patents from 2009 to 2019, the change in patents awarded was not distributed evenly. Massachusetts experienced a 104% increase in patents granted, the largest in the region. Despite having earned nearly 2,000 less patents than New York in 2009, Massachusetts' continual increase in patents granted year over year allowed the state to surpass New York in 2017. New Jersey experienced an increase of 37%, a larger increase than only Delaware (13%) from 2009 to 2019. Historical data can be found in Appendix I.

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

INDICATOR 10

Rate of New Employer Business Actualization



Regional Score*	
Connecticut	3
Delaware	1
Maryland	2
Massachusetts	7
New Jersey	**4**
New York	6
Pennsylvania	5

EVERY YEAR KAUFFMAN releases a series of indicators in their "New Employer Business" series. Among them is the Rate of New Employer Business Actualization, which uses the U.S. Census Bureau's Business Formation Statistics to calculate the percent of all new businesses that make a first payroll within eight quarters of business application. According to Kauffman, "a new business is regarded as a new employer business formation if it makes a first payroll within eight quarters of its EIN application."

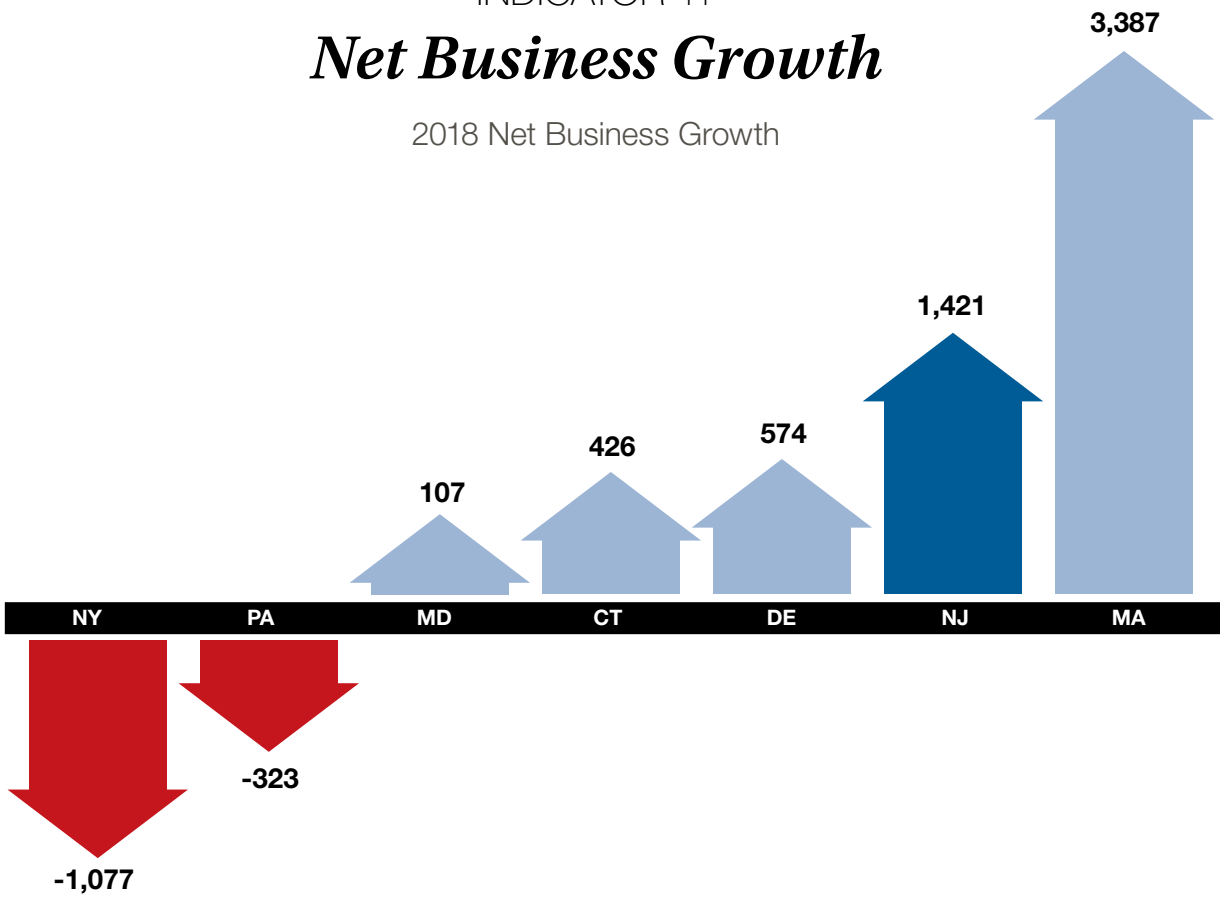
The data indicates that in 2018 Massachusetts again led its regional competitors with a New Employer Business Actualization rate of 13.5%, followed by New York (12.5%), Pennsylvania (11.6%), New Jersey (9.9%), Connecticut (9.5%), and Maryland (7.9%). Delaware had the lowest actualization rate at 6.6%.

Every state in the region experienced a decrease in the rate of New Employer Business Actualization when comparing 2008 to 2018 data. Delaware and New York experienced the largest decreases in the region at 29% and 24%, respectively. New Jersey experienced a 20% decrease, dropping from 12.4% in 2008 to 9.9% in 2018, but still good for second best in the region behind only Massachusetts (-16%). Historical data can be found in Appendix J.

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

INDICATOR 11

Net Business Growth



Regional Score*	
Connecticut	4
Delaware	5
Maryland	3
Massachusetts	7
New Jersey	**6**
New York	1
Pennsylvania	2

CENTRALLY LOCATED BETWEEN Philadelphia and New York City, New Jersey has the distinct advantage of location; thus, it should be easy to attract and retain business in New Jersey. An increasing number of businesses in a state signifies a growing economy that enhances an innovative ecosystem. Bottom line, businesses attract talent and talent spurs innovation. Net business growth refers to the total number of private establishment "deaths" subtracted from the total number of private establishment "births" in each state, as compiled by the U.S. Bureau of Labor Statistics (BLS).

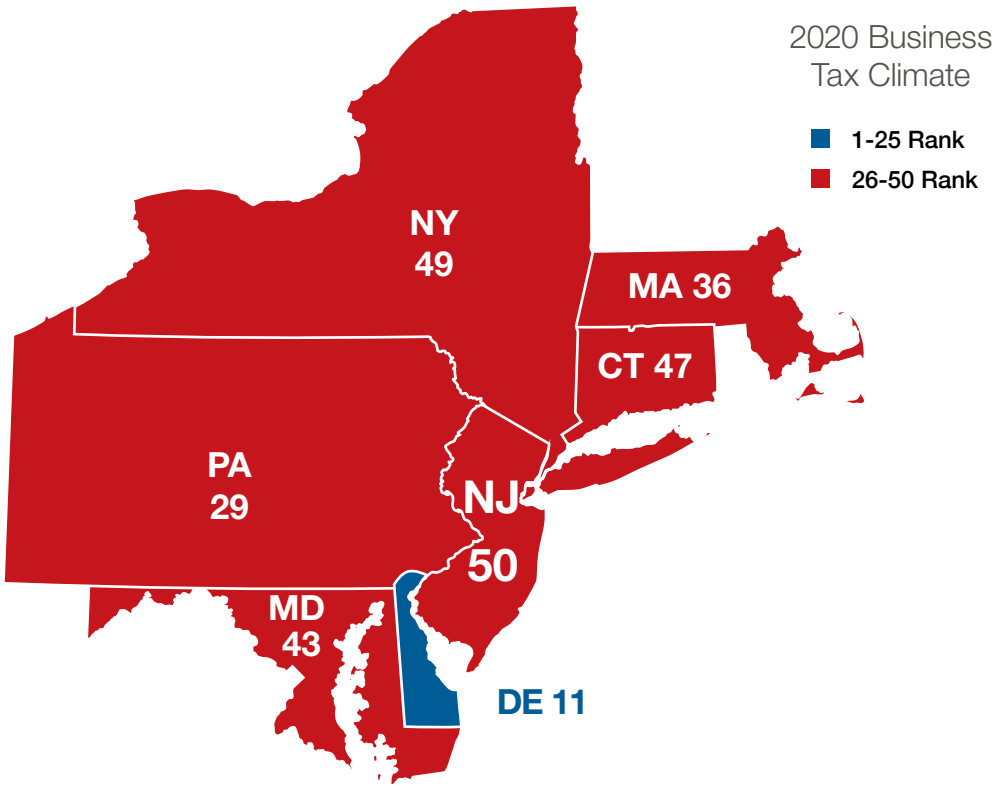
In 2018 (the last full year of data available), Massachusetts led the region with a net business growth of 3,387 private establishments, followed by New Jersey (1,421), Delaware (574), Connecticut (426), and Maryland (107). Two states, New York and Pennsylvania, experienced a decrease in net business growth, with a loss of 1,077 and 323 private establishments, respectively.

Despite New Jersey ranking second in the region in 2018 for net business growth, historical data shows consistent trends of businesses struggling in the Garden State. In fact, New Jersey has experienced a net loss of over 3,900 businesses from 2008 to 2018, the largest net loss in the region. To put this into perspective, Massachusetts and New York gained 37,132 and 25,355 net businesses respectively, during the same time span. Furthermore, New Jersey is the only state in the region to experience six years of a net loss of businesses from 2008 to 2018. Historical data can be found in Appendix K.

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

INDICATOR 12

Business Tax Climate



Regional Score*	
Connecticut	3
Delaware	7
Maryland	4
Massachusetts	5
New Jersey	**1**
New York	2
Pennsylvania	6

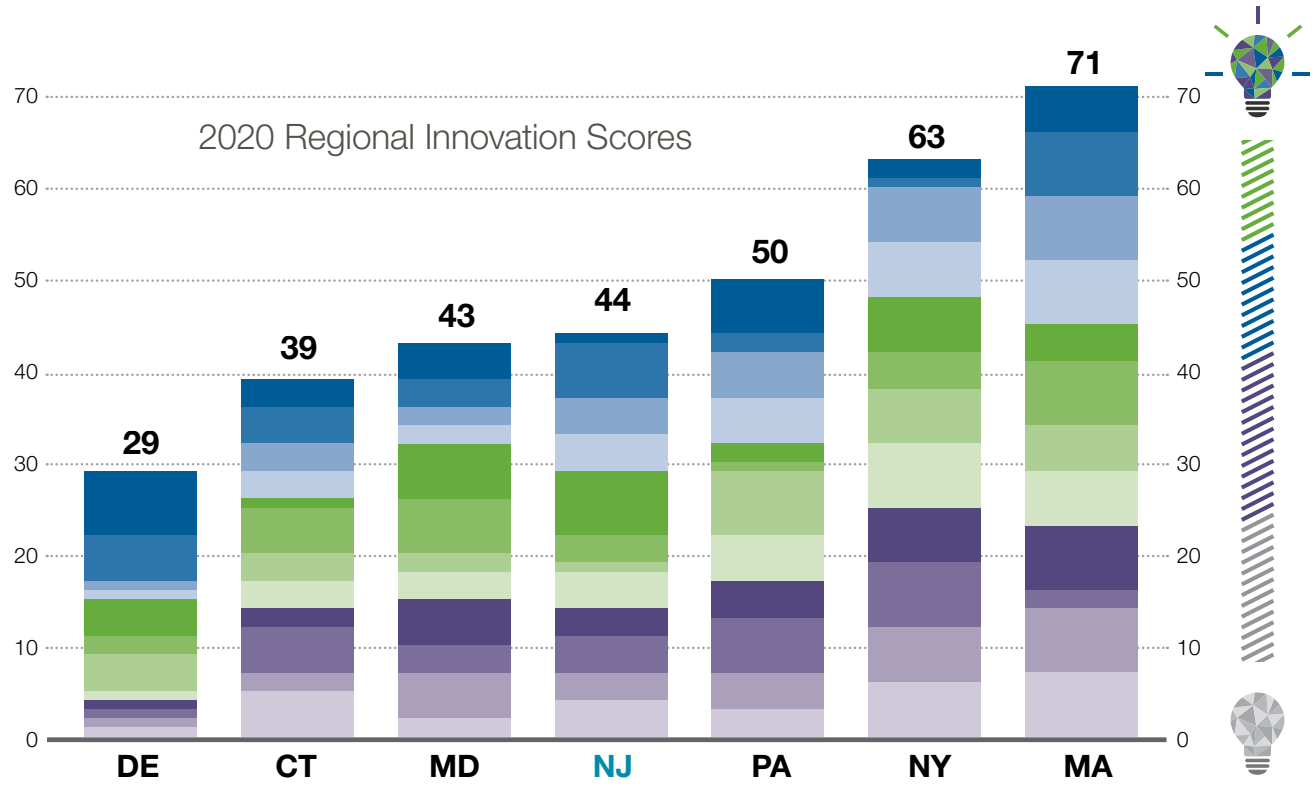
EVERY YEAR, THE Tax Foundation releases a study that examines the Business Tax Climate in each state and produces a ranking of all 50 states based on the Tax Foundation's "State Business Tax Climate Index." According to the Tax Foundation, the index is a "hierarchical structure built from five components: Individual Income Tax, Sales Tax, Corporate Income Tax, Property Tax, and Unemployment Insurance Tax." A low ranking indicates that the state has a poor business tax climate, whereas a higher ranking suggests a more business-friendly tax climate.

In the 2020 report, New Jersey ranked worst at 50th in the United States for business tax climate, followed by New York (49), Connecticut (47), Maryland (43), Massachusetts (36), and Pennsylvania (29). Delaware ranked the best, by far, out of its regional competitors at 11th in the nation.

An analysis from 2010 to 2020 reveals that New Jersey has consistently ranked either 49th or 50th in the nation per the Business Tax Climate Index. Historical data can be found in Appendix L.

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

Regional Innovation Scores



› CAPITAL

- Venture Capital Investment – Assests Under Management
- SBIR/STTR Award Obligation
- State R&D Expenditures
- National Science Foundation Award Totals – All Groups

› TALENT

- Number of Institutions Ranked in the Top 100
- Net Migration of First-Time, Full-Time College Students
- Percentage of Population with a Graduate or Professional Degree
- Rate of New Entrepreneurs

› BUSINESS

- Number of Patents Granted
- Rate of New Employer Business Actualization
- Net Business Growth
- Business Tax Climate

TO PUT THESE indicators in perspective, NJBIA scored each from 1 (least competitive in the region) to 7 (most competitive in the region), with a potential high score of 84 points. Since the study does not determine which category or indicator is the most important component of an innovation ecosystem, the indicators are not weighted. New Jersey's cumulative innovation score totaled 44 (an increase from 41 points in the 2019 report), which ranks 4th in the region. Massachusetts ranked 1st in the region, generating 71 points, followed closely by New York (63). Pennsylvania earned 50 points, Maryland earned 43, Connecticut earned 39 and Delaware earned 29.

Breaking Down State Innovation Scores

Based on the cumulative impact analysis, Pennsylvania, New York, and Massachusetts lead the Garden State in innovation, with Maryland trailing New Jersey by just one point. In order to gain a more nuanced view of New Jersey's place among its regional competitors, the following presents a breakdown of each innovation category – capital, talent, and business – and each state's average score within each category.

The tables below reflect the respective indicator score in each category for New Jersey and its primary competitors (Maryland, Pennsylvania, New York, and Massachusetts), along with each state's average indicator score in that category. Scores range from 1–7, with 1 indicating the lowest (or "worst") score for that indicator, and 7 indicating the best. In addition to breaking down each indicator category, NJBIA also provides recommendations that seek to make New Jersey more competitive in each category.

Capital

New Jersey's average score for the capital category is 3.5, which is one of the lowest scores in the region. Compared to regional leaders Massachusetts and New York, which average 5.75 and 6.25 respectively, New Jersey is behind in its capacity to support innovation through investment, research, and commercial enterprise.

Capital Indicators	NJ	MD	PA	MA	NY
Venture Capital AUM	4	2	3	7	6
SBIR/STTR Award Obligation	3	5	4	7	6
State R&D Expenditures	4	3	6	2	7
NSF Award Totals	3	5	4	7	6
Average Capital Score	**3.5**	**3.75**	**4.25**	**5.75**	**6.25**

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

Recommendations to Increase Innovation Capital in New Jersey

1. **Modify New Jersey's R&D Tax Credit to better align with leading innovation states.**
    a. **Background:** R&D tax credits are an important tool that federal and state governments use to incentivize spending on the R&D process for corporations, universities, laboratories, and other entities. Although R&D is a crucial part of developing new technology in various sectors, it is also costly, as there is no guarantee that a research project will turn into a commercially viable product.

    b. **New Jersey's Current Policy:** New Jersey's R&D tax credit is 10% of excess qualified research expenditures over a base amount, plus an additional 10% of basic research payments. While this credit incentivizes R&D across all sectors in the state, it falls short of the R&D tax credit in Massachusetts and California, as well as the Life Sciences R&D tax credit in New York.

    c. **Regional Competition:**
        i. Massachusetts R&D tax credit – 10% credit for qualified expenses, plus 15% credit for basic research payments.

        ii. New York Life Sciences R&D tax credit – 15% for qualified expenditures in New York State for companies with 10 or more employees, 20% for companies with fewer than 10 employees.

    d. **Other Noteworthy States:**
        i. California R&D tax credit – 15% of qualified expenses that exceed the base amount, plus 24% of basic research payments.

    e. **Recommendation:** Modify New Jersey's current tax credit by increasing the credits awarded for R&D in strategic sectors to 15% of qualified expenses exceeding the base amount and at least 15% for basic research payments. The strategic sectors the government should emphasize are those that were identified by Governor Phil Murphy in his Economic Development Plan and currently prioritized by the NJEDA's Office of Economic Transformation: Technology, Life Sciences, Offshore Wind, Clean Energy, Transportation & Logistics, Advanced Manufacturing, Food & Beverage, and Finance & Professional Services.

2. **Increase annual funding for the New Jersey Commission on Science, Technology and Innovation to directly increase the number of SBIR and STTR awards granted to small businesses.**
    a. **Background:** SBIR and STTR awards are key mechanisms that allow small businesses to participate in and promote strategic innovation nationwide. While success in the program is ultimately determined by the drive of a business and the promise of its research or product,

other factors play important roles. Consequently, many states have found it beneficial to create programs and support structures to aid businesses, within their state, in the application and research processes.

b. **New Jersey's Current Policy:** The New Jersey Commission on Science, Technology and Innovation was renewed in 2018 under Governor Murphy and received a $1 million allocation in the FY2020 state budget. With this funding, the Commission deployed $500,000 to help New Jersey small businesses in Phases I and II of the SBIR/STTR program. To date, the funding was used for seven Phase I grants ($175,000) and four Phase II grants ($200,000).

   The Commission originally requested $4 million for FY2021 to expand its operations. However, it was allocated only $1 million in the Governor's revised FY2021 budget proposal following the onset of the COVID-19 pandemic.

c. **Regional Competition:**
   i. MassVentures SBIR Targeted Technologies ("START") Program – provides grant funding to Massachusetts-based technology companies that have received Phase II SBIR/STTR federal funding. Since 2012, the program has allocated $25.2 million to over 100 companies, leading to over 2,500 jobs in Massachusetts.

   ii. New York Small Business Innovation Research Assistance Program – provides grant funding to SBIR Centers to help small businesses apply for SBIR/STTR and determine markets and federal agencies that might be interested in applicants' technologies. The goal is to increase the number of small businesses receiving federal funding in the state to stimulate economic growth. Funding is different each year.

d. **Recommendation:** Increase annual funding for the New Jersey Commission on Science, Technology and Innovation to increase the amount of direct financial support offered to small businesses through grants, as well as create and implement new programs including the already planned early stage seed grant program and technology commercialization matching fund.

3. **Form public-private partnerships with state government and the state's venture capital funds to reduce investment risk for both parties.**
   a. **Background:** Venture capital plays an important role in stimulating innovative activity and boosting promising, early-stage companies. Still, venture capital is a risky industry: funds often invest millions of dollars in projects that fail. States can enact different types of policies to spur venture capital investment by sharing or incentivizing the risk.

b. New Jersey's Current Policy: The NJEDA's NJ CoVest Fund provides funding, in the form of convertible notes, to technology and life sciences companies in the state who have secured funding from other sources. NJEDA's investment cannot represent more than one-third of the funding the company has received in its current round of funding. Maximum exposure is $1.75 million.

c. Regional Competition:

i. MassVentures, Massachusetts – quasi-public entity founded in 1978 and reinstated in 2012 with a $5 million investment fund focused on supporting early-stage tech companies throughout Massachusetts. The Economic Development Administration has allocated millions of dollars to MassVentures to fulfill its mission throughout its existence. As an entity, it focuses on Series Seed and Seed A investments.

ii. Massachusetts Life Sciences Center Seed Fund, Massachusetts – quasi-public entity focused on fostering a budding life sciences sector in the state by investing in promising life sciences companies and products. The Seed Fund provides convertible notes up to $250,000 to early-stage life sciences companies.

iii. Empire State Development New York Ventures Direct Fund, New York – $100 million venture capital fund investing in early-stage, innovative companies throughout the state. Focusing on strategic industries including information technology, life sciences, and clean energy, its Series A investments range from $500,000 to $1.5 million, while its seed investments range from $150,000 to $500,000. The fund requires a 2:1 match from institutional investors it collaborates with.

iv. Empire State Development Innovate NY Fund, New York – New York State launched this fund in 2012 by using a $35.6 million grant from the U.S. Department of the Treasury and a $10.3 million grant from Goldman Sachs. The fund also received $323 million in investments from the private sector. Innovate NY selected seven managers to invest the money in innovative, high-growth companies throughout the state. By 2019, all the money had been invested in 81 companies, creating 2,250 jobs.

d. Recommendation: Form public-private partnerships with state government and venture capital (VC) funds in New Jersey by providing the venture capital funds with state money to invest in a new generation of early-stage companies that will grow and innovate in the state. Partnering with VC firms will allow them to share some of the inherent risk of investing in early-stage companies. For the state, these partnerships will help attract high-growth, innovative companies to New Jersey, bringing new jobs and cutting-edge products with them.

Talent

In terms of talent, the data indicates that New Jersey is a leader in producing an entrepreneurial workforce yet is losing a vital talent pipeline in the form of net student outmigration. As a result, New Jersey is tied for 4th in the region with an average talent score of 3.75. New York scored an average of 5.75 for the talent category, earning scores of 6 and 7 in nearly every category.

Talent Indicators	NJ	PA	MD	MA	NY
Number of Institutions Ranked in the Top 100	4	5	3	6	7
Net Migration of First-Time College Students	1	7	2	5	6
Percentage of Population with a Graduate or Professional Degree	3	1	6	7	4
Rate of New Entrepreneurs	7	2	6	4	6
Average Talent Score	**3.75**	**3.75**	**4.25**	**5.50**	**5.75**

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

Recommendations to Increase Innovative Talent in New Jersey

4. **Foster Public-Private Partnerships to attract and retain top-tier talent in the Garden State.**
   a. **Background:** Public-Private Partnerships (P3s) are an effective way for a public entity, such as a public agency, local government, or school, to be benefit from different types of activities without having to fully bear the financial risk or burden. These partnerships can be used to create robust infrastructure, cutting-edge technology, and life-saving medical treatments or products. When it comes to innovation, P3s help pool financial resources and foster relationships between industry professionals, academic researchers, and government officials.

   b. **New Jersey's Current Partnerships:** Rutgers University and RWJBarnabas Health recently partnered to create a world-class academic health system. The partnership involves a $100 million investment by RWJBH to achieve educational and research goals, with the company

committing more than $1 billion over a period of 20 years. Funding will be used to recruit clinical and academic leaders and expand clinical trials statewide. The partnership also reserves $10 million for encouraging Rutgers medical students to stay in state following graduation.

c. Regional Competition:

i. Cyber NYC – Created by the New York City Economic Development Council, Cyber NYC is an entity consisting of various education and industry partners within the city, funded by $100 million in public-private investment. Cyber NYC's goal is to make NYC a leader in cybersecurity by leveraging and connecting the city's academic and professional talent networks with the city's financial resources. The initiative aims to add 10,000 cybersecurity jobs to the city's workforce.

d. Other Noteworthy States:

i. The Transportation Electrification Partnership in Los Angeles – consists of state, regional, and local leaders in government and industry working to make Los Angeles a leader in electric transportation infrastructure. Leadership includes Los Angeles Mayor Eric Garcetti and the Los Angeles Cleantech Incubator (LACI), which is a nonprofit focusing on assisting and bringing to market startups working on transportation, clean energy, and smart cities. The advisory group partners include BMW Group, Audi, and Tesla. LACI has helped its startup companies raise $159 million in funding, generate $220 million in revenue, and create nearly 1,700 jobs.

ii. Tesla Manufacturing Facility in Fremont, California – Tesla received a $465 million loan from the U.S. Department of Energy in 2010 to develop all-electric plug-in vehicles and create a manufacturing facility in Fremont, California for producing electric-vehicle-enabling technology. The funding made possible the development and deployment of technologies that have helped Tesla and many other American auto companies compete globally.

e. Recommendation: Increase the number of public-private partnerships within New Jersey, focusing on partnerships to promote innovative talent or create innovative products. Agencies and universities need to identify areas where they could partner with New Jersey businesses and need funding to make strategic investments in these partnerships.

5. Adopt GLOBAL EIR at New Jersey's higher education research institutions to retain top-tier international students and recent entrepreneur graduates.

a. Background: Empowering talented students is a key driver of innovation. New Jersey is one of the most diverse states in the nation, with over 22% of the state's population comprised of foreign-born individuals in 2018. Last year, the Garden State welcomed nearly 25,000 international students who enrolled in its higher education institutions. These individuals are gifted

students who will become talented professionals providing new perspectives, ideas and approaches. Providing international students with the tools and resources they need to stay in New Jersey upon graduation is essential to recreating New Jersey's innovation ecosystem.

Global EIR is a new nonprofit that partners with universities to help entrepreneurs secure visas so that they can build their businesses in the U.S. and create jobs. This benefits universities as entrepreneurs pledge 1% of future profits to the local economy at their university and serve the school by mentoring and connecting students with opportunities. This helps immigrant entrepreneurs by securing legal status in the U.S., allowing them to focus on growing their company and attracting investors. As a young nonprofit, Global EIR has yet to become widely adopted; thus, forming a state-level partnership provides New Jersey with an opportunity to position itself as a regional and national leader.

b. **New Jersey's Current Policy:** None.

c. **Regional Competition:**
   i. UMass, Boston – partnership with Global EIR
   ii. Babson College, Boston – partnership with Global EIR

d. **Other Global EIR Institutions:**
   i. University of Colorado, Boulder – partnership with Global EIR
   ii. San Jose State University, California – partnership with Global EIR
   iii. University of Missouri, St. Louis – partnership with Global EIR

e. **Policy Proposal:** Allocate and administer funds to New Jersey's higher education research institutions to establish partnerships with GLOBAL EIR to retain international students and recent entrepreneur graduates.

6. Expand R&D/STEM fellowship programs in New Jersey to attract and retain innovation talent in New Jersey.

a. **Background:** One avenue for boosting research activity is to allocate funding directly to researchers. While tax credits target businesses and institutions, grant funding can go directly to individual researchers to cover salary or expenses. State-funded fellowships directly boost researchers' early-career endeavors, while ensuring that the state's scientific and business communities will benefit from emerging talent.

b. **New Jersey's Current Policy:** New Jersey created the Innovation and Research Fellowship Program through the Workforce Development Partnership Fund in May 2019. The program provides pre-and post-Ph.D. scholars with two-year grants to do research at a company located in New Jersey. The cost-sharing ratio is 2:1 between the state and the company, respectively. The program was originally launched with $1.5 million in program funding, and the first recipient was announced in December 2019.

c. **Regional Competitors:**

i. Empire State Development NYFIRST, New York – $15 million fund that awards grants to medical schools in New York State to recruit and retain top life science researchers. The maximum grant size is $1 million. Funding can be used to cover the cost of upgrading laboratory space, purchasing equipment, and funding the recruited researcher's professional staff. The program requires a 2:1 cost-sharing ratio between the medical school and the NYFIRST fund, respectively.

d. **Recommendations:** Increase and annualize funding for the Innovation and Research Fellowship Program to support more researchers in New Jersey's innovation ecosystem. Increasing funding for the program will help the state retain promising researchers in crucial industries. Committing to annual funding will also create certainty for researchers and businesses alike, and signal that New Jersey is seriously committed to being a leader in STEM research.

**Author's Note on Addressing Outmigration: For recommendations on how New Jersey can reduce its net outmigration, and how to retain and attract New Jersey's future workforce pipeline, please review NJBIA's Postsecondary Education Task Force Report.*

Business

Notably, New Jersey ranks second in net business growth in the region, according to the last year of available data, earning 6 points. However, New Jersey's business tax climate ranks not only the worst in the region, but the worst in the nation. New Jersey is tied for 3rd in the region with and overall business score of 3.75.

Business Indicators	MD	NJ	NY	PA	MA
U.S. Patents Granted	2	4	6	5	7
Rate of New Employer Business Actualization	2	4	6	5	7
Net Business Growth	3	6	1	2	7
Business Tax Climate	4	1	2	6	5
Average Business Score	**2.75**	**3.75**	**3.75**	**4.5**	**6.5**

*Regional Scoring System: 1= least competitive in the region 7= most competitive in the region

Recommendations to Increase Innovative Business Competitiveness in New Jersey

Startups, Small- and Medium-Size Business Competitiveness

7. Provide additional incentives through the Angel Investor Tax Credit to small and medium, high-growth companies.

a. **Background:** Angel Investor Tax Credits incentivize investments in early-stage companies by reducing the risk borne by investors. Early-stage companies need funding to develop, but the challenging nature of scaling and commercialization means the most promising companies can still be risky investments.

b. **New Jersey's Current Policy:** New Jersey has a 20% credit, with an additional 5% credit if the company is women or minority-owned or located in an Opportunity Zone, for investments in emerging technology and life sciences companies with fewer than 225 full-time employees (FTE), 75% of whom must work in the Garden State. Although New Jersey's credit effectively targets the right industries, it might incentivize investments in more developed companies relative to younger ones. Investment in a company that has matured to include 200 employees is likely less risky than investment in a company that still only employs 20 individuals.

c. **Regional Competition:**

   i. Massachusetts Angel Investor Tax Credit – tax credit up to 20% of qualifying investment, 30% for investments in a Gateway Municipality. Investment must be in businesses with 20 or fewer FTEs, gross revenues up to $500,000, a fully developed business plan, a primary place of business in Massachusetts, and 50% of workforce in Massachusetts.

   ii. New York Qualified Emerging Technology Company (QETC) Tax Credit – 10% of a qualified investment if the investor agrees to hold their investment for four years after the close of the tax year in which they claim the QETC credit, 20% if they hold their investment for nine years.

d. **Recommendation:** Amend New Jersey's current Angel Investor Tax Credit to provide additional incentives for investing in smaller, high-growth companies. Similar to the policy's additional 5% credit for investments in companies located in certain zones, the amended credit should provide additional credits for investments in high-growth companies, defined as companies that experience 30% job growth year over year.

   i. Additional credit is equal to 5% of the investment in a medium-sized company of 50–200 employees.

ii. Additional credit is equal to 10% of the investment in a small-sized company of 10–50 employees.

8. Create a commission to review New Jersey's regulatory structure, with the goal of identifying and reducing inefficiencies and overly burdensome red tape.

a. **Background:** Regulations and rules seek to implement laws efficiently. However, often regulations create unnecessary or unintended burdens because of how they are implemented, or they become outdated. For early-stage companies, navigating a complex system of regulations can be costly in time and money. Creating a process within government to review regulations, new and old, could improve regulatory efficiency within the state and facilitate a robust innovation ecosystem.

b. **New Jersey's Current Policy:** New Jersey previously had a "Red Tape Review Commission," which was tasked with determining areas where red tape could be cut to reduce regulatory burdens. However, the commission was not renewed by Governor Murphy. In 2019, there was an attempt by a bipartisan group of legislators in the state Senate to create the "Government Efficiency and Regulatory Review Commission," which would have been tasked with determining the effects of rules and regulations, and whether the burdens they created outweighed the benefits they produced.

c. **Regional Competitors:**

i. New York Senate Administrative Regulations Review Commission, General Assembly Commission on Administrative Regulations Review, New York – Legislators appointed to the commission are tasked with reviewing agency regulations and weighing in on their effects on the state's economy.

d. **Recommendation:** Establish the "Government Efficiency and Regulatory Review Commission," as was proposed in S-4125 in 2019, to determine where rules and regulations are creating outsized burdens on the state's businesses.

Large Companies & Corporate Competitiveness

9. Reinstate a corporate tax incentive program in New Jersey

a. **Background:** All businesses need a healthy business climate to thrive and grow; one that supports job growth and incentivizes investment. Large corporations, especially those located in major cities, attract early-stage companies and spur healthy competition in a region. Therefore, they play a critical role in an innovation ecosystem.

Corporate tax incentive programs are an important tool for states to retain top companies and encourage them to invest in-state. When larger companies see the Garden State as a worthwhile place to grow, they will attract smaller companies looking to benefit from the budding business activity.

b. New Jersey's Current Policy: New Jersey does not have a main tax incentive program for large corporations because both the GROW New Jersey Assistance Tax Credit (GROW NJ) and Economic Redevelopment and Growth Program (NJERG) incentives expired in 2019.

c. Regional Competition:

i. New York Excelsior Jobs Program – provides fully refundable tax credits for companies in strategic industries creating jobs/making capital investments.

1. Jobs Tax Credit: up to 6.85% of wages per net new job
2. Investment Tax Credit: 2% of qualified investments
3. R&D Tax Credit: up to 50% of federal R&D credit; up to 3% of research expenditures in New York State
4. Real Property Tax Credit: dependent on location in distressed areas and if the project is a Regionally Significant Project

d. Other Noteworthy States:

i. California Competes Tax Credit – Five-year agreement for businesses that relocate to California and grow their operation in the state. Milestones must be met each year to receive the annual credits. Overall, $180 million is allocated per fiscal year, with no more than 20% going to one applicant. The program prioritizes, among other objectives:

1. Number of jobs created/retained
2. Compensation for employees
3. Amount of investment
4. Unemployment and poverty in the proposed location
5. How much the benefit to the state will exceed the tax credit
6. Overall economic impact
7. Strategic importance to the state, region, or locality
8. Training opportunities offered to employees

e. Recommendation: Reinstate a corporate tax incentive program to help retain top businesses and encourage in-state growth. The new program should be modeled off the strengths of New Jersey's old programs, while adopting measures such as those used in New York and California to target different types of behaviors that will spur innovative activity in the state. Credits awarded should depend on:

i. Jobs created
ii. Investment
iii. Location in, or near, a city

10. Implement structural reform to improve the New Jersey's business climate

a. Background: Current policies in New Jersey are harmful for both small and large businesses. Highest-in-the-region tax rates make the state more expensive for already established businesses. New Jersey has some of the highest, if not the highest, tax rates in several categories compared to its regional competitors and, in some instances, the nation.

b. New Jersey's Current Policy:

i. High Taxation: Among its regional competitors, New Jersey has the highest tax rates in several categories including top income tax rate (10.75%), top corporate tax rate (11.50%*), state sales tax rate (6.625%), and property tax paid as percentage of personal income (5.05%)

**The enactment of New Jersey's FY 2021 budget, on Oct. 1, 2020, increased the top corporate tax rate from 10.50% to 11.50%.*

c. Regional Competition:

i. Massachusetts Pension Reform Act – In 2011, the state Legislature passed a package of reforms to the Massachusetts public employee pension system. The act secured cost savings for the state through anti-spiking provisions, an increase in the minimum retirement age, and an increase in the salary average period for retirement benefits from three to five years.

d. Recommendation: Implement the Path to Progress reforms for New Jersey's public employee pension and benefits system, state and local tax structure, county and municipal shared services, and education reform. Use the savings to deliver on key initiatives to improve New Jersey's business climate, which will help spur innovation by making the Garden State a more attractive place to do business. In addition to using these savings to create new programs, the state can also use the savings to reduce the tax burden on New Jersey's business community. By making the state an attractive place to grow, the Garden State will attract not only large, established businesses, but also early-stage companies.

Tying it all Together

To successfully recreate an innovation ecosystem, there must be a strong presence of all three categorical indicators: capital, talent, and business. According to our analysis, New Jersey ranks in the middle of the pack in all three categories. However, two key indicators have undermined New Jersey's ability to be a leading innovative state again: Net-migration of first-time college students and the business tax climate. With this comparative data in hand, New Jersey leaders must strive to increase the state's innovation score.

This can be done by leveraging and mining our assets: an ideally centralized location, nationally recognized K-12 academics, quality higher education institutions, and a highly educated, highly skilled workforce. In addition, state leaders can address and begin to reform our state's structural deficiencies (property taxes, pension costs and infrastructure investment), which are creating a lag on our state's regional competitiveness and affordability.

Done the correct way, the Garden State can attract top-tier talent to New Jersey's postsecondary institutions, build "live, work and play" communities, increase venture capital investment, and target industry clusters for growth.

To get there we need coordination and a willingness to make tough decisions that, if made today, will reap great short- and long-term returns to the state. Together, government, academia and business can make the vision of revitalizing New Jersey's innovation ecosystem a reality.

Simply put, New Jersey has the capacity to be a leader in innovation, but has yet to capitalize on its assets by addressing existing obstacles. And, given that the COVID-19 pandemic is expected to have drastic implications for New Jersey's economy, leaders across government, business, and academia must implement concerted measures to bolster innovation and growth as New Jersey emerges from this historic crisis.

New Jersey ranks in the middle of the pack in all three categories. **However, two key indicators have undermined New Jersey's ability to be a leading innovative state again:** Net-migration of first-time college students and the business tax climate.

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Appendix A

Venture Capital – Assets Under Management
(Dollars in Millions)

	2008	2009	2010	2011	2012	2013	2014
Connecticut	$9,504.82	$9,573.97	$9,897.09	$9,485.17	$9,444.27	$8,925.44	$8,763.41
Delaware	$12.66	$11.44	$11.83	$11.75	$15.46	$16.17	$41.93
Maryland	$2,110.22	$1,965.65	$1,752.44	$1,551.42	$1,489.95	$1,531.68	$1,429.92
Massachusetts	$37,365.58	$37,869.54	$39,110.10	$41,675.81	$40,117.51	$42,249.83	$41,997.24
New Jersey	**$5,815.00**	**$5,955.05**	**$5,967.82**	**$5,800.09**	**$5,599.65**	**$5,468.81**	**$5,421.15**
New York	$21,219.27	$20,914.62	$22,062.10	$27,668.71	$28,296.01	$29,402.14	$36,120.51
Pennsylvania	$3,598.11	$3,877.97	$4,072.53	$3,999.73	$3,675.79	$3,644.13	$3,936.15

	2015	2016	2017	2018	2019	% Change (08-19)
Connecticut	$6,941.82	$5,960.51	$5,332.06	$5,111.74	$5,619.50	-41%
Delaware	$44.56	$56.84	$67.53	$69.25	$71.60	466%
Maryland	$1,375.04	$1,099.68	$979.05	$1,127.19	$760.80	-64%
Massachusetts	$46,476.23	$49,217.45	$52,345.49	$59,495.50	$60,230.00	61%
New Jersey	**$5,440.42**	**$4,791.18**	**$4,277.82**	**$3,610.80**	**$3,335.70**	**-43%**
New York	$43,427.57	$43,080.25	$46,241.32	$55,998.58	$57,073.20	169%
Pennsylvania	$4,110.33	$3,470.70	$3,278.05	$3,542.12	$3,233.70	-10%

Appendix B

SBIR/STTR Award Obligation
Dollars in Millions

	2008	2009	2010	2011	2012	2013
Connecticut	$33.76	$32.49	$43.21	$32.22	$25.68	$28.04
Delaware	$10.74	$6.11	$12.69	$11.13	$7.83	$10.94
Maryland	$111.77	$122.17	$136.97	$112.63	$104.73	$111.67
Massachusetts	$306.39	$311.72	$320.73	$304.09	$269.20	$255.77
New Jersey	**$55.18**	**$64.51**	**$78.10**	**$51.29**	**$49.37**	**$45.83**
New York	$110.44	$147.82	$119.69	$122.64	$115.13	$102.66
Pennsylvania	$104.73	$76.44	$95.41	$101.89	$90.45	$70.27

	2014	2015	2016	2017	2018	2019	% Change (08-19)
Connecticut	$31.19	$34.56	$38.98	$34.30	$33.70	$27.16	-19.5%
Delaware	$8.51	$10.37	$17.63	$23.59	$23.69	$13.84	28.9%
Maryland	$120.66	$123.77	$134.64	$141.85	$150.16	$93.19	-16.6%
Massachusetts	$262.57	$306.12	$302.19	$331.01	$354.15	$199.80	-34.8%
New Jersey	**$60.15**	**$43.95**	**$56.45**	**$60.68**	**$49.58**	**$38.17**	**-30.8%**
New York	$99.30	$116.86	$120.01	$128.83	$133.08	$102.71	-7.0%
Pennsylvania	$97.61	$109.75	$103.91	$115.87	$133.78	$87.78	-16.2%

Appendix C

State Government R&D Expenditures
Dollars in Millions

	2007	2009	2010	2011	2012	2013
Connecticut	$29.29	$28.56	$40.07	$39.19	$40.02	$41.02
Delaware	$2.61	$1.68	$2.39	$2.61	$4.64	$4.73
Maryland	$40.30	$21.09	$22.83	$20.09	$21.89	$29.47
Massachusetts	$5.60	$3.29	$4.88	$4.88	$3.92	$4.59
New Jersey	**$19.98**	**$25.15**	**$38.64**	**$27.87**	**$29.82**	**$34.41**
New York	$128.36	$375.42	$391.26	$405.35	$382.23	$382.14
Pennsylvania	$103.97	$95.90	$87.91	$75.49	$80.60	$66.43

	2014	2015	2016	2017	2018	% Change (07-18)
Connecticut	$47.41	$55.82	$49.46	$55.59	$54.49	86.0%
Delaware	$2.24	$2.20	$2.70	$3.27	$3.86	48%
Maryland	$29.98	$24.85	$26.45	$29.52	$30.96	-23%
Massachusetts	$18.26	$22.67	$23.43	$27.74	$23.00	311%
New Jersey	**$30.39**	**$33.76**	**$30.48**	**$37.42**	**$51.30**	**157%**
New York	$377.02	$370.59	$404.83	$434.29	$450.16	251%
Pennsylvania	$35.43	$75.02	$73.19	$92.51	$101.61	-2%

Appendix D

National Science Foundation Award Totals – All Groups
Dollars in Millions

	2010	2011	2012	2013	2014
Connecticut	$61.53	$64.64	$60.56	$59.19	$71.44
Delaware	$35.17	$27.32	$33.54	$36.69	$39.21
Maryland	$162.57	$144.48	$250.71	$304.93	$336.25
Massachusetts	$476.67	$453.46	$457.27	$452.72	$461.10
New Jersey	**$157.96**	**$130.43**	**$131.27**	**$126.87**	**$142.83**
New York	$481.21	$425.05	$458.87	$436.10	$467.95
Pennsylvania	$279.66	$231.85	$261.13	$275.73	$275.82

	2015	2016	2017	2018	2019	% Change in State Expenditures (10-19)
Connecticut	$68.32	$79.65	$68.53	$70.06	$76.26	23.9%
Delaware	$25.59	$46.12	$25.20	$36.65	$41.14	17.0%
Maryland	$329.58	$343.28	$325.39	$392.03	$426.37	162.3%
Massachusetts	$456.77	$448.70	$458.67	$502.74	$550.38	15.5%
New Jersey	**$147.25**	**$163.70**	**$139.61**	**$163.44**	**$138.80**	**-12.1%**
New York	$493.17	$480.11	$484.69	$514.15	$483.92	0.6%
Pennsylvania	$292.04	$275.03	$262.77	$261.35	$313.29	12.0%

No data available for 2008.

Appendix E

Number of Institutions Ranked in the Top 100

Connecticut	
Institution	Ranking
Yale University	3
University of Connecticut	64

Delaware	
Institution	Ranking
University of Delaware	91

Maryland	
Institution	Ranking
Johns Hopkins University	10
University of Maryland – College Park	64

Connecticut	
Institution	Ranking
Harvard University*	2
Massachusetts Institute of Technology*	3
Tufts University*	29
Boston College*	37

New Jersey	
Institution	Ranking
Princeton University	1
Rutgers University – New Brunswick	62
Stevens Institute of Technology	74
New Jersey Institute of Technology	97

New York	
Institution	Ranking
Columbia University	3
Cornell University	17
New York University	29
University of Rochester	29

Pennsylvania	
Institution	Ranking
University of Pennsylvania	6
Carnegie Mellon University	25
Villanova University	46
Lehigh University	50

Appendix F

Net Migration of First-Time Degree Seeking Undergraduates

Sates	2012	2014	2016	2018
Connecticut	-5,572	-5,249	-4,547	-4,368
Delaware	1,418	1,683	1,301	1,371
Maryland	-8,756	-8,422	-6,550	-7,091
Massachusetts	9,253	9,089	7,680	7,623
New Jersey	**-29,203**	**-29,101**	**-28,605**	**-28,259**
New York	6,061	7,130	8,910	8,912
Pennsylvania	16,074	16,959	16,816	13,360

Appendix G

Percentage of Population with a Graduate or Professional Degree

States	2010	2011	2012	2013	2014	2015	2016	2017	2018	% Change (10-18)
Connecticut	15.3%	15.7%	16.6%	16.6%	16.7%	16.7%	16.7%	17.3%	17.8%	16.3%
Delaware	11.3%	11.7%	11.4%	12.6%	12.3%	12.9%	12.6%	13.5%	13.1%	15.9%
Maryland	16.4%	16.5%	16.9%	17.1%	17.5%	17.7%	18.5%	18.3%	18.9%	15.2%
Massachusetts	16.7%	16.8%	17.1%	17.8%	18.0%	18.4%	19.0%	19.5%	20.1%	20.4%
New Jersey	**13.3%**	**13.3%**	**13.8%**	**14.0%**	**14.3%**	**14.3%**	**14.9%**	**15.6%**	**16.0%**	**20.3%**
New York	14.0%	14.2%	14.4%	14.8%	14.9%	15.0%	15.5%	15.8%	16.4%	17.1%
Pennsylvania	10.4%	10.4%	10.9%	11.2%	11.4%	11.6%	12.0%	12.5%	12.7%	22.1%

Appendix H

Rate of New Entrepreneurs

States	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Connecticut	0.27	0.26	0.27	0.29	0.30	0.31	0.30	0.29	0.27	0.23	0.20	0.19
Delaware	0.16	0.19	0.23	0.26	0.25	0.28	0.29	0.24	0.20	0.16	0.23	0.25
Maryland	0.26	0.28	0.25	0.28	0.26	0.27	0.24	0.28	0.26	0.32	0.27	0.30
Massachusetts	0.28	0.28	0.29	0.31	0.29	0.26	0.29	0.29	0.29	0.26	0.23	0.25
New Jersey	**0.27**	**0.29**	**0.28**	**0.28**	**0.24**	**0.22**	**0.24**	**0.32**	**0.34**	**0.32**	**0.29**	**0.31**
New York	0.36	0.36	0.36	0.36	0.36	0.34	0.33	0.35	0.36	0.33	0.32	0.30
Pennsylvania	0.16	0.16	0.17	0.18	0.18	0.19	0.20	0.18	0.17	0.18	0.19	0.20

Appendix I

Number of U.S. Patents Granted

States	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Connecticut	3,138	3,702	3,664	3,945	4,100	4,427	3,904	4,068	4,314	4,421	5,005
Delaware	869	932	1,222	1,300	1,360	1,365	1,119	958	1,017	956	978
Maryland	2,751	3,438	3,327	3,570	3,794	4,168	4,014	4,087	4,300	4,111	4,797
Massachusetts	8,130	10,315	10,613	11,609	12,842	13,490	13,746	14,100	14,986	14,588	16,564
New Jersey	**6,056**	**7,598**	**7,605**	**8,132**	**8,865**	**9,155**	**8,466**	**8,388**	**8,620**	**7,983**	**8,311**
New York	10,070	12,540	12,276	13,299	14,072	14,616	14,142	14,172	14,652	14,215	15,924
Pennsylvania	5,828	7,215	7,013	7,417	8,210	8,429	8,014	8,273	8,904	8,515	9,210

States	% Change (09-19)
Connecticut	59.5
Delaware	12.5
Maryland	74.4
Massachusetts	103.7
New Jersey	**37.2**
New York	58.1
Pennsylvania	58.0

Appendix J

Rate of New Employer Business Actualization
(In Percent)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	% Change (08-18)
Connecticut	11.79	11.81	11.99	11.98	11.11	10.80	10.96	10.84	10.13	9.78	9.47	-19.7
Delaware	9.31	8.81	9.19	8.55	7.94	7.70	7.95	7.69	7.38	6.79	6.60	-29.1
Maryland	10.16	10.55	10.07	9.84	9.63	9.52	9.29	9.06	8.59	8.24	7.87	-22.6
Massachusetts	16.07	15.49	14.97	14.67	14.75	14.65	14.30	14.50	14.20	13.59	13.54	-15.7
New Jersey	**12.39**	**12.53**	**12.60**	**11.95**	**11.53**	**11.50**	**11.46**	**11.22**	**10.87**	**10.16**	**9.90**	**-20.1**
New York	16.48	16.79	15.87	14.93	14.36	14.09	13.56	13.93	13.52	12.87	12.47	-24.3
Pennsylvania	15.35	14.56	14.65	13.98	13.64	13.11	13.19	12.73	12.42	11.85	11.63	-24.2

Appendix K

Net Business Growth

	Period	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total Net Businesses (08-18)
NEW JERSEY	Births	26,442	25,178	24,898	25,594	25,808	25,788	24,808	28,782	26,781	24,960	27,243	
	Deaths	29,182	30,091	26,529	25,993	25,046	24,650	25,557	26,128	25,745	25,490	25,822	
	Net	**(2,740)**	**(4,913)**	**(1,631)**	**(399)**	**762**	**1,138**	**(749)**	**2,654**	**1,036**	**(530)**	**1,421**	**(3,951)**
NEW YORK	Births	52,281	50,388	54,067	55,917	55,415	57,049	56,653	59,647	58,209	58,900	57,412	
	Deaths	54,761	54,907	49,881	51,762	51,151	50,786	52,504	54,294	55,916	56,132	58,489	
	Net	**(2,480)**	**(4,519)**	**4,186**	**4,155**	**4,264**	**6,263**	**4,149**	**5,353**	**2,293**	**2,768**	**(1,077)**	**25,355**
PENNSYLVANIA	Births	28,939	26,083	27,924	28,460	32,669	28,301	27,395	28,750	27,893	28,054	28,156	
	Deaths	28,726	29,040	25,096	28,309	29,437	32,029	27,083	27,575	27,731	28,031	28,479	
	Net	**213**	**(2,957)**	**2,828**	**151**	**3,232**	**(3,728)**	**312**	**1,175**	**162**	**23**	**(323)**	**1,088**
CONNECTICUT	Births	8,042	7,068	7,481	7,917	8,423	8,294	8,306	8,732	8,332	8,961	9,128	
	Deaths	9,186	9,882	8,221	7,712	7,956	8,131	8,157	8,234	8,411	8,844	8,702	
	Net	**(1,144)**	**(2,814)**	**(740)**	**205**	**467**	**163**	**149**	**498**	**(79)**	**117**	**426**	**(2,752)**
DELAWARE	Births	2,962	2,406	2,729	2,818	3,037	2,871	3,218	3,122	3,238	3,381	3,557	
	Deaths	3,356	3,157	2,749	2,903	2,670	2,633	2,730	2,933	2,910	3,132	2,983	
	Net	**(394)**	**(751)**	**(20)**	**(85)**	**367**	**238**	**488**	**189**	**328**	**249**	**574**	**1,183**
MARYLAND	Births	15,021	13,454	14,066	14,837	15,105	14,899	15,220	16,176	15,536	15,744	15,551	
	Deaths	17,033	17,131	14,643	14,643	14,151	14,547	14,469	14,843	15,108	15,062	15,444	
	Net	**(2,012)**	**(3,677)**	**(577)**	**194**	**954**	**352**	**751**	**1,333**	**428**	**682**	**107**	**(1,465)**
MASSACHUSETTS	Births	17,061	15,545	17,405	20,009	20,831	20,827	25,913	24,237	23,861	25,753	25,897	
	Deaths	17,289	17,870	16,072	14,762	15,444	17,469	18,397	19,875	19,413	21,106	22,510	
	Net	**(228)**	**(2,325)**	**1,333**	**5,247**	**5,387**	**3,358**	**7,516**	**4,362**	**4,448**	**4,647**	**3,387**	**37,132**

Appendix L

Business Tax Climate
(National Ranking)

States	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Connecticut	38	40	40	40	47	47	47	47	47	47	47
Delaware	8	12	12	14	18	13	14	20	20	11	11
Maryland	45	44	42	41	40	39	39	40	40	42	43
Massachusetts	36	28	24	22	28	30	29	31	29	33	36
New Jersey	**50**	**50**	**50**	**49**	**49**	**50**	**50**	**50**	**50**	**50**	**50**
New York	49	49	49	50	50	49	49	49	49	48	49
Pennsylvania	27	21	19	19	33	33	33	29	30	32	29

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