



PHOTO: ROBERT EMERSON



Benchmarking the Rhode Island Knowledge Economy



**G R E A T E R
P R O V I D E N C E
C H A M B E R O F
C O M M E R C E**

FOUNDED IN 1868



November, 2011

Dear Friends,

In the 21st century, knowledge and innovation drive economic change and progress.

It's increasingly clear that states and cities which have a candid and impartial understanding of their core competencies, cluster strengths and a trajectory of key economic trends will better catalyze additional economic growth within emerging areas.

Understanding these themes, the Greater Providence Chamber of Commerce (GPCC) and the RI Science & Technology Advisory Council (STAC) have joined together to produce this report entitled "Benchmarking the Rhode Island Knowledge Economy."

The document is designed around 23 indicators that together will provide a strong foundation to benchmark Rhode Island's knowledge enterprise. The goal is not only to track the state's ability to develop its knowledge-driven, science and technology-based economy, but also to compare that development to what others are doing on the regional and national level.

As the document is updated in the coming years, there will also be an additional opportunity to gain an understanding of how Rhode Island is trending in major areas that define our capacity for creating prosperity.

Simply put, these data will better position us as a community to strategically identify and support initiatives that best leverage scarce financial resources, measure the impact of these investments and pursue the promise of a strong Rhode Island in the years to come.

The Greater Providence Chamber of Commerce and RI Science & Technology Advisory Council remain committed to fostering the evolution of Rhode Island into a major hub for high impact research and development, business incubation and entrepreneurial activity.

Greater Providence
Chamber of Commerce



RI Science & Technology
Advisory Council



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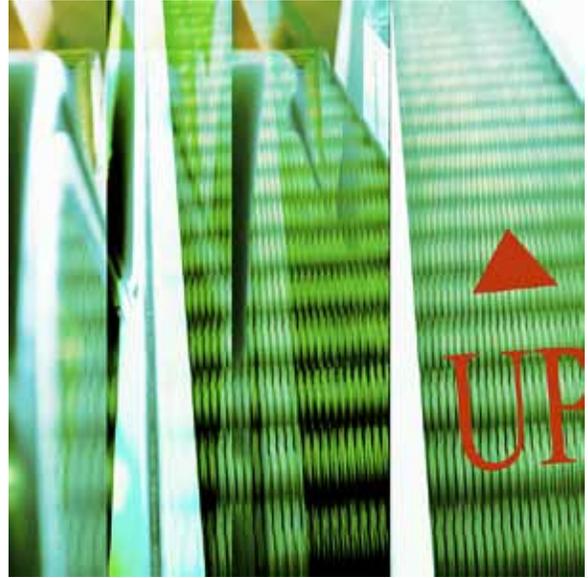
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A strong knowledge economy is a key component in a state's economic success in the 21st century. Exemplary research and development capacity, a strong knowledge-to-business pipeline, and an adequately prepared workforce are instrumental to creating a sustainable and cutting edge knowledge economy. The Greater Providence Chamber of Commerce in partnership with the Rhode Island Science and Technology Advisory Council has taken a dedicated approach to measuring how the state of Rhode Island is faring in the primary indicators that detail the relative strength of the state's knowledge economy.



As Rhode Island's oldest and largest business advocacy organization, the Greater Providence Chamber of Commerce fosters the development of a positive and productive business climate through economic development, business-to-business relationship building and effective public policy and government. The Rhode Island Science and Technology Advisory Council is a coalition of academic, medical, government and business leaders that recommends strategic investments that drive economic development and job creation by maximizing the economic impact of science, technology and innovation. With the emergence of a knowledge, innovation and information based economy in Rhode Island, the Chamber and STAC seek to understand and identify our state's strengths, shortfalls and opportunities in this important growth sector. The benchmarking data tracked in this Index, when updated in the coming years, will provide a tool to evaluate Rhode Island's competitive position over time and inform our activities to support the generation of new ideas, technologies and jobs.

Benchmarking the Rhode Island Knowledge Economy is a compilation of twenty-three different indicators measuring Rhode Island's capacity and progress toward competing in a knowledge-driven and science and technology based economy. The indicators are organized into four categories representing key components of a knowledge-based economy:

- Rhode Island's Knowledge Economy
- The Knowledge Business Pipeline
- Research and Development
- The Workforce for the Knowledge Economy

Rhode Island's Knowledge Economy – As other states invest in science and technology, it is important that Rhode Island remain competitive through investments as well. This section includes the indicators: per capita income, high speed internet access, net-migration of persons 22-39 years of age, targeted science and technology sector establishment's employment, and wages, as well as state funding for higher education and state funding for science and technology. Funding for higher education and particularly for science and technology is a measure of the State's commitment to both Research and Development and to building the future knowledge-economy workforce.

INTRODUCTION & SUMMARY

The Knowledge Business Pipeline – Being able to commercialize new ideas and to access startup and early stage capital for entrepreneurial activity is the backbone of a knowledge-based economy. The indicators in this section include: patents issued per 1,000 residents, patents issued for universities and colleges, entrepreneurial activity, venture capital investments, and small business research and small business technology transfer program investments.

Research and Development – R&D creates knowledge for innovation and serves as the basis for commercialization. The indicators in this section include: total R&D performance, academic R&D, industry R&D, not-for-profit R&D performance, and federal R&D obligations. Understanding where R&D funding is sourced and how it is expended is vital to determining the likely strength of the state’s R&D capacity into the future.

The Workforce for the Knowledge Economy – The knowledge economy requires a highly skilled and educated workforce. This section assesses the reservoir of the state’s human capital by measuring the level of science, technology, engineering, and mathematics (STEM) literacy and the intensity of workers trained in technology and the sciences. The indicators in this section include: math scores for 8th graders, science and engineering degrees awarded, education attainment (defined as the percent of the population aged 25 or older with a BA or more) and scientists and engineers in the workforce.

Within each capacity area there are two types of indicators. The first measures the relative strength of the “raw materials” or inputs essential to the growth of Rhode Island’s knowledge economy. Examples include: R&D spending, education attainment, venture capital investments, and Internet connectivity - all necessary inputs



INTRODUCTION & SUMMARY

that serve as the foundation for innovation-based economic growth. The second type of indicator assesses the performance of Rhode Island's knowledge-driven economic growth by measuring key outputs and products. Examples include: patents issued, and scientists and engineers in the workforce. These indicators tell us how Rhode Island's knowledge economy is performing and the degree to which inputs may be leading to desired outputs and outcomes. In addition to the key indicators, related sub-indicators further describe Rhode Island's performance in growing and sustaining the knowledge economy.

In order to assess Rhode Island's performance relative to other states, the data for Rhode Island are compared with data for the U.S. as a whole and to New England as a whole. Additionally, Rhode Island is compared to the 27 EPSCoR states, which are those that have been designated by the National Science Foundation as part of the Experimental Program to Stimulate Competitive Research (EPSCoR) due to their lagging performance in science and technology relative to the nation. To allow for "apples to apples" comparisons, for most of the key indicators, the data are expressed as a portion of population (per capita) or state's economic output (as a percent of the state's domestic product) to account for geographic and population size differences.

As data for all of the indicators come from a variety of sources, the years for which data are available may change from one indicator to another. All of the data used in this report represent the most recently released statistics for each particular data source. We recognize that some of the available data are dated in the sense that they predate both the economic recession and also changes made within the states to address them. Thus this report should be viewed as presenting an historical background rather than a report card on where we are today. However, these historical data are important for us to use as a benchmark as we go forward and as the report is updated we would expect to see positive changes in many of these indicators.

Figure 1 presents a summary of Rhode Island's performance for the twenty-three primary innovation indicators. The indicators presented are not meant to be the sole-source, definitive assessment of whether Rhode Island is succeeding in building and sustaining a knowledge economy. Like all states, Rhode Island has areas that represent strengths or assets that will serve as the building blocks for the future economy. It also has areas requiring improvement in order for the state to foster innovation, leading to commercialization and economic growth. Figure 2 details how Rhode Island compares to the other five New England states on the primary indicators. For this table, all rankings represent the ranking in the most recent year for which reliable data were available.

Existing areas of strength for Rhode Island in building and sustaining a knowledge-driven economy.

The following are indicators for which Rhode Island's performance ranks it within the top 20 states in the latest year for which data are available:

- Per Capita Income
- High Speed Internet Access
- Patents Issued Per 1,000 Residents
- Venture Capital Investments
- Total R&D Performance
- Academic R&D Performance
- Not-For-Profit R&D Performance
- Federal R&D Obligations
- Science and Engineering Degrees Awarded
- Education Attainment – Percent of Population 25 or Older with a BA or More

INTRODUCTION & SUMMARY

Existing areas of weakness for Rhode Island in building and sustaining a knowledge-driven economy.

The following are indicators for which Rhode Island's performance ranks it within the bottom 20 states in the latest year for which data are available:

- Gross State Product Growth
- Net Migration of Persons 22-39 Years of Age
- State Appropriations for Higher Education
- Entrepreneurial Climate
- Industry R&D Performance
- Math Scores for 8th Graders
- Scientists and Engineers in the Workforce

Areas in which Rhode Island has shown improvement in building and sustaining a knowledge-driven economy.

The following are indicators for which Rhode Island experienced a trend of improvement during the last five years for which data are available:

- Gross State Product Growth
- Per Capita Income
- High Speed Internet Access
- Patents (Utilities Only) Issued to Universities and Colleges
- Academic R&D Performance
- Federal R&D Obligations
- Math Scores for 8th Graders (4 Year Trend)
- Science and Engineering Degrees Awarded
- Education Attainment – Percent of Population 25 or Older with a BA or More

Areas in which Rhode Island has shown decline in building and sustaining a knowledge-driven economy.

The following are indicators for which Rhode Island experienced a trend of decline during the last five years for which data are available:

- Targeted Science and Engineering Sector Employment
- State Funding for Science and Technology
- State Appropriations for Higher Education
- Patents Issued Per 1,000 Residents
- Entrepreneurial Climate
- Venture Capital Investments
- Total SBIR/STTR Investments
- Total R&D Performance
- Industry R&D Performance
- Not-For-Profit R&D Performance
- Scientists and Engineers in the Workforce

INTRODUCTION & SUMMARY

Figure 1.

Rhode Island – Indicator Summary

Indicator	1 Year Change	5 Year Trend	Rhode Island Compared to EPSCoR	Rhode Island's Most Recent National Ranking
Rhode Island's Knowledge Economy				
Gross State Products	^	^	v	45
Per Capita Income	v	^	^	17
Targeted Science and Technology Sector Establishments	^	^	^	N/A
Targeted Science and Technology Sector Employment	v	v	v	N/A
Targeted Science and Technology Sector Wages	N/A	N/A	v	N/A
High Speed Internet Access	^	^	^	16
Net-Migration of Persons 22-39 Years of Age	N/A	N/A	v	45
State Funding for Science and Technology	=	v	N/A	N/A
State Appropriations for Higher Education	v	v	v	46
The Knowledge Business Pipeline				
Patents Issued per 1,000 Residents	^	v	^	17
Patents (Utility Only) Issued to Universities and Colleges	^	^	^	23
Entrepreneurial Climate	^	v	v	33
Venture Capital Investments	^	v	^	10
Total SBIR/STTR Investments	v	v	v	21
Research and Development				
Total R&D Performance	v	v	^	19
Academic R&D Performance	^	^	^	7
Industry R&D Performance	v	v	v	31
Not-For-Profit R&D Performance	^	v	^	4
Federal R&D Performance	=	^	^	8
Workforce for the Knowledge Economy				
Math Scores for 8th Graders	^	^	v	37
Science and Engineering Degrees Awarded	^	^	^	15
Education Attainment – Percent of Population 25 or Older with a BA or More	^	^	^	14
Scientists and Engineers in the Workforce	=	v	^	30

Key: ^ – Improving Trend or Higher = – No Change or Equal
 v – Decreasing or Lower N/A – Not Applicable or Data Not Available

INTRODUCTION & SUMMARY

Figure 2.

New England Summary Table

(State Ranking on data for latest year available, where 1 = best and 51 = worst)

	CT	ME	MA	NH	RI	VT
Gross State Product	23	44	13	42	45	51
Per Capita Income	2	31	4	11	17	22
High Speed Internet Lines Per 1,000 Residents	4	29	6	14	16	28
Net Migration of Persons 22-39 Years of Age	17	41	30	23	45	43
State Appropriations for Higher Education Per Person	10	36	45	49	46	47
Patents Issued Per 1,000 Residents	8	42	5	9	17	1
Patents (Utility Only) Issued to Universities and Colleges Per \$10,000 of Academic R&D	26	29	1	32	23	14
Entrepreneurial Climate - Index of Entrepreneurial Activity	38	29	20	33	33	5
Venture Capital Investments as a Percent of Gross State Product	13	34	1	15	10	20
Total SBIR/STTR Investments	17	29	1	2	21	7
Total R&D Performance as a Percent of Gross State Product	5	40	2	10	19	22
Academic R&D Performance as a Percent of Gross State Product	30	41	2	6	7	10
Industry R&D Performance as a Percent of Gross State Product	2	38	1	7	31	16
Not-For-Profit R&D Performance as a Percent of Gross State Product	36	3	1	42	4	47
Federal R&D Obligations as a Percent of Gross State Product	13	14	5	20	9	31
Math Scores for 8th Graders	10	19	1	6	37	3
Science and Engineering Degrees Awarded Per 1,000 Residents	47	39	14	36	18	19
Education Attainment - Percent of Population 25 or Older with a BA or More	5	24	2	10	14	8
Scientists and Engineers in the Workforce	10	42	3	13	30	20

RHODE ISLAND'S KNOWLEDGE ECONOMY

OVERVIEW

Gross state product (GSP) and per capita income are the end-outcome indicators for investing in research and development, and supporting technology intensive industries. In the five-year period from 2006-2010, Rhode Island experienced slower growth in its GSP than the growth experienced in all of the reference geographies. In 2009, Rhode Island's per capita income was above both the U.S. as a whole and the EPSCoR states, but below that of the New England states.

Rhode Island targets six sectors related to science and technology. They are: Advanced Manufacturing, Marine Trades & Defense, Information Technology (IT) & Digital Media, Health Care & Life Science, Wind Turbine Component Manufacturing, and Design.

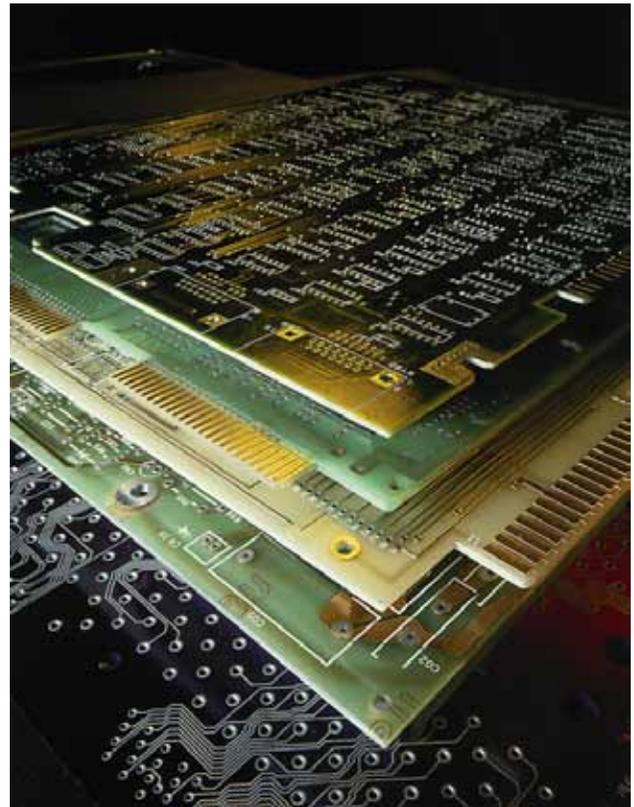
For these targeted sectors, the total number of science and technology-sector establishments (businesses) within Rhode Island is 35,538. As a percent of all establishments in 2009, Rhode Island had a higher concentration of these sectors than all the reference groups.

In 2010, Rhode Island employed 150,560 workers in its targeted science and technology sectors. In these sectors Rhode Island has experienced greater declines in employment in the past five years compared to the reference geographies. This decline was driven by steep declines in Marine Trades & Defense and Advanced Manufacturing. Design and Health Care & Life Science both saw an increase in employment in the five-year period.

In 2010, the average wage in Rhode Island for its targeted science and technology sectors was \$46,718, which was higher than the average for all Rhode Island sectors. Rhode Island's targeted science and technology sector wages were slightly ahead of the EPSCoR states' average wage and significantly behind both the United States average and that of the New England states. Among the targeted science and technology sectors in 2010 in Rhode Island, the highest average wage is in the Information Technology & Digital Media sector followed by the Marine Trades & Defense sector. The lowest average wage of the targeted science and technology sectors was in the Advanced Manufacturing.

INDICATORS

- Gross State Product
- Per Capita Income
- Targeted Science and Technology Sector Establishments
- Targeted Science and Technology Sector Employment
- Targeted Science and Technology Sector Wages
- High Speed Internet Access
- Net-Migration of Persons 22-39 Years of Age
- State Funding for Science and Technology
- State Appropriations for Higher Education



RHODE ISLAND'S KNOWLEDGE ECONOMY

There have been significant increases in broadband Internet subscribers since 2000 with an increase of over 1,500 percent through 2009. Relative to the reference groups in 2009, Rhode Island had fewer subscribers per 1,000 residents than the New England states as a whole, but more than both the U.S. as a whole and the EPSCoR states. Rhode Island ranked 16th on this indicator in 2009.

From 2005-2007, Rhode Island experienced a net out-migration of persons aged 22-39. All the reference geographies experienced positive net in-migration rates for this age group. On this indicator, Rhode Island ranked 45th nationally.

Since 1997, the Slater Technology Fund has been financed by the State of Rhode Island to provide financing to technology ventures. From 2000 to 2009, there has been an annual investment of \$3.0 million which decreased to \$2.0 million for 2010 and 2011. Starting in 2007, there has also been a state investment in the Science & Technology Advisory Council of \$1.5 million a year. From 2000 to 2011, there has been a total state investment of \$41.5 million for science and technology.

From 1990 to present, Rhode Island has remained low compared to other states for State Appropriations for Higher Education and has fallen below all the reference groups in the last several years. Rhode Island's national ranking has remained in the lower third of all states since 1990.

RHODE ISLAND'S KNOWLEDGE ECONOMY

Gross State Product

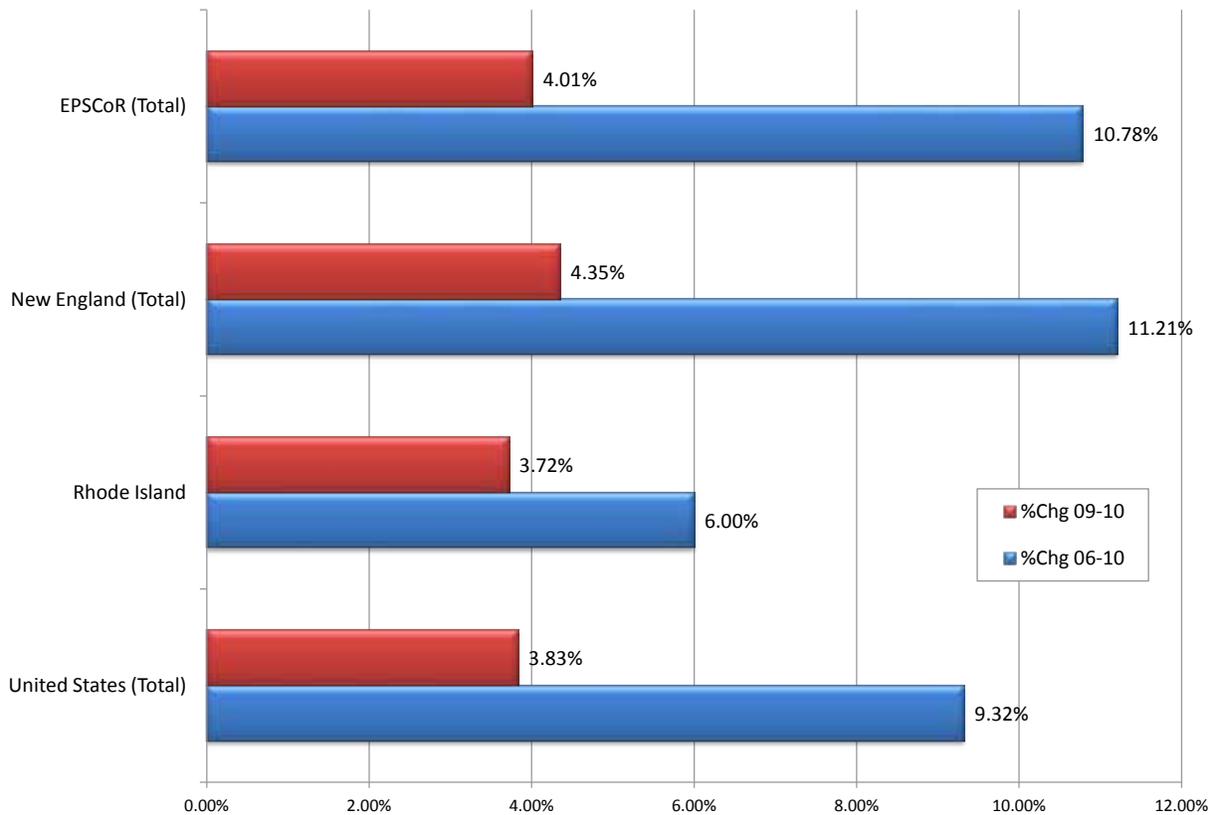
- Rhode Island 1-Year Trend ▲
- Rhode Island 5-Year Trend ▲
- Rhode Island Compared to EPSCoR ▼
- Rhode Island Compared to New England ▼
- Rhode Island Compared to U.S. ▼
- Rhode Island's Most Recent National Ranking **45**

SUMMARY

In 2010, Rhode Island's gross state product (GSP) was \$49.2 billion. In the five-year period from 2006-2010, Rhode Island experienced a six percent increase in gross state product which was less than the growth experienced in the United States as a whole (9.32%), as well as the total for all EPSCoR states (10.78%) and the New England states (11.21%) (see Figure 1-1). Rhode Island ranked 44th among all states in 5-year growth but improved to 25th in growth during the most current year, though it still lagged the reference geographies. In 2010, Rhode Island was ranked 45th nationally on this indicator.

Figure 1-1.

Percent Change in Gross Domestic Product by State - 2006-2010



RHODE ISLAND'S KNOWLEDGE ECONOMY

Gross State Product

WHY THIS IS SIGNIFICANT

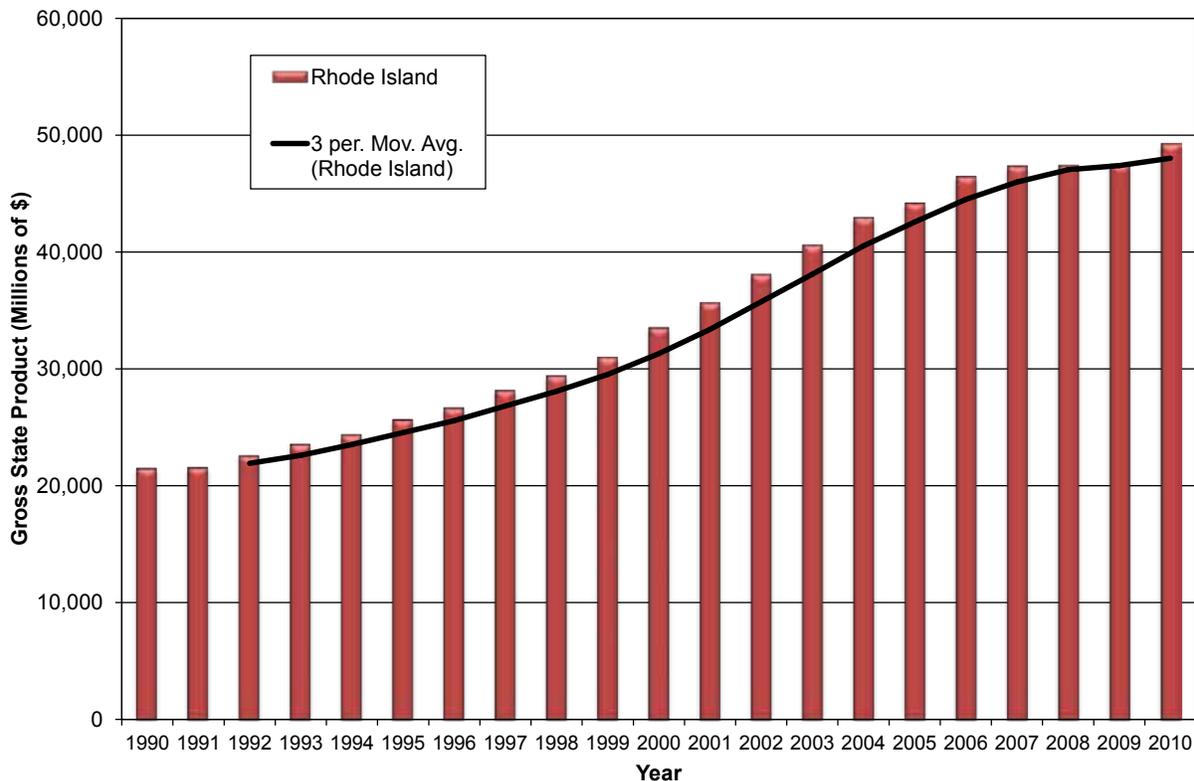
Gross state product is a comprehensive indicator of statewide total economic output and growth. It measures the total dollar value of all goods and services in the economy, and therefore is an indicator of economic health. Growth in GSP relative to other geographies indicates whether growth in Rhode Island is keeping pace with national growth in GSP over time.

RELATED

From 2009 to 2010, Rhode Island saw an increase in the amount of gross state product to \$49.2 billion after remaining relatively level from 2007 to 2009 (see Figure 1-2). From 1990 to 2010, Rhode Island has seen an increase in gross state product of 129%, less than all of the reference groups.

Figure 1-2.

Gross Domestic Product in Rhode Island – 1990-2010
Millions of Current \$



SOURCES: Gross state product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2010; <http://www.bea.gov/regional/gsp/>; 1997-2010 is based on NAICS while 1980-1996 is based on SIC industry classification.

RHODE ISLAND'S KNOWLEDGE ECONOMY

Per Capita Income

Rhode Island 1-Year Trend ▼

Rhode Island Compared to New England ▼

Rhode Island 5-Year Trend ▲

Rhode Island Compared to U.S. ▲

Rhode Island Compared to EPSCoR ▲

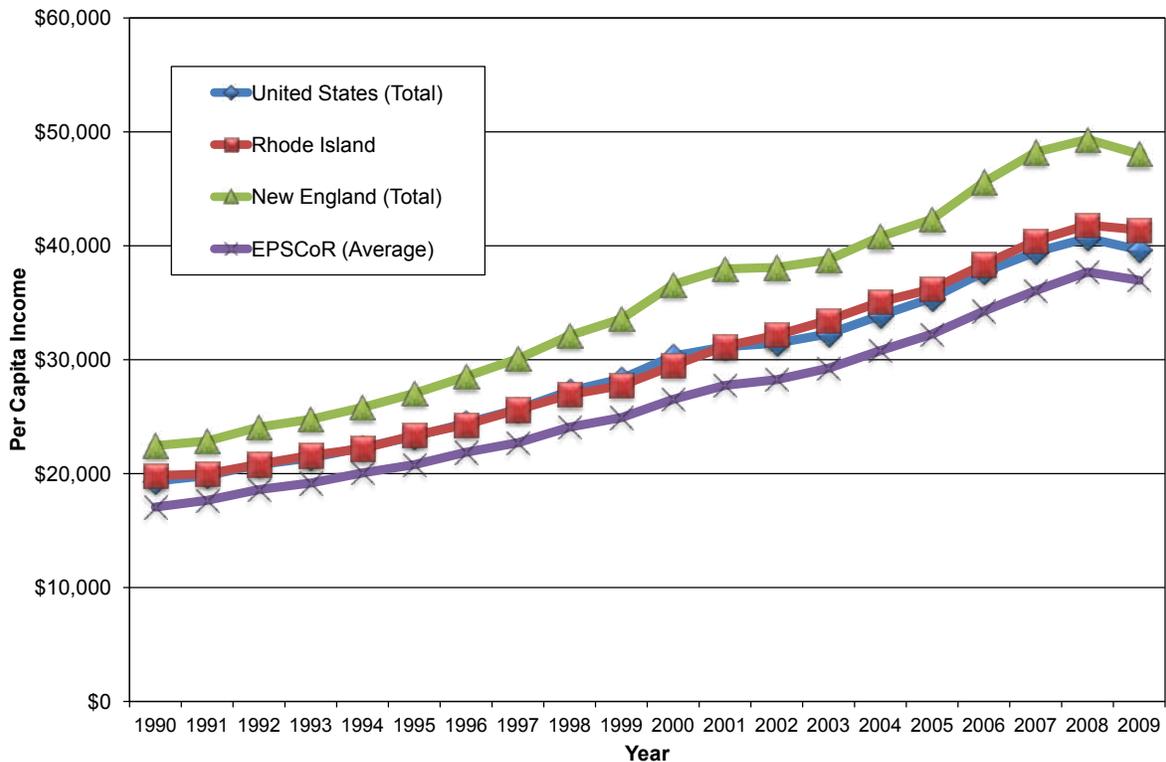
Rhode Island's Most Recent National Ranking **17**

SUMMARY

In 2009, Rhode Island's per capita income was \$41,392. This was greater than that of the U.S. as a whole (\$39,635) and of the EPSCoR states (\$36,974), but was below that of the New England states (\$48,049) (see Figure 1-3). All of the reference geographies and the U.S. as a whole have experienced increases in per capita income from 2000-08, but saw a decrease in 2009. Rhode Island's national ranking was 17th in 2009.

Figure 1-3.

Per Capita Income – 1990-2009
Actual \$



WHY THIS IS SIGNIFICANT

Per capita income is a measure of individual prosperity which is a desired end outcome of economic development. It is one measure of the standard of living for a state's residents.

SOURCES: Per capita income is from Bureau of Economic Analysis, U.S. Department of Commerce; <http://www.bea.gov>. All dollar estimates are in current dollars (not adjusted for inflation). Revised state personal income estimates were released September 20, 2011.

RHODE ISLAND'S KNOWLEDGE ECONOMY

Targeted Science and Technology Sector Establishments

Rhode Island Compared to EPSCoR [^](#)

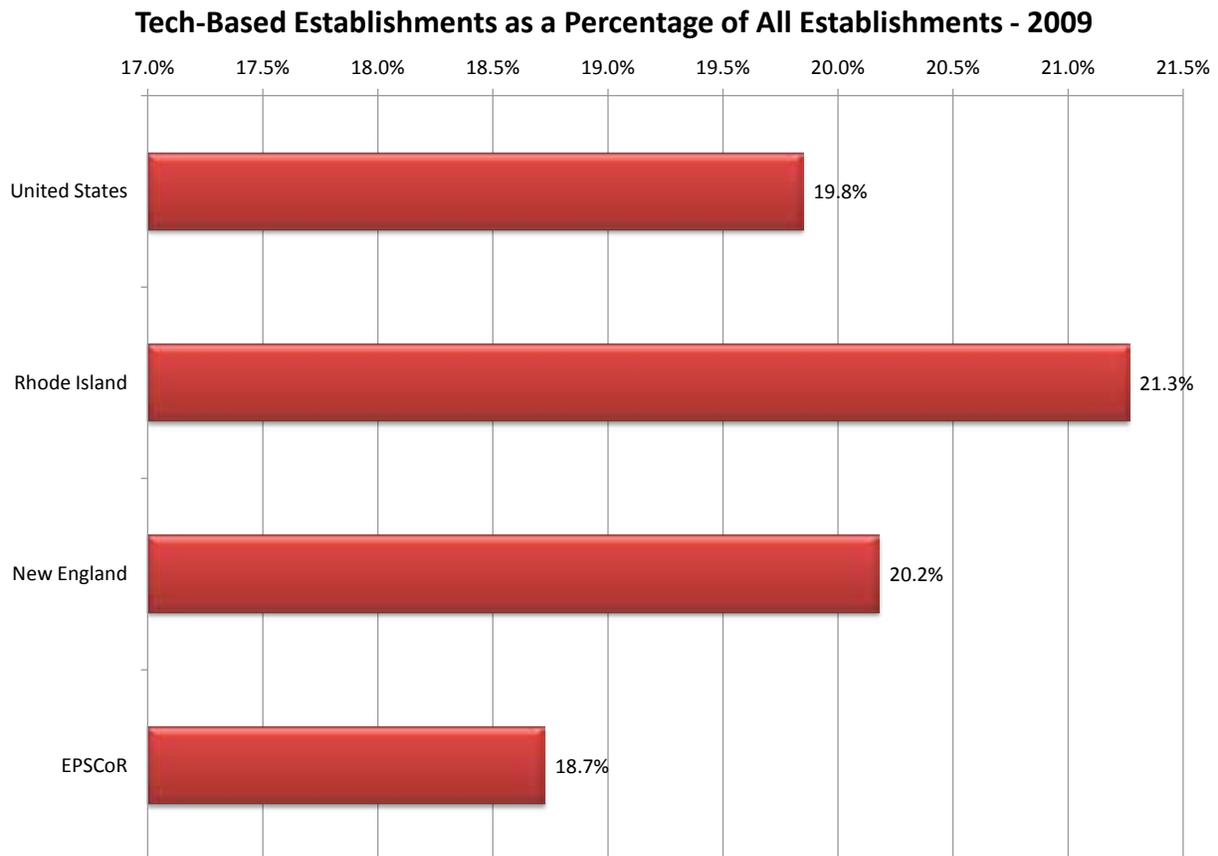
Rhode Island Compared to New England [^](#)

Rhode Island Compared to U.S. [^](#)

SUMMARY

Rhode Island targets six sectors related to science and technology. They are Advanced Manufacturing, Marine Trades & Defense, IT & Digital Media, Health Care & Life Science, Wind Turbine Component Manufacturing, and Design.¹ For these targeted sectors, the total number of science and technology-sector establishments (businesses) within Rhode Island is 35,538. Rhode Island had the most science and technology-based establishments as a percent of all establishments in 2009 (21.3%) when compared to the New England states (20.2%), the United States as a whole (19.8%), and the EPSCoR states (18.7%) (see Figure 1-4).

Figure 1-4.



RHODE ISLAND'S KNOWLEDGE ECONOMY

Targeted Science and Technology Sector Establishments

WHY THIS IS SIGNIFICANT

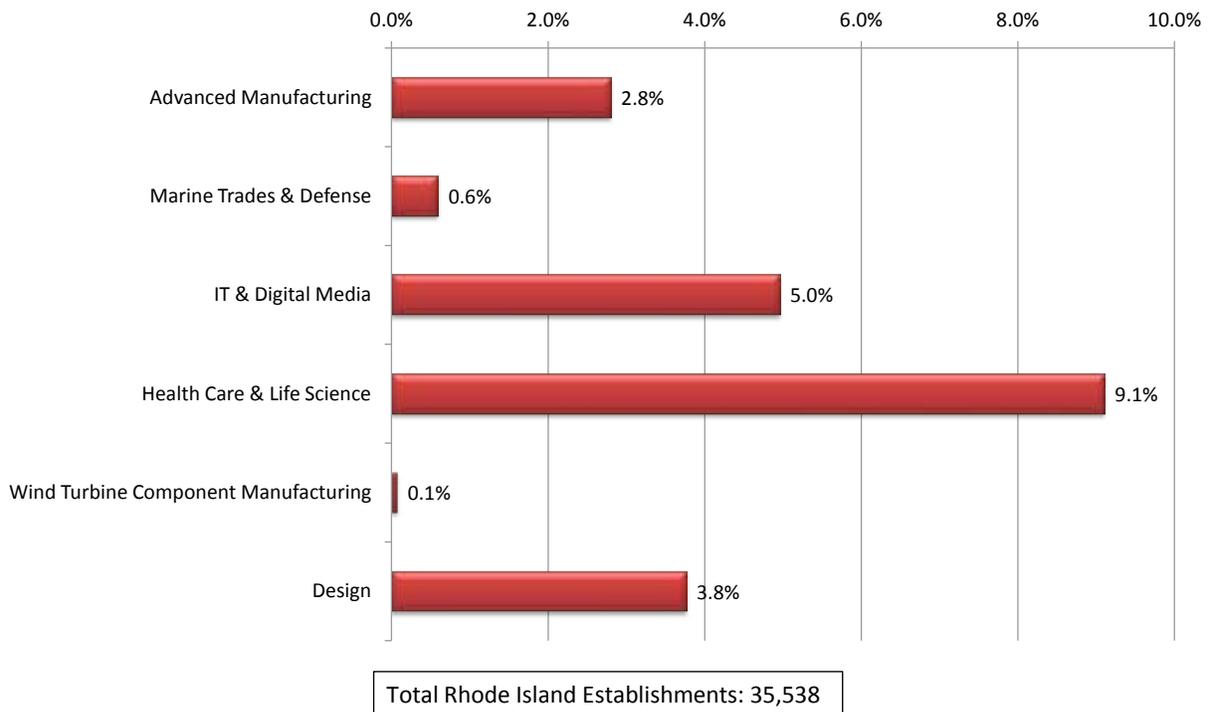
Establishments (businesses) currently located in Rhode Island that are science and technology-based provide employment and therefore income to workers and residents of the state. They are the ones that have the potential to commercialize R&D and create opportunities for the future workforce.

RELATED

Health Care & Life Science represents the largest amount of technology establishments as a percent of all establishments in Rhode Island at 9.1% (see Figure 1-5). IT & Digital Media (5.0%) represents the second highest amount of the technology-based establishments in the State. In 2009, there were a total of 7,557 targeted technology establishments in Rhode Island representing 21.3% of all establishments in the state (see Figure 1-6).

Figure 1-5.

Rhode Island Tech Establishments as Percent of Total Establishments - 2009



RHODE ISLAND'S KNOWLEDGE ECONOMY

Targeted Science and Technology Sector Establishments

Figure 1-6.

Rhode Island Targeted Science and Technology Establishments - 2009

Rhode Island Cluster	Targeted Tech Establishments	% of Total Tech Sector	Targeted Tech as % of Total (All Sectors)
Advanced Manufacturing	993	13.1%	2.8%
Marine Trades & Defense	209	2.8%	0.6%
IT & Digital Media	1,760	4%	5.0%
Health Care & Life Science	3,235	23%	9.1%
Wind Turbine Component Manufacturing	24	4%	0.1%
Design	1,336	8%	3.8%
TOTAL TARGETED TECHNOLOGY SECTOR	7,557	100%	21.3%

SOURCES: Economic Modeling Specialists, EMSI, 3rd Quarter 2010, www.economicmodeling.com.

RHODE ISLAND'S KNOWLEDGE ECONOMY

Targeted Science and Technology Sector Employment

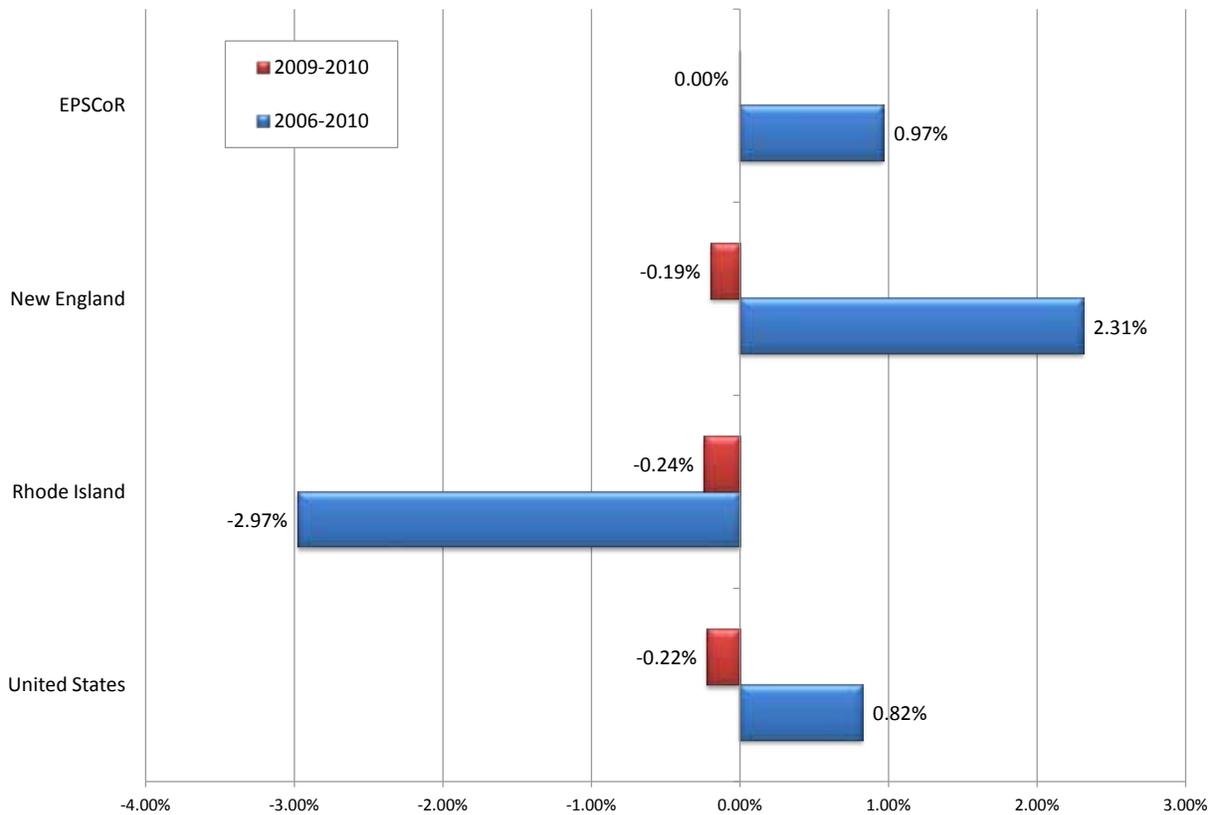
- Rhode Island 1-Year Trend ▼
- Rhode Island 5-Year Trend ▼
- Rhode Island Compared to EPSCoR 1-Year Trend ▼
- Rhode Island Compared to New England 1-Year Trend ▼
- Rhode Island Compared to U.S. 1-Year Trend ▼

SUMMARY

In 2010, Rhode Island employed 150,560 workers in its targeted science and technology sectors.² For the one-year period from 2009 to 2010, all the reference groups saw a decrease,³ but in a five-year period from 2006 to 2010, Rhode Island saw a decrease (-2.97%) while the EPSCoR states (0.97%), New England states (2.31%), and the United States as a whole (0.82%) all saw an increase (see Figure 1-7).

Figure 1-7.

Percent Change in Employment - 2006-2010



RHODE ISLAND'S KNOWLEDGE ECONOMY

Targeted Science and Technology Sector Employment

WHY THIS IS SIGNIFICANT

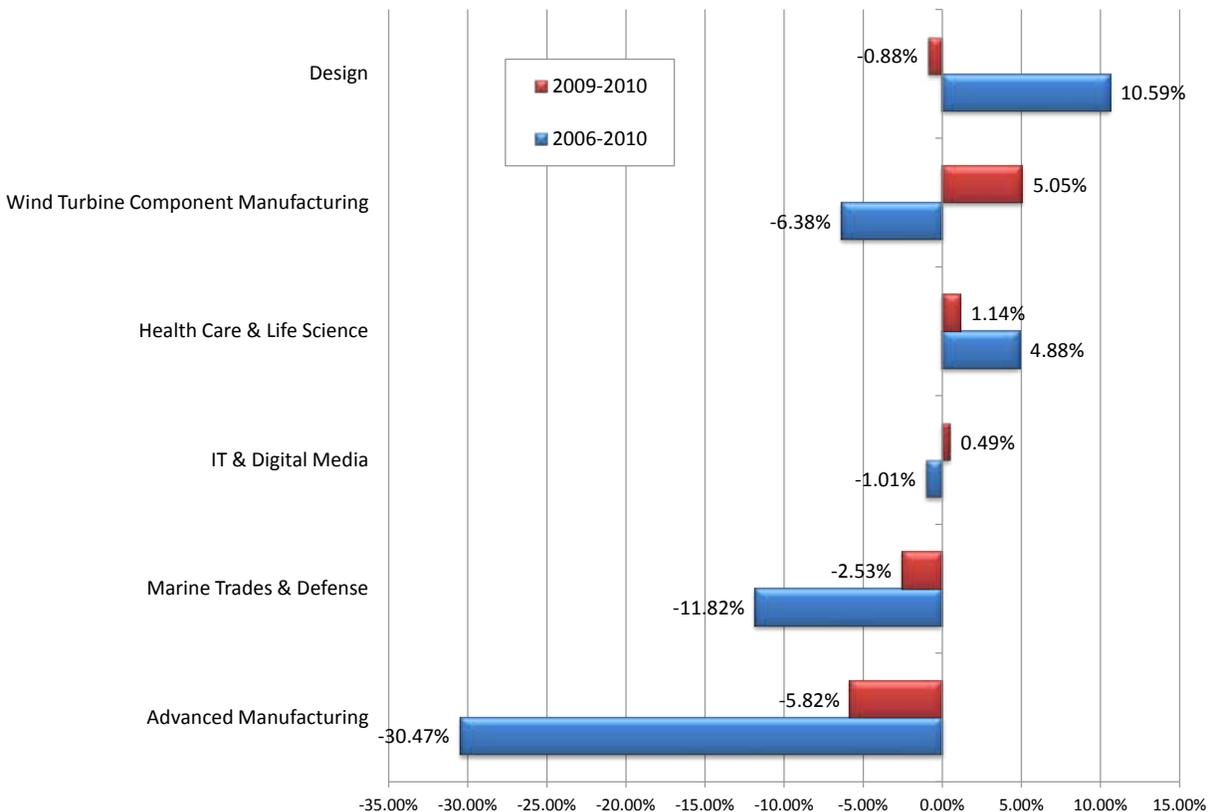
The number of residents currently employed by technology-based establishments within Rhode Island indicates the market strength of the current innovation and knowledge economy. Categorizing the data into science and technology sector sub-categories highlights areas which have particular strength or need for targeting.

RELATED

The largest decrease in employment in the tech sectors in Rhode Island was in the Advanced Manufacturing sector for both the one- and five-year time periods (see Figure 1-8). This was followed by a decrease in Marine Trades & Defense. Design and Health Care & Life Science both saw an increase in the five-year period and Wind Turbine Component Manufacturing saw the greatest increase in a one-year period. Health Care & Life Sciences represents by far the largest targeted science and technology sector in Rhode Island employing 91,096 workers in 2010 and representing 60.5% of all targeted science and technology sector jobs for the state and 15.9% of all jobs statewide (see Figure 1-9). Overall, all of the targeted science and technology sectors combined represented 26.2% of all Rhode Island jobs in 2010 (see Figure 1-10).

Figure 1-8.

Percent Change in Employment by RI Tech Sector - 2006-2010



RHODE ISLAND'S KNOWLEDGE ECONOMY

Targeted Science and Technology Sector Employment

Figure 1-9.

Rhode Island Targeted Technology Employment - 2006-2010

Targeted Technology Sector	2006 Jobs	2009 Jobs	2010 Jobs	% Change 2006-10	% Change 2009-10	2006 % of Total Tech Sector Jobs	2009 % of Total Tech Sector Jobs	2010 % of Total Tech Sector Jobs
Advanced Manufacturing	28,530	21,062	19,837	-30.47%	-5.82%	18.4%	14.0%	13.2%
Marine Trades & Defense	8,598	7,779	7,582	-11.82%	-2.53%	5.5%	5.2%	5.0%
IT & Digital Media	19,674	19,380	19,475	-1.01%	0.49%	12.7%	12.8%	12.9%
Health Care & Life Science	86,859	90,067	91,096	4.88%	1.14%	56.0%	59.7%	60.5%
Wind Turbine Component Manufacturing	956	852	895	-6.38%	5.05%	0.6%	0.6%	0.6%
Design	10,557	11,779	11,675	10.59%	-0.88%	6.8%	7.8%	7.8%
TOTAL TARGETED TECHNOLOGY SECTOR	155,174	150,919	150,560	-2.97%	-0.24%	100.0%	100.0%	100.0%

Figure 1-10.

Total Jobs (All sectors) - 2006-10			Targeted Technology Sector as a % of Total Jobs (All sectors)		
Geographic Area	% Change 2006-10	% Change 2009-10	2006	2009	2010
United States	-1.38%	-0.61%	21.2%	21.6%	21.7%
Rhode Island	-4.79%	-1.50%	25.7%	25.9%	26.2%
New England	-0.68%	-0.42%	25.3%	26.0%	26.1%
EPSCoR	-0.53%	-0.51%	19.2%	19.4%	19.5%

SOURCES: Economic Modeling Specialists, EMSI, 3rd Quarter 2010, www.economicmodeling.com.

RHODE ISLAND'S KNOWLEDGE ECONOMY

Targeted Science and Technology Sector Wages

Rhode Island Compared to EPSCoR ✓

Rhode Island Compared to New England ✓

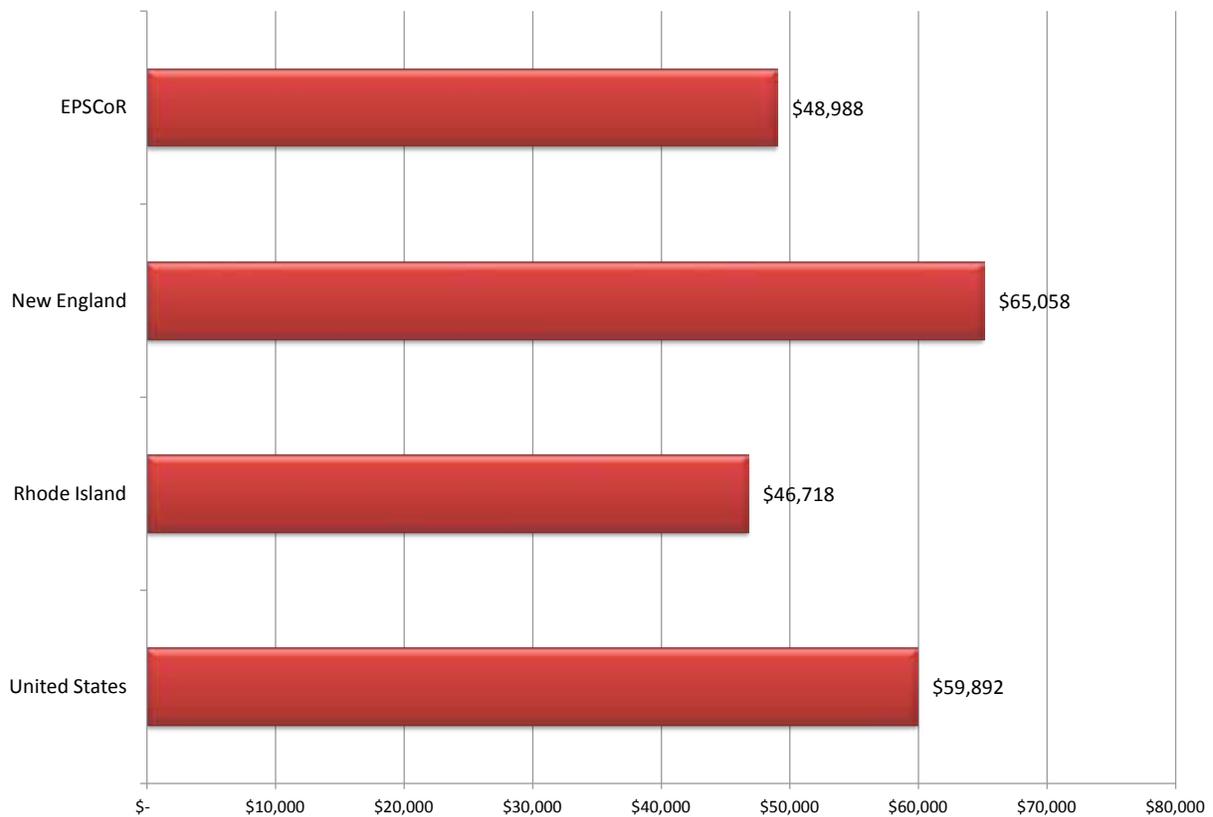
Rhode Island Compared to U.S. ✓

SUMMARY

The average wage⁴ in Rhode Island for its targeted science and technology sectors was \$46,718 in 2010. This is slightly behind the EPSCoR states' average wage of \$48,988 and behind both the U.S. average (\$59,892) and that of the New England states (\$65,058) (see Figure 1-11).

Figure 1-11.

Average Wage for Technology Sectors - 2010



WHY THIS IS SIGNIFICANT

Wages provide the means for workers to support themselves, their households and their families. Wages are strongly related to total income and quality of life by providing workers with the opportunity to make choices. Wages in technology-based sectors are typically higher than wages in other sectors.

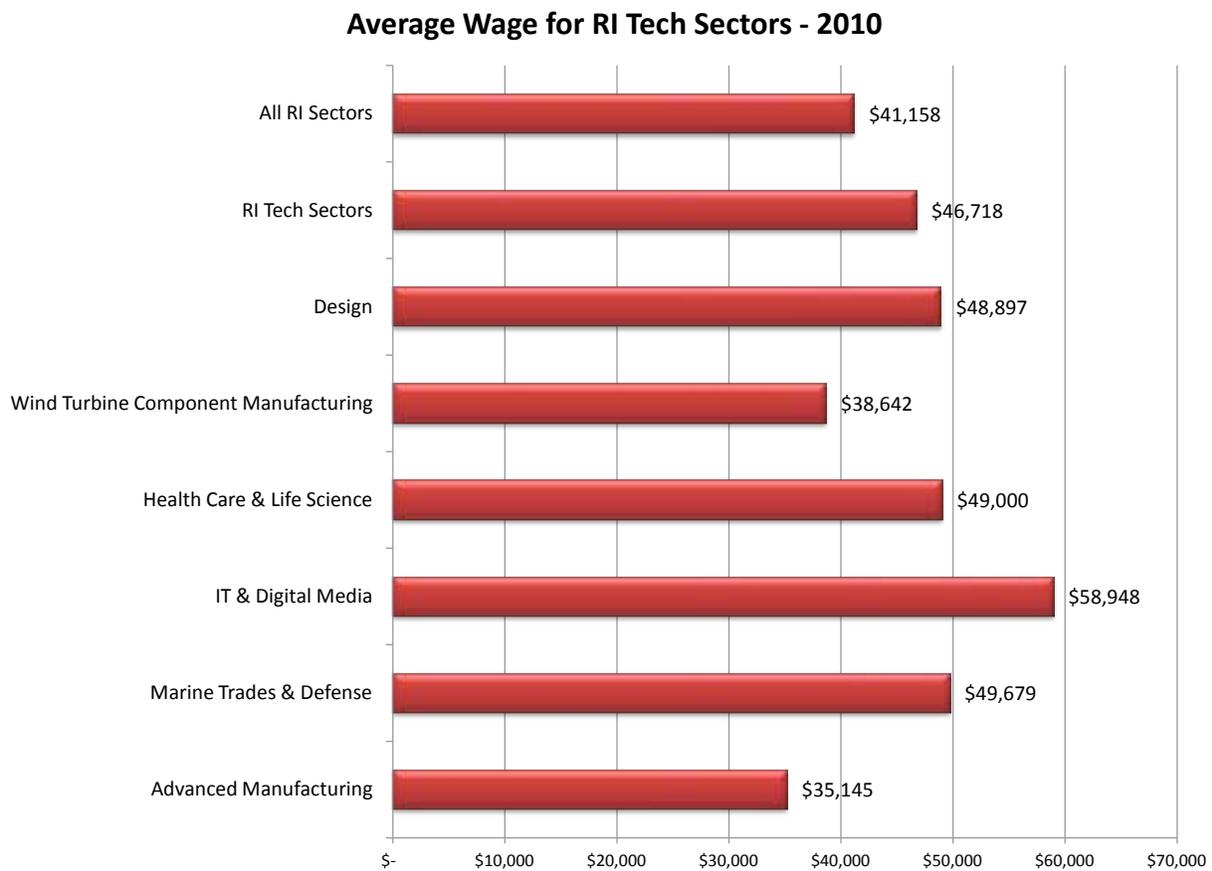
RHODE ISLAND'S KNOWLEDGE ECONOMY

Targeted Science and Technology Sector Wages

RELATED

In 2010, the average wage for the Rhode Island targeted science and technology sectors, at \$46,718, was higher than the average wage for all Rhode Island sectors (\$41,158). Among the targeted science and technology sectors in 2010, the highest average wage was in the Information Technology & Digital Media sector followed by the Marine Trades & Defense sector. The lowest average wage of the targeted science and technology sectors was in Advanced Manufacturing (see Figure 1-12).

Figure 1-12.



SOURCES: Economic Modeling Specialists, EMSI, 3rd Quarter 2010, www.economicmodeling.com.

RHODE ISLAND'S KNOWLEDGE ECONOMY

High Speed Internet Access

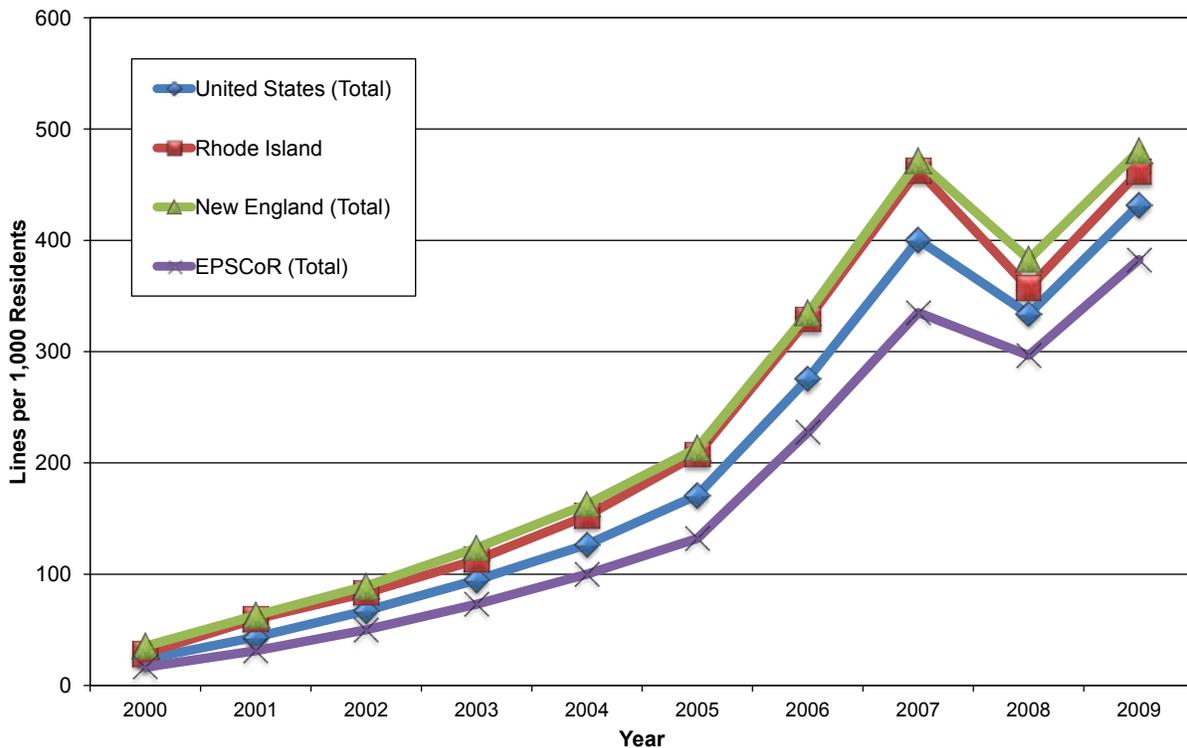
- Rhode Island 1-Year Trend ▲
- Rhode Island 5-Year Trend ▲
- Rhode Island Compared to EPSCoR ▲
- Rhode Island Compared to New England ▼
- Rhode Island Compared to U.S. ▲
- Rhode Island's Most Recent National Ranking **16**

SUMMARY

Rhode Island has experienced significant increases in broadband⁵ Internet subscribers,⁶ growing from 30,038 in 2000 to 488,000 in 2009 or an increase of over 1,500 percent. This pattern is similar for the reference states. In 2009, Rhode Island had 461 subscribers per 1,000 residents, less than the New England states as a whole (481), but more than both the U.S. as a whole (432) and the EPSCoR states (383) (see Figure 1-13). Rhode Island's ranking dropped slightly from 14th in 2008 to 16th in 2009.

Figure 1-13.

**High Speed Internet Lines (Subscribers) per 1,000 Residents
2000-2009**



Note: Reporting instructions for mobile wireless changed in 2008

RHODE ISLAND'S KNOWLEDGE ECONOMY

High Speed Internet Access

WHY THIS IS SIGNIFICANT

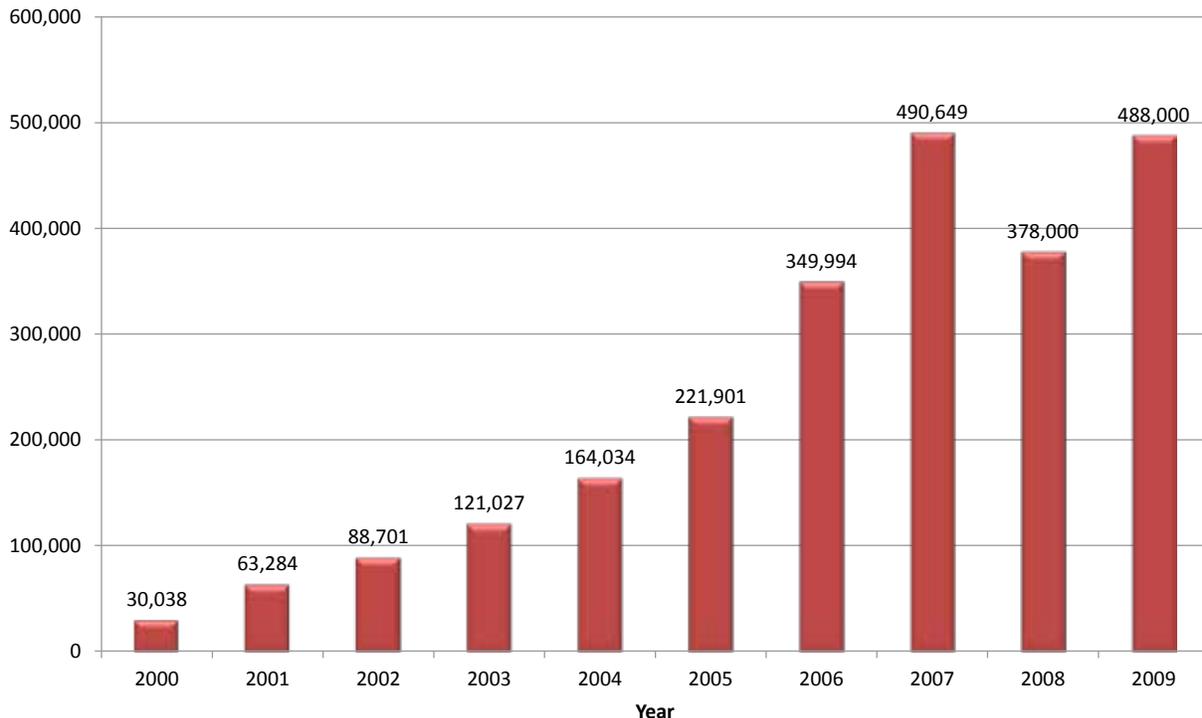
The degree to which broadband technology is available and used in Rhode Island determines, to a significant extent, the degree to which Rhode Island is technologically competitive. For instance, companies that rely on e-commerce for sales transactions require broadband technology. Likewise, entities engaged in research and development require high capacity communications technology. Moreover, the rise of Internet video and other technologies, including both consumer uses and business tools, places more demand on Internet traffic. Using these new tools and technologies is almost impossible without broadband access.

RELATED

In 2009, Rhode Island had 488,000 high speed Internet lines. Following eight years of growth, the number of high speed Internet lines has leveled-off since 2007 (see Figure 1-14).

Figure 1-14.

**High Speed Internet Lines (Subscribers) in Rhode Island
2000-2009**



Note: Reporting instructions for mobile wireless changed in 2008

SOURCES: Internet line data is from “High-Speed Services for Internet Access: Status as of December 31, 2009”, Released December, 2010, Federal Communications Commission, <http://www.fcc.gov/wcb/iatd/comp.html>.

RHODE ISLAND'S KNOWLEDGE ECONOMY

Net Migration of Persons 22-39 Years of Age

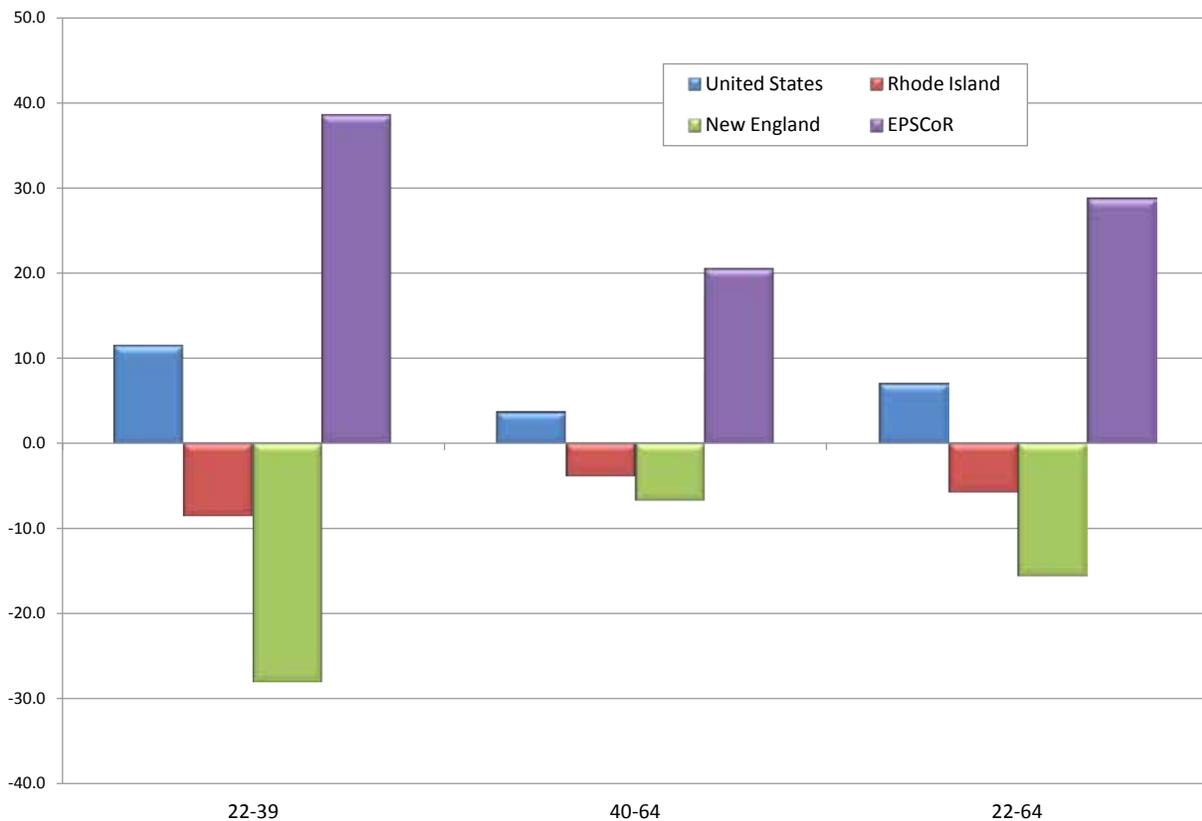
- Rhode Island Compared to EPSCoR ▼
- Rhode Island Compared to New England ▲
- Rhode Island Compared to U.S. ▼
- Rhode Island's Most Recent National Ranking **45**

SUMMARY

Between 2005-2007, the net migration rate⁷ in Rhode Island was -8.5 per thousand for persons aged 22 to 39, meaning more persons in this age-group moved out of Rhode Island than moved in (see Figure 1-15). All the reference geographies except New England experienced positive net migration rates; more people moving in than out during this period. Rhode Island ranks 45th nationally on this indicator.

Figure 1-15.

Migration Rate by Age



WHY THIS IS SIGNIFICANT

Economic growth requires attracting and retaining workers. Persons aged 22-39 represent individuals entering their prime workforce years. Regions that offer good jobs, quality of life, and reasonable costs can attract and retain workers in this age group.

RHODE ISLAND'S KNOWLEDGE ECONOMY

Net Migration of Persons 22-39 Years of Age

RELATED

Rhode Island also experienced out-migration of persons aged 40-64 between 2005 and 2007 with a net-migration rate of -3.9. The New England states combined experienced net out-migration as well, but at a lesser rate than Rhode Island. The U.S. and the EPSCoR states as a whole experienced net in-migration.

SOURCES: U.S. Census Bureau, 2005-07 American Community Survey (ACS) Three-Year Public Use Microdata Sample (PUMS) File. ACS PUMS Files are based on a sub-sample of the complete ACS sample and are representative of about 1% of the Nations households. For a complete explanation of the American Community Survey, visit <http://www.census.gov/acs/www/index.htm>.

RHODE ISLAND'S KNOWLEDGE ECONOMY

State Funding for Science & Technology

Rhode Island 1-Year Trend =

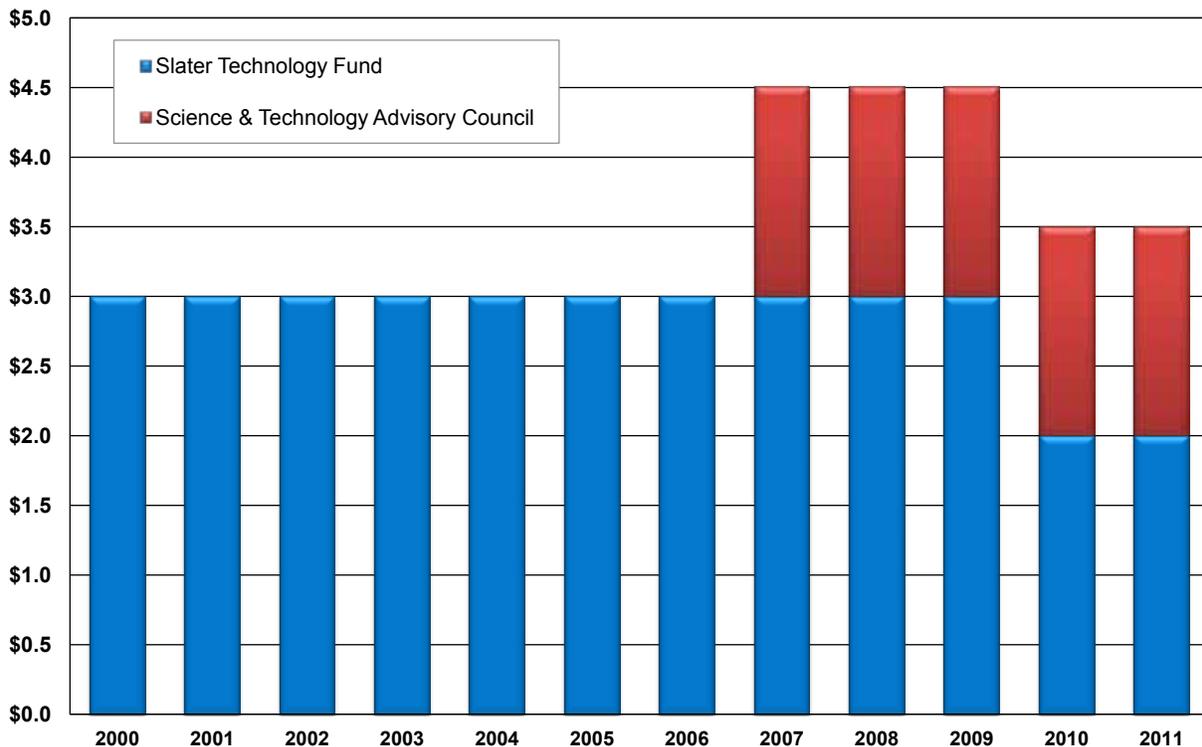
Rhode Island 5-Year Trend ▼

SUMMARY

Since 1997, the Slater Technology Fund has been financed by the Rhode Island General Assembly to provide financing to technology ventures in the state. From 2000 to 2009, there was an annual investment of \$3.0 million that decreased to \$2.0 million for 2010 and 2011 (see Figure 1-16). Starting in 2007, there has also been a state investment for the Science and Technology Advisory Council of \$1.5 million a year. From 2000 to 2011, there has been a total state investment of \$41.5 million for science and technology.

Figure 1-16.

**State Funding for Science & Technology - FY 2000 - FY 2011
Rhode Island (millions of \$)**



WHY THIS IS SIGNIFICANT

State support for building innovation and supporting entrepreneurs is essential for success. The Slater Technology Fund provides seed-stage capital to companies that are committed to building their

RHODE ISLAND'S KNOWLEDGE ECONOMY

State Funding for Science & Technology

technology-based businesses in Rhode Island and the Rhode Island Science and Technology Advisory Council (STAC) works to strengthen the statewide collaborative research and development platform. STAC is the official oversight body for the EPSCoR program for the State of Rhode Island.

SOURCES: Provided by Rhode Island Science & Technology Advisory Council, <http://stac.ri.gov/> and <http://www.slaterfund.com>.

RHODE ISLAND'S KNOWLEDGE ECONOMY

State Appropriations for Higher Education

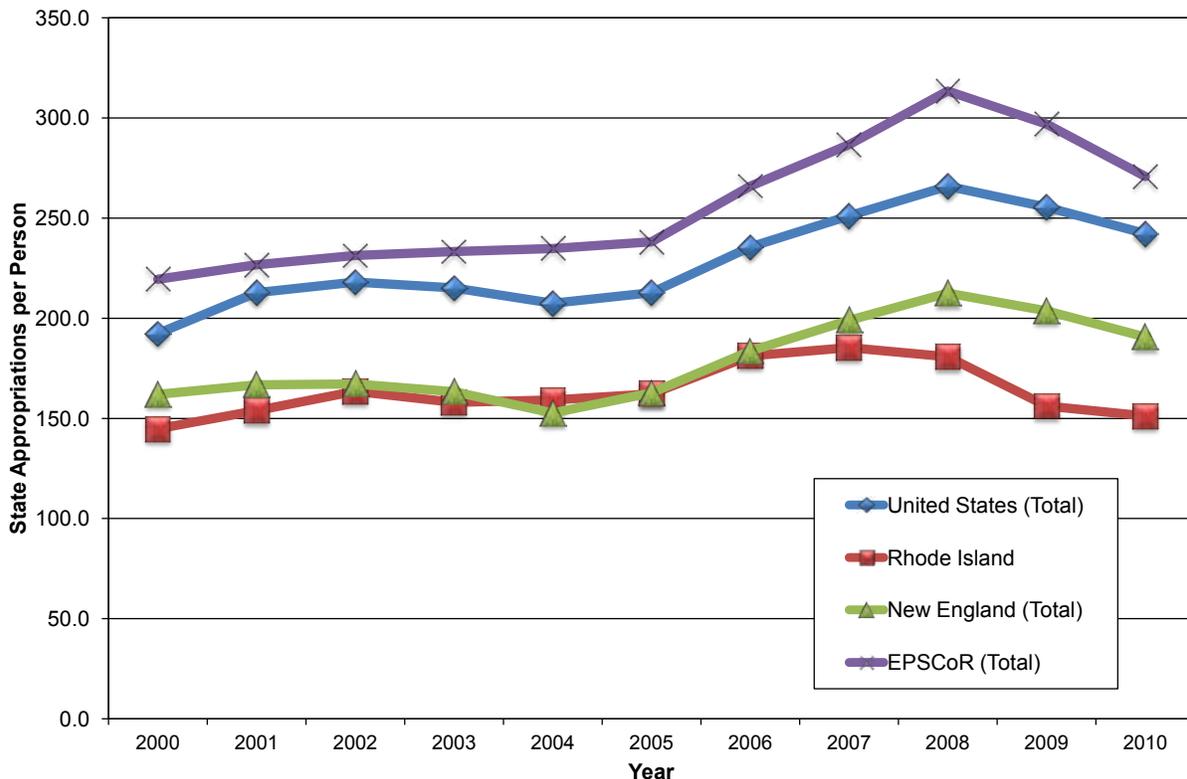
- Rhode Island 1-Year Trend ▼
- Rhode Island 5-Year Trend ▼
- Rhode Island Compared to EPSCoR ▼
- Rhode Island Compared to New England ▼
- Rhode Island Compared to U.S. ▼
- Rhode Island's Most Recent National Ranking **46**

SUMMARY

On a per total population basis, Rhode Island appropriates less state funds for higher education than the reference geographies. From 2000 to 2006, Rhode Island remained fairly consistent with the New England states as a whole but since 2006 has dropped below all reference geographies. In 2010, Rhode Island appropriated \$151 in state funds for higher education per capita. This compares to \$191 for the New England states, \$242 for the U.S. as a whole, and \$271 for the EPSCoR states (see Figure 1-17). In 2010, Rhode Island ranked 46th nationally on this indicator.

Figure 1-17.

**State Appropriations for Higher Education per Person
2000-10**



RHODE ISLAND'S KNOWLEDGE ECONOMY

State Appropriations for Higher Education

WHY THIS IS SIGNIFICANT

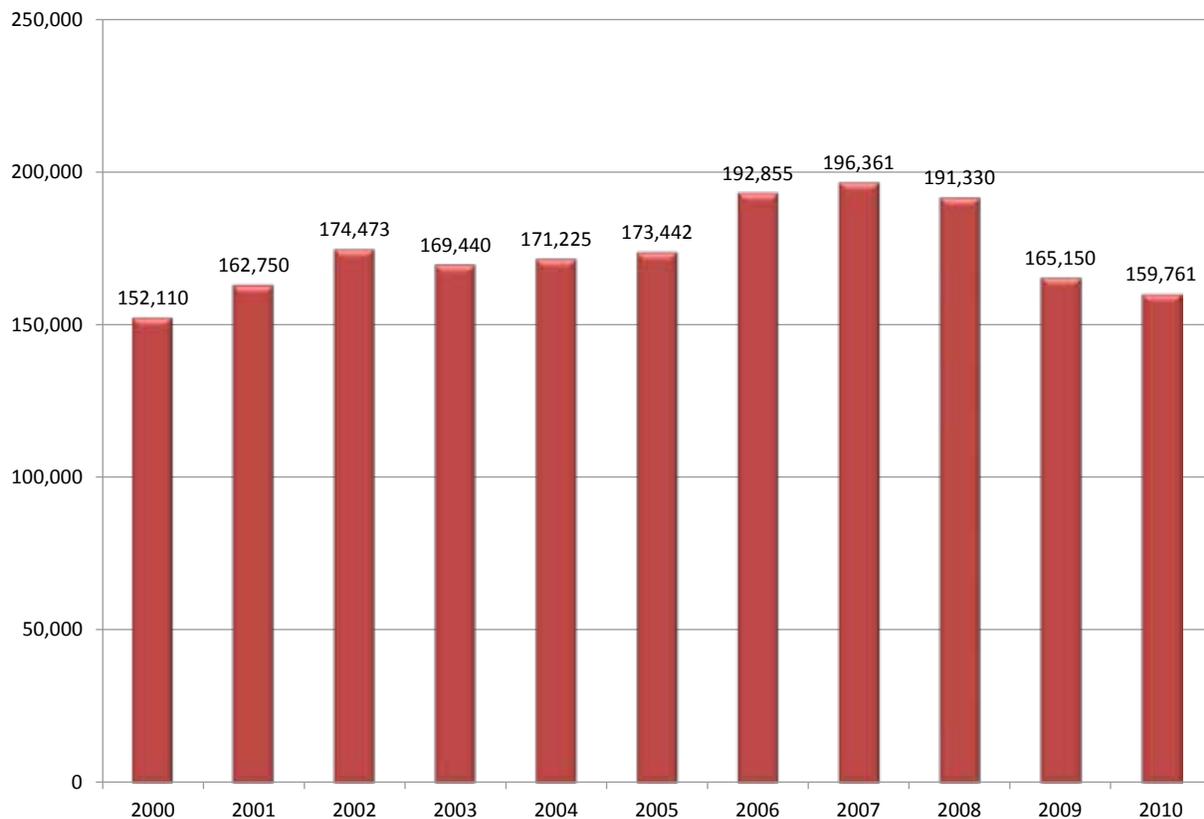
Rhode Island's investment in science and technology-based economic development is also driven by its appropriations for higher education. This indicator also relates to the importance placed on the preparedness of the Rhode Island workforce for higher-paying jobs requiring post-secondary degrees.

RELATED

In 2010, the State of Rhode Island appropriated \$160 million in funds for higher education. This represents a decrease of 3.3% from 2009 and a decrease of 17.2% since 2006 (see Figure 1-18).

Figure 1-18.

State Appropriations for Higher Education in Rhode Island 2000-10



SOURCES: State Appropriations from the Center for the Study of Education Policy, "An Annual Compilation of Data on State Fiscal Support for Higher Education, 1990-2011"; <http://www.grapevine.ilstu.edu/index.shtml>.

Annual Estimates of the Population for the United States and States, and for Puerto Rico: April 1, 2000 to July 1, 2010 (NST-EST2010-alldata), Population Division, U.S. Census Bureau, Release Date: February, 2011; <http://www.census.gov/popest/estimates.php>.

RHODE ISLAND'S KNOWLEDGE ECONOMY

Endnotes

¹ The targeted technology sectors are as follows:

TARGETED TECHNOLOGY SECTORS IN RHODE ISLAND

ADVANCED MANUFACTURING	
NAICS Code	Description
313	Textile Mills
315	Apparel Manufacturing
324110	Petroleum Refineries
3251	Basic Chemical Manufacturing
3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing
3255	Paint, Coating, and Adhesive Manufacturing
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing
3259	Other Chemical Product and Preparation Manufacturing
326	Plastics and Rubber Products Manufacturing
3271	Clay Product and Refractory Manufacturing
3272	Glass and Glass Product Manufacturing
3321	Forging and Stamping
3322	Cutlery and Handtool Manufacturing
3323	Architectural and Structural Metals Manufacturing
3324	Boiler, Tank, and Shipping Container Manufacturing
3325	Hardware Manufacturing
3326	Spring and Wire Product Manufacturing
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing
3328	Coating, Engraving, Heat Treating, and Allied Activities
33291	Metal Valve Manufacturing
332992	Small Arms Ammunition Manufacturing
332993	Ammunition (except Small Arms) Manufacturing
332994	Small Arms Manufacturing
332995	Other Ordnance and Accessories Manufacturing
332996	Fabricated Pipe and Pipe Fitting Manufacturing
332997	Industrial Pattern Manufacturing
332998	Enameled Iron and Metal Sanitary Ware Manufacturing
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing
3331	Agriculture, Construction, and Mining Machinery Manufacturing
3332	Industrial Machinery Manufacturing
3333	Commercial and Service Industry Machinery Manufacturing
333411	Air Purification Equipment Manufacturing
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing

RHODE ISLAND'S KNOWLEDGE ECONOMY

333415	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing
3335	Metalworking Machinery Manufacturing
333618	Other Engine Equipment Manufacturing
3339	Other General Purpose Machinery Manufacturing
3346	Manufacturing and Reproducing Magnetic and Optical Media
3351	Electric Lighting Equipment Manufacturing
3352	Household Appliance Manufacturing
3361	Motor Vehicle Manufacturing
3365	Railroad Rolling Stock Manufacturing
3399	Other Miscellaneous Manufacturing

MARINE TRADES & DEFENSE

NAICS Code	Description
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing
335311	Power, Distribution, and Specialty Transformer Manufacturing
335313	Switchgear and Switchboard Apparatus Manufacturing
335314	Relay and Industrial Control Manufacturing
33591	Battery Manufacturing
33592	Communication and Energy Wire and Cable Manufacturing
33593	Wiring Device Manufacturing
335991	Carbon and Graphite Product Manufacturing
3362	Motor Vehicle Body and Trailer Manufacturing
3363	Motor Vehicle Parts Manufacturing
3364	Aerospace Product and Parts Manufacturing
3366	Ship and Boat Building
3369	Other Transportation Equipment Manufacturing
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers

IT & DIGITAL MEDIA

NAICS Code	Description
3341	Computer and Peripheral Equipment Manufacturing
3342	Communications Equipment Manufacturing
3343	Audio and Video Equipment Manufacturing
3344	Semiconductor and Other Electronic Component Manufacturing
511	Publishing Industries (except Internet)
515	Broadcasting (except Internet)
517	Telecommunications
518	Data Processing, Hosting and Related Services
51913	Internet Publishing and Broadcasting and Web Search Portals
5415	Computer Systems Design and Related Services
5418	Advertising, Public Relations, and Related Services

RHODE ISLAND'S KNOWLEDGE ECONOMY

HEALTH CARE & LIFE SCIENCE	
NAICS Code	Description
3254	Pharmaceutical and Medicine Manufacturing
3391	Medical Equipment and Supplies Manufacturing
54171	Research and Development in the Physical, Engineering, and Life Sciences
621	Ambulatory Health Care Services
622	Hospitals
623	Nursing and Residential Care Facilities
624	Social Assistance

WIND TURBINE COMPONENT MANUFACTURING	
NAICS Code	Description
331511	Iron Foundries
332312	Fabricated Structural Metal Manufacturing
332991	Ball and Roller Bearing Manufacturing
333412	Industrial and Commercial Fan and Blower Manufacturing
333611	Turbine and Turbine Generator Set Units Manufacturing
333612	Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing
333613	Mechanical Power Transmission Equipment Manufacturing
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing
335312	Motor and Generator Manufacturing
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing

DESIGN	
NAICS Code	Description
5413	Architectural, Engineering, and Related Services
5414	Specialized Design Services
5416	Management, Scientific, and Technical Consulting Services

² EPSCoR percent change was small enough that it rounds to zero but represents a decrease of several hundred employees.

³ Includes wages, salaries, & proprietor earnings.

⁴ See endnote 1 for a description of targeted technology sectors in Rhode Island.

⁵ Broadband is defined as high-speed data lines that provide the subscriber with data transmissions at speeds in excess of 200 kilobits per second (kbps) in at least one direction.

⁶ Subscriber is equivalent to a line in service. An active line may have one or more users.

⁷ The net migration rate equals the number of persons moving into a geography minus the number of persons moving out with the result divided by the total population in that age-group. A negative rate means the geography experienced out-migration (more people leaving than coming) and a positive number means the geography experienced in-migration (more people coming than leaving).

THE KNOWLEDGE BUSINESS PIPELINE

OVERVIEW

The indicators in this section reflect the ability of Rhode Island to transfer knowledge into innovation and business activity. This activity forms the basis for the competitiveness of Rhode Island's economy.

The issuance of patents provides insight into the degree to which a state can commercialize research and development, and profit from expenditures in research and development. Rhode Island is ranked 17th nationally on the number of patents issued per 1,000 residents in 2009, and has experienced a decline in the issuance of patents compared to the total from five years ago. Over the past ten years, the state has outperformed the EPSCoR states as a whole and performed on par with the U.S. as a whole on this indicator.

A desired economic outcome of academic research is the transfer of new knowledge into products of commercial value and the formation of new ventures and jobs. Patenting by academic institutions is one indication of this potential. Rhode Island performed slightly higher than the EPSCoR states combined but lags both New England and the U.S. In 2008, Rhode Island ranked 23rd among all states on this indicator. On related indicators of licensees and start-ups generated by universities and colleges, Rhode Island also lags behind.

Entrepreneurial activity in Rhode Island measured by individuals starting businesses ranked 33rd in 2010 and lags the reference geographies. Venture capital is an important source of funding for technology-based start-ups and companies with high growth potential. Rhode Island ranks 10th among the states on this indicator and over the last five years, the state has experienced an increase in the amount of venture capital invested.

The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are important sources of early stage capital for technology-based entrepreneurs. Rhode Island ranks 21st on this indicator.

INDICATORS

Patents Issued per 1,000 Residents

Patents (Utility Only) Issued to Universities & Colleges

Entrepreneurial Climate

Venture Capital Investments

Total SBIR/STTR Investments



THE KNOWLEDGE BUSINESS PIPELINE

Patents Issued Per 1,000 Residents

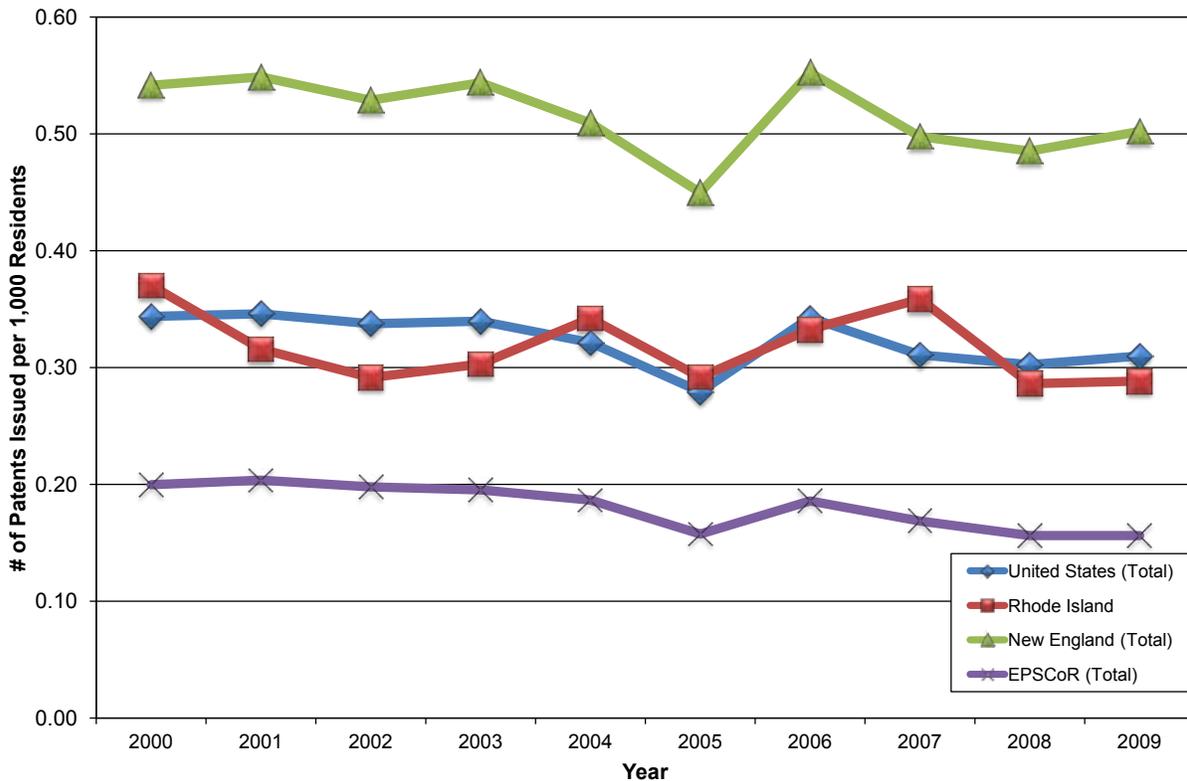
- Rhode Island 1-Year Trend ▲
- Rhode Island 5-Year Trend ▼
- Rhode Island Compared to EPSCoR ▲
- Rhode Island Compared to New England ▼
- Rhode Island Compared to U.S. ▼
- Rhode Island's Most Recent National Ranking 17

SUMMARY

Rhode Island's pattern is mixed with regard to the number of patents issued per 1,000 residents¹ (see Figure 2-1). In 2009, Rhode Island was ranked 17th nationally on this indicator, which is down from 15th in 2005. In 2009, on this indicator Rhode Island (0.288) was slightly below the level of the U.S. as a whole, and above the EPSCoR states (0.156). Of the reference geographies, New England had the highest number of patents issued per 1,000 with .502.

Figure 2-1.

**Patents Issued (all types) per 1,000 Residents
2000-09**



THE KNOWLEDGE BUSINESS PIPELINE

Patents Issued Per 1,000 Residents

WHY THIS IS SIGNIFICANT

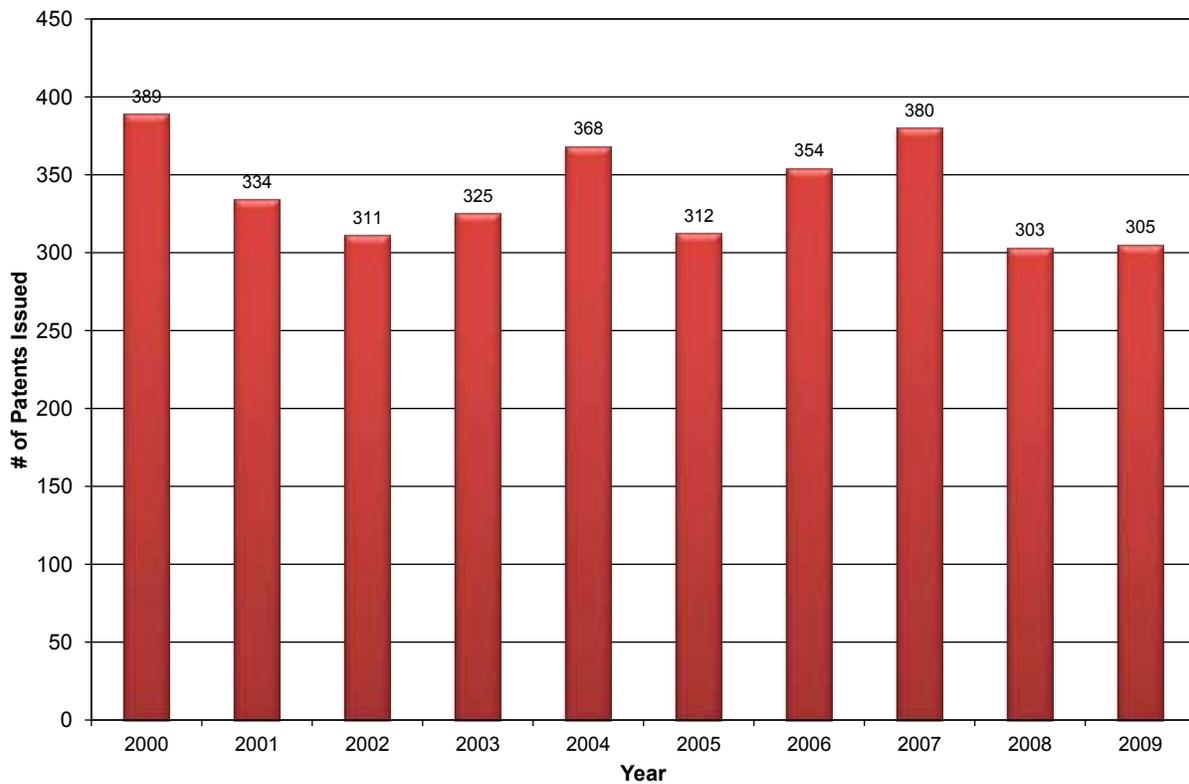
Patents are a measure of knowledge creation and the commercial potential of that knowledge and related research. The issuance of patents suggests that dollars expended on R&D are allowing companies and research institutions to reach commercialization.

RELATED

The number of patents in Rhode Island was at its highest in 2000, and has experienced ups and downs in the intervening years, with almost no change from 2008 to 2009. The State's 2008 level of 303 patents represents the lowest patent output in the last nine years (see Figure 2-2).

Figure 2-2.

**Patents Issued (all types) in Rhode Island
2000-09**



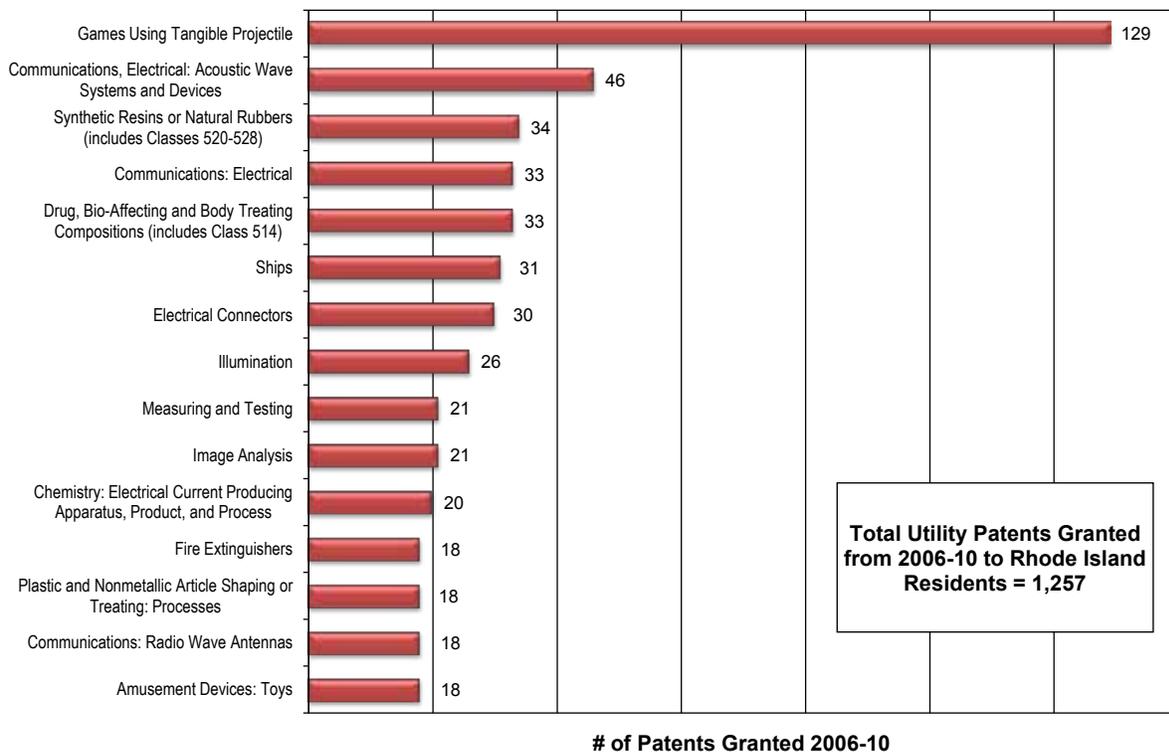
THE KNOWLEDGE BUSINESS PIPELINE

Patents Issued Per 1,000 Residents

Utility patents provide a means to analyze patents issued by technology class, and show which specific technology areas are particularly strong in the state. In the past five years, the classes related to game manufacturing, communications, materials, and drugs exhibited the largest patent activity (see Figure 2-3).

Figure 2.3

**Utility Patents Issued by Technology Class in Rhode Island 2006-10
– Top 15 Classes**



SOURCES: Total Patents - Patent Counts by Country/State and Year, All Patents, All Types, January 1, 1977-December 31, 2009; by Calendar Year; US Patent and Trademark Office; <http://www.uspto.gov/>.

Population - Table 1: Annual Estimates of the Population for the United States and States, and for Puerto Rico: April 1, 2000 to July 1, 2010 (NST-EST2010-alldata), Population Division, U.S. Census Bureau, Release Date: February, 2011; <http://www.census.gov/popest/estimates.php>.

Utility Patents by Class - "Patenting by Geographic Region (State and Country), Breakout by Technology Class, 2005-2009 Utility Patent Grants by Calendar Year of Grant," US Patent and Trademark Office; www.uspto.gov.

THE KNOWLEDGE BUSINESS PIPELINE

Patents (Utility Only) Issued to Universities and Colleges

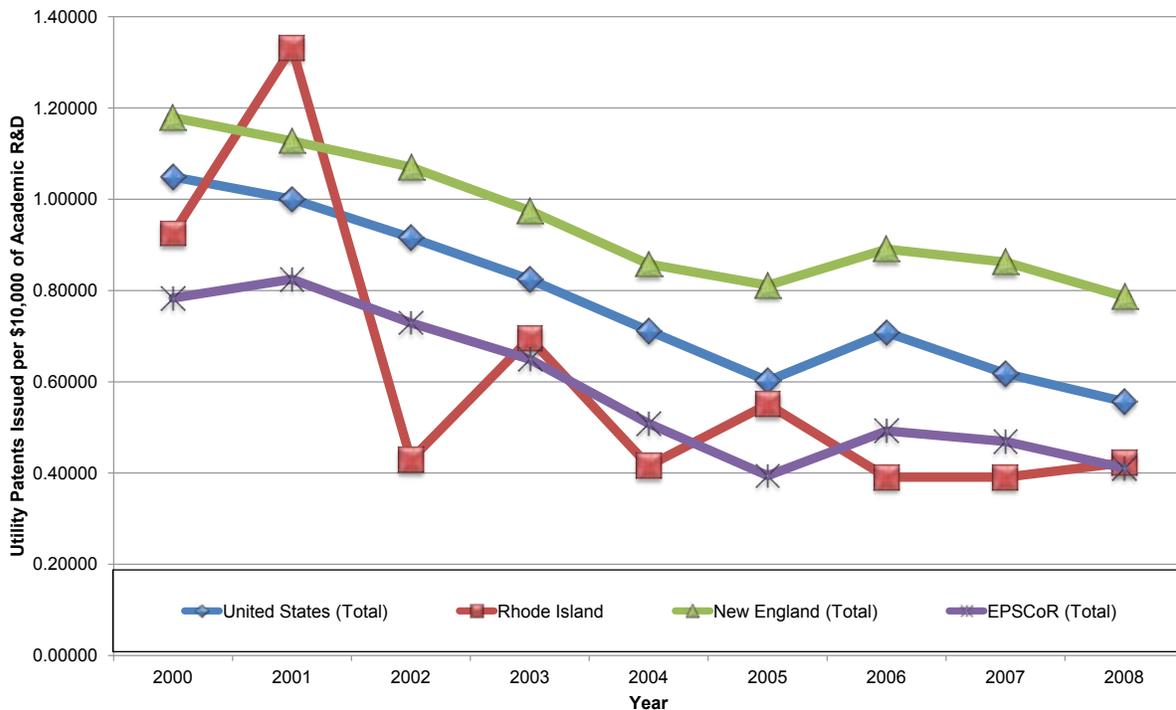
- Rhode Island 1-Year Trend ▲
- Rhode Island 5-Year Trend ▲
- Rhode Island Compared to EPSCoR ▲
- Rhode Island Compared to New England ▼
- Rhode Island Compared to U.S. ▼
- Rhode Island's Most Recent National Ranking **23**

SUMMARY

In 2008, Rhode Island had 10 utility patents issued to universities and colleges in the state. On a per \$10,000 of academic R&D dollars basis in 2008, Rhode Island (0.42261) performed slightly higher than the EPSCoR states combined (0.41084) but lagged both the New England total (0.78682) and the U.S. (0.55655) (see Figure 2-4).² In 2008, Rhode Island ranked 23rd among all states on this indicator.

Figure 2-4.

Utility Patents Issued to Colleges & Universities Per \$10,000 of Academic R&D 2000-08



WHY THIS IS SIGNIFICANT

The capacity of universities to patent and commercialize research is one mark of the research strength of the institution and its ability to impact local economic growth.

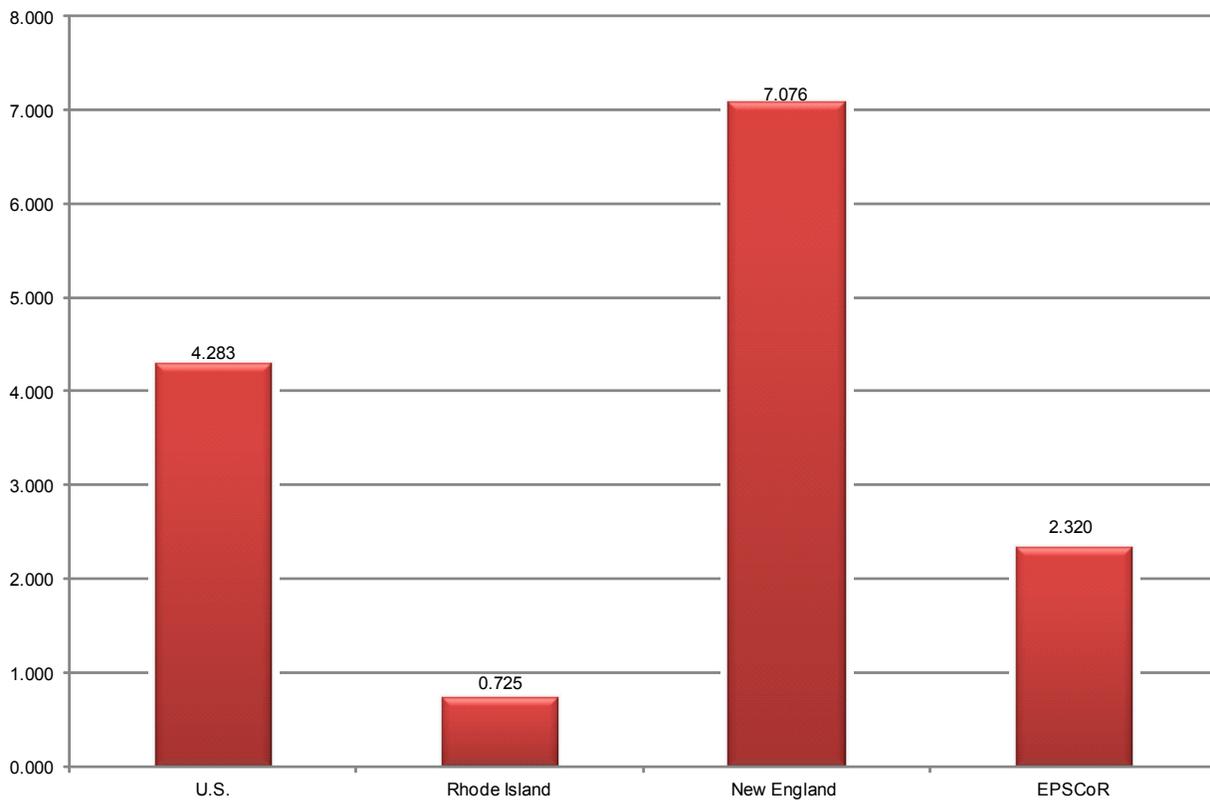
THE KNOWLEDGE BUSINESS PIPELINE

Patents (Utility Only) Issued to Universities and Colleges

RELATED

Licenses are a means of transferring academic R&D into private sector commercialization. Between 2005 and 2009, licenses per \$10,000 of academic R&D performed in Rhode Island (0.725) lagged that of all the reference groups (see Figure 2-5). During this period, Rhode Island universities and colleges completed a total of sixteen licenses.

Figure 2-5.
**Licenses Completed by Universities per \$10,000 of Academic R&D
2005-09**

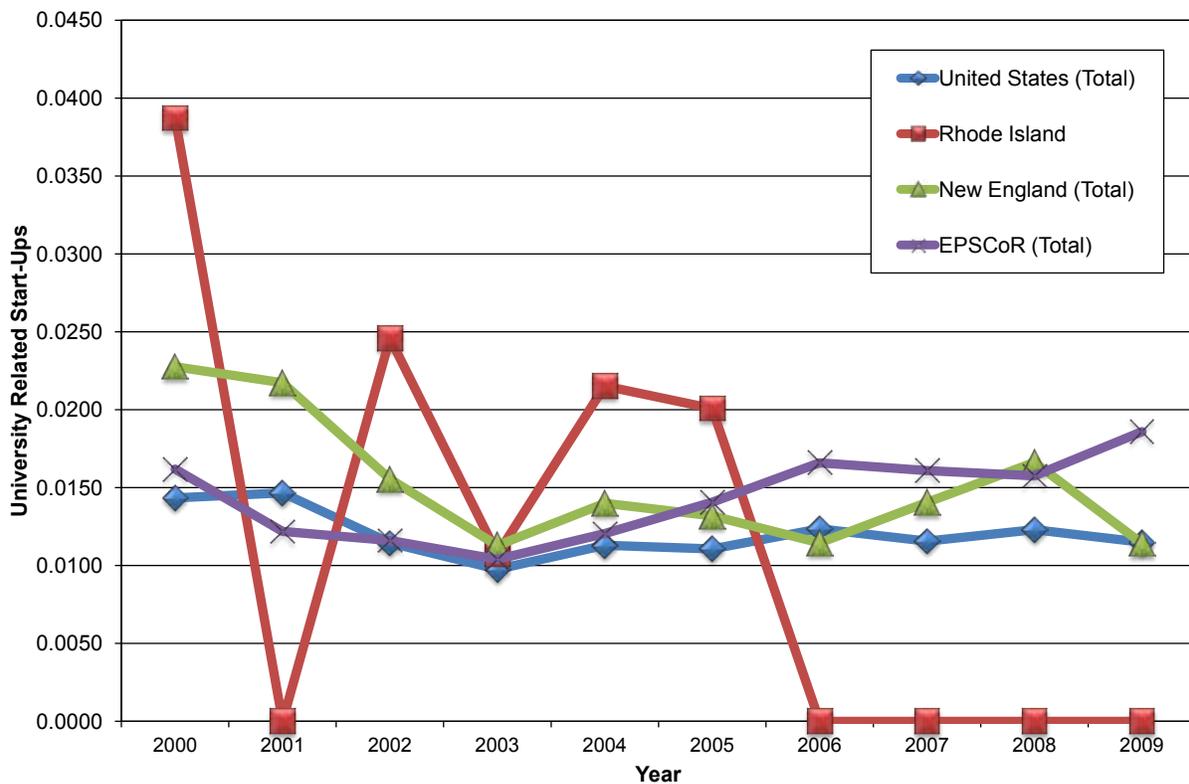


THE KNOWLEDGE BUSINESS PIPELINE

New business start-ups emerging from academic R&D is another way in which colleges and universities impact economic growth. In four of the five years between 2000 and 2005, Rhode Island exceeded the reference geographies in university related start-ups per \$1 million of university research. However from 2006 to 2009, Rhode Island universities and colleges reported no start-ups and therefore lagged the reference geographies (see Figure 2-6).

Figure 2-6.

**University Related Start-Ups Per \$1 million of University Research
2000-09**



SOURCES: U.S. Colleges and Universities Patents from “Utility Patent Grants, 1969-Present, Patents Distributed by Calendar Year of Grant”; US Patent and Trademark Office; <http://www.uspto.gov/>

Academic R&D Performed - National Science Foundation/Division of Science Resources Statistics; Survey of R&D Expenditures at Universities and Colleges 2003 & 2004; Science and Engineering State Profiles: 2005-08 NSF 08-314 | August 2008, <http://www.nsf.gov/statistics>.

Licenses and university start-ups & research expenditures at universities for use in licensing and start-up indicators - extracted from AUTM Licensing STATT database; <http://www.autm.net/Home.htm>. Includes reporting by Brown University and University of Rhode Island only.

THE KNOWLEDGE BUSINESS PIPELINE

Entrepreneurial Climate

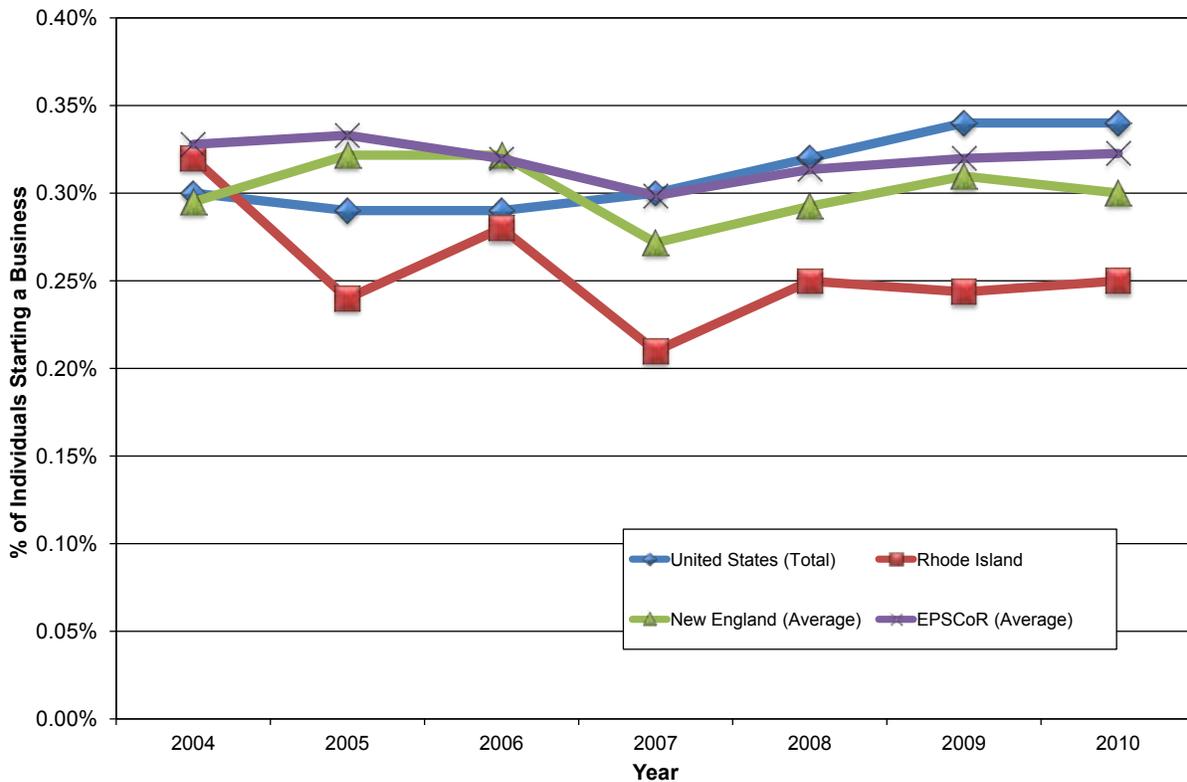
- Rhode Island 1-Year Trend ▲
- Rhode Island 5-Year Trend ▼
- Rhode Island Compared to EPSCoR ▼
- Rhode Island Compared to New England ▼
- Rhode Island Compared to U.S. ▼
- Rhode Island's Most Recent National Ranking **33**

SUMMARY

From 2009 to 2010, Rhode Island increased its index of entrepreneurial activity³ from 0.24% to 0.25%. From 2005 through 2010, Rhode Island lagged the reference geographies on this indicator. In 2010, Rhode Island is ranked 33rd, up from its 2009 ranking of 42nd (see Figure 2-7).

Figure 2-7.

**Index of Entrepreneurial Activity
2004-10**



THE KNOWLEDGE BUSINESS PIPELINE

Entrepreneurial Climate

WHY THIS IS SIGNIFICANT

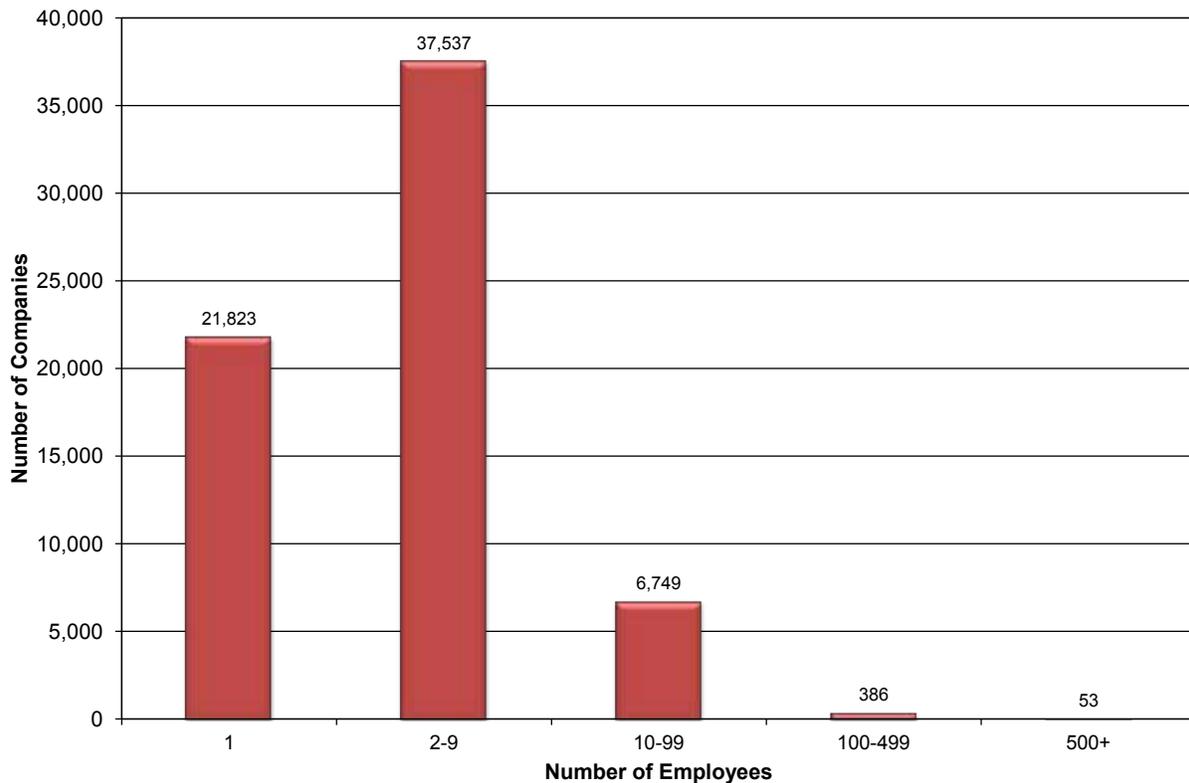
An active and well-connected entrepreneurial climate where innovators can take ideas to national and international markets is vital to a region’s economic development. Inherent to this environment are intermediaries that serve as the node connectors for high-impact companies, linking entrepreneurs to various public and private resources through start-up, growth and expansion stages.

RELATED

In 2008, there were 21,823 establishments with one employee in Rhode Island representing 32.8 percent of all Rhode Island establishments. Another 37,537 establishments had 2-9 employees or 56.4 percent of all establishments in Rhode Island. (See Figure 2-8.)

Figure 2-8.

**Establishments by Size of Company - Rhode Island
2008**



SOURCES: Entrepreneurship Index from the Kauffman Foundation: <http://www.kauffman.org/researchandpolicy/entrepreneurship-data.aspx>.

Establishments by number of employees from YourEconomy.org.

THE KNOWLEDGE BUSINESS PIPELINE

Venture Capital Investments

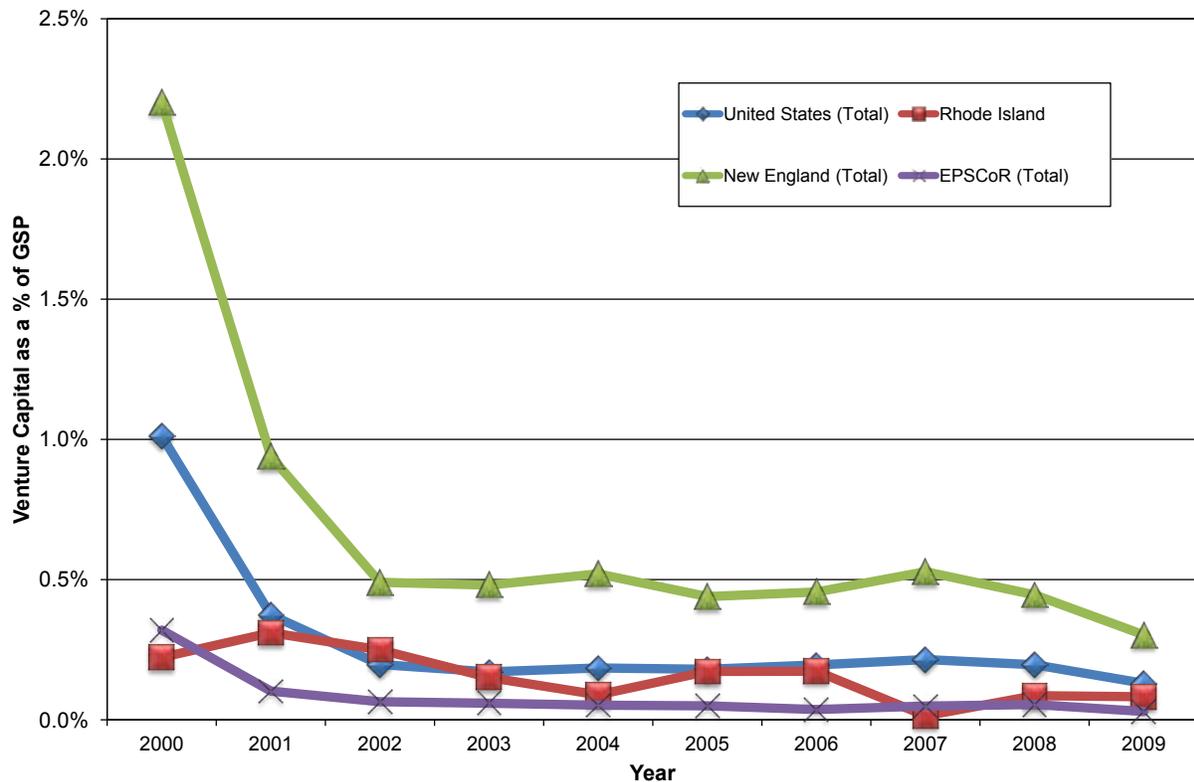
- Rhode Island 1-Year Trend ▲
- Rhode Island 5-Year Trend ▼
- Rhode Island Compared to EPSCoR ▲
- Rhode Island Compared to New England ▼
- Rhode Island Compared to U.S. ▼
- Rhode Island's Most Recent National Ranking **10**

SUMMARY

Venture capital investments as a percent of GSP in Rhode Island decreased from 0.086 percent in 2008 to 0.083 percent in 2009. However, the 2008 total represents an increase from the 2007 total of 0.015 percent. Compared to the reference geographies, Rhode Island lagged both the U.S. and New England, but exceeded the EPSCoR states as a whole. In 2009, Rhode Island's ranking on this indicator is 10th nationally (see Figure 2-9).

Figure 2-9.

**Venture Capital Invested as a Percent of Gross State Product
2000-09**



THE KNOWLEDGE BUSINESS PIPELINE

Venture Capital Investments

WHY THIS IS SIGNIFICANT

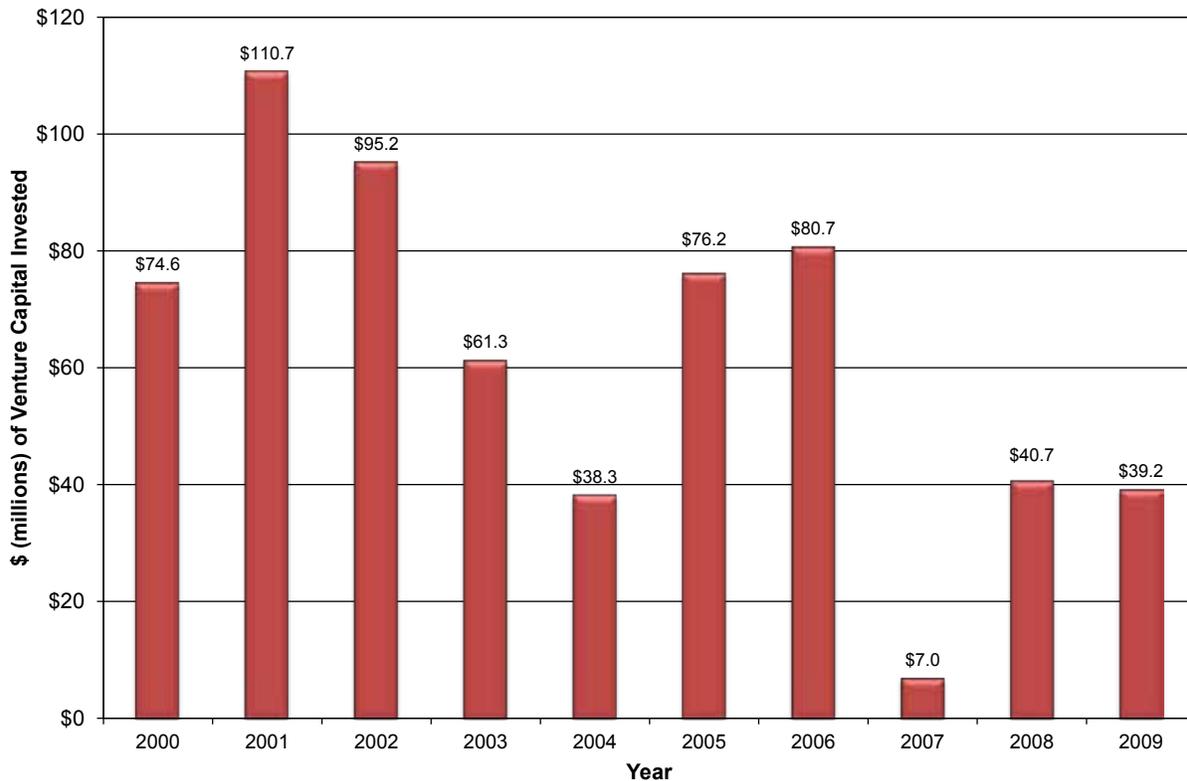
High-growth companies often require equity capital to develop their products and services and to expand. Therefore the level of equity capital available in a region is one measure of the attractiveness of a state for these types of companies and growth.

RELATED

In 2009, venture capital dollars invested in Rhode Island totaled \$39.2 million. The height of venture capital investments over the last nine years occurred in 2001, when total investments were \$110.7 million. The lowest point over the last nine years was in 2007, where investments totaled \$7.0 million (see Figure 2-10). Rhode Island had 17 deals in 2009, the highest level in the period since 2000 (see Figure 2-11).

Figure 2-10.

**Venture Capital \$ Invested in Rhode Island
2000-09**

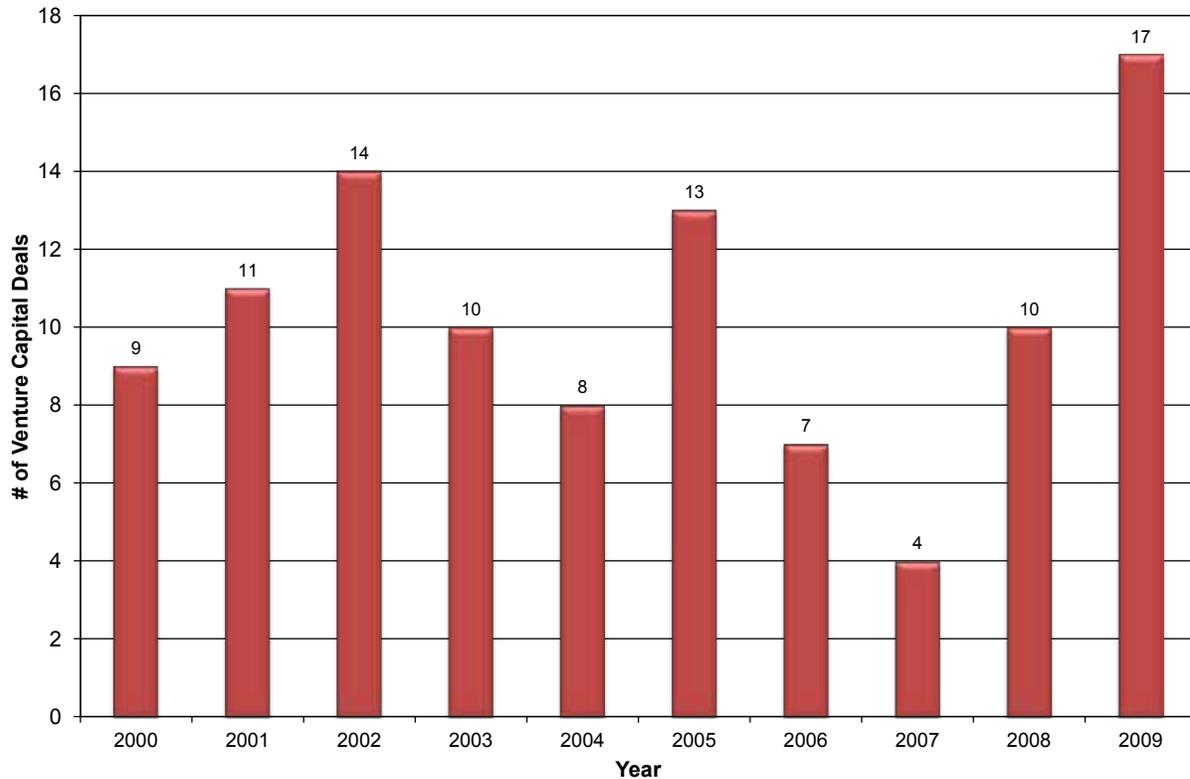


THE KNOWLEDGE BUSINESS PIPELINE

Venture Capital Investments

Figure 2-11.

**Venture Capital Deals in Rhode Island
2000-09**



SOURCES: Venture Capital - MoneyTree Venture Capital Profiles by State based on PricewaterhouseCooper/Venture Economics/National Venture Capital Association Surveys, <http://www.venturexpert.com/VxComponent/static/stats/>.

Gross State Product - Bureau of Economic Analysis, U.S. Department of Commerce, <http://www.bea.gov>.

THE KNOWLEDGE BUSINESS PIPELINE

Total SBIR/STTR Investments

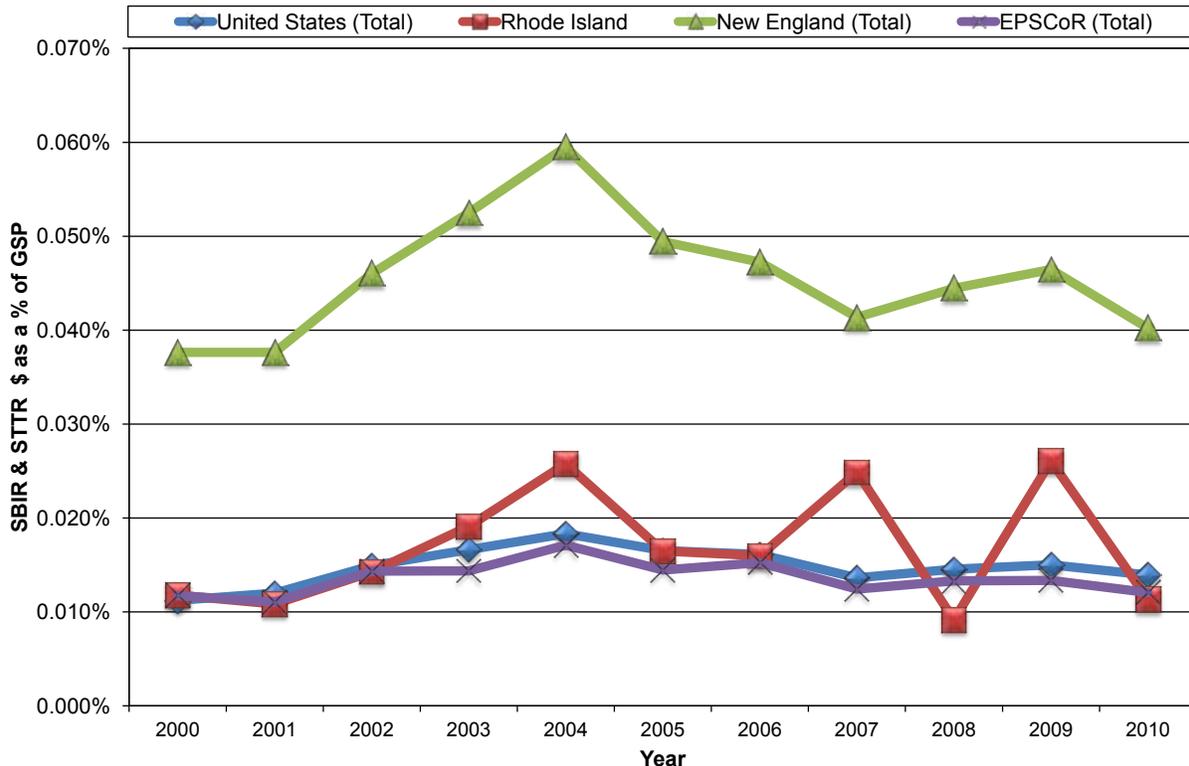
- Rhode Island 1-Year Trend ▼
- Rhode Island 5-Year Trend ▼
- Rhode Island Compared to EPSCoR ▼
- Rhode Island Compared to New England ▼
- Rhode Island Compared to U.S. ▼
- Rhode Island's Most Recent National Ranking **21**

SUMMARY

The federal government provides grants to small businesses performing R&D through its Small Business Innovation Research (SBIR) program and Small Business Technology Transfer (STTR) program. From 2000 through 2010, Rhode Island's SBIR and STTR investments increased from 0.0118 percent of GSP in 2000 to 0.0113 percent in 2010. Rhode Island's 2010 ranking was 21st, which was down from its 2009 ranking of 8th. Over the past five years this indicator has fluctuated in Rhode Island (see Figure 2-12).

Figure 2-12.

**Total SBIR & STTR \$ as a Percent of Gross State Product
2000-10**



THE KNOWLEDGE BUSINESS PIPELINE

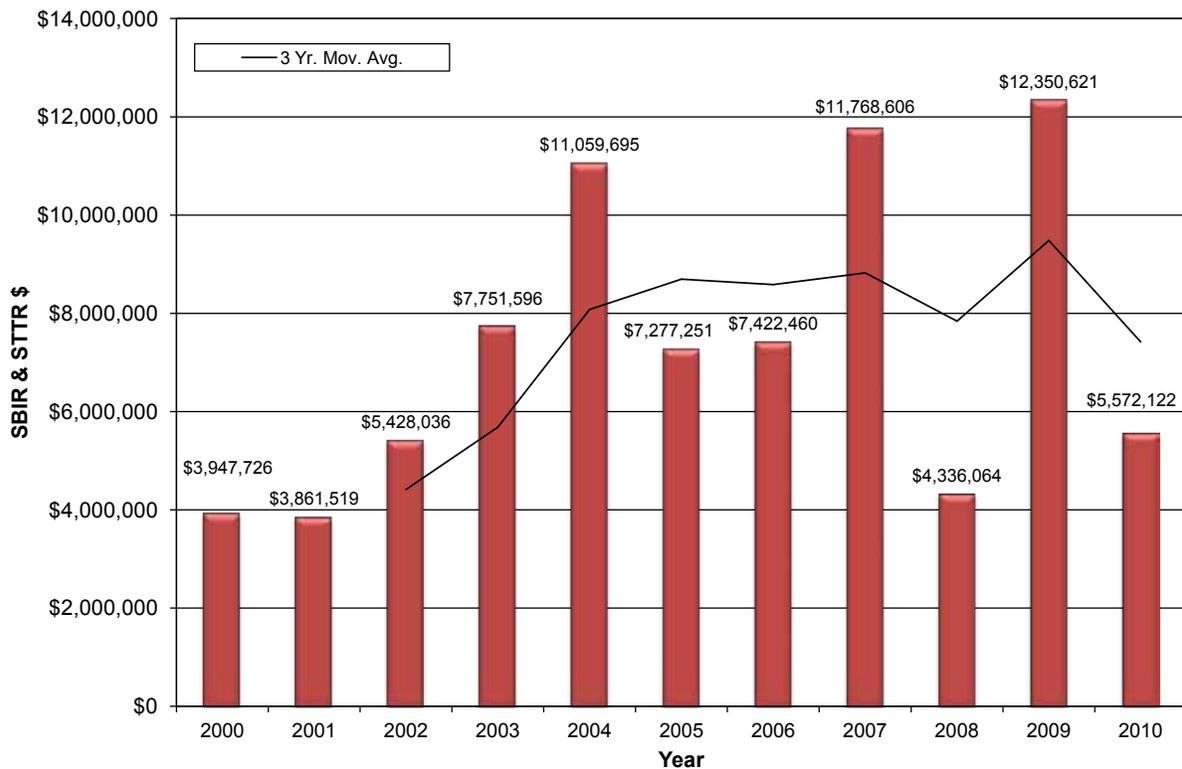
Total SBIR/STTR Investments

WHY THIS IS SIGNIFICANT

The award of SBIR and STTR grants to small research and development companies in a state is one measure of the quality of the R&D being performed. SBIR and STTR awards are made competitively by federal agencies using peer review. Criteria include scientific and technical quality and potential for commercialization. Venture capitalists often use SBIR and STTR awards as a proxy for high technical quality when considering new investments.⁴

Figure 2-13.

**SBIR & STTR \$ in Rhode Island
2000-10**



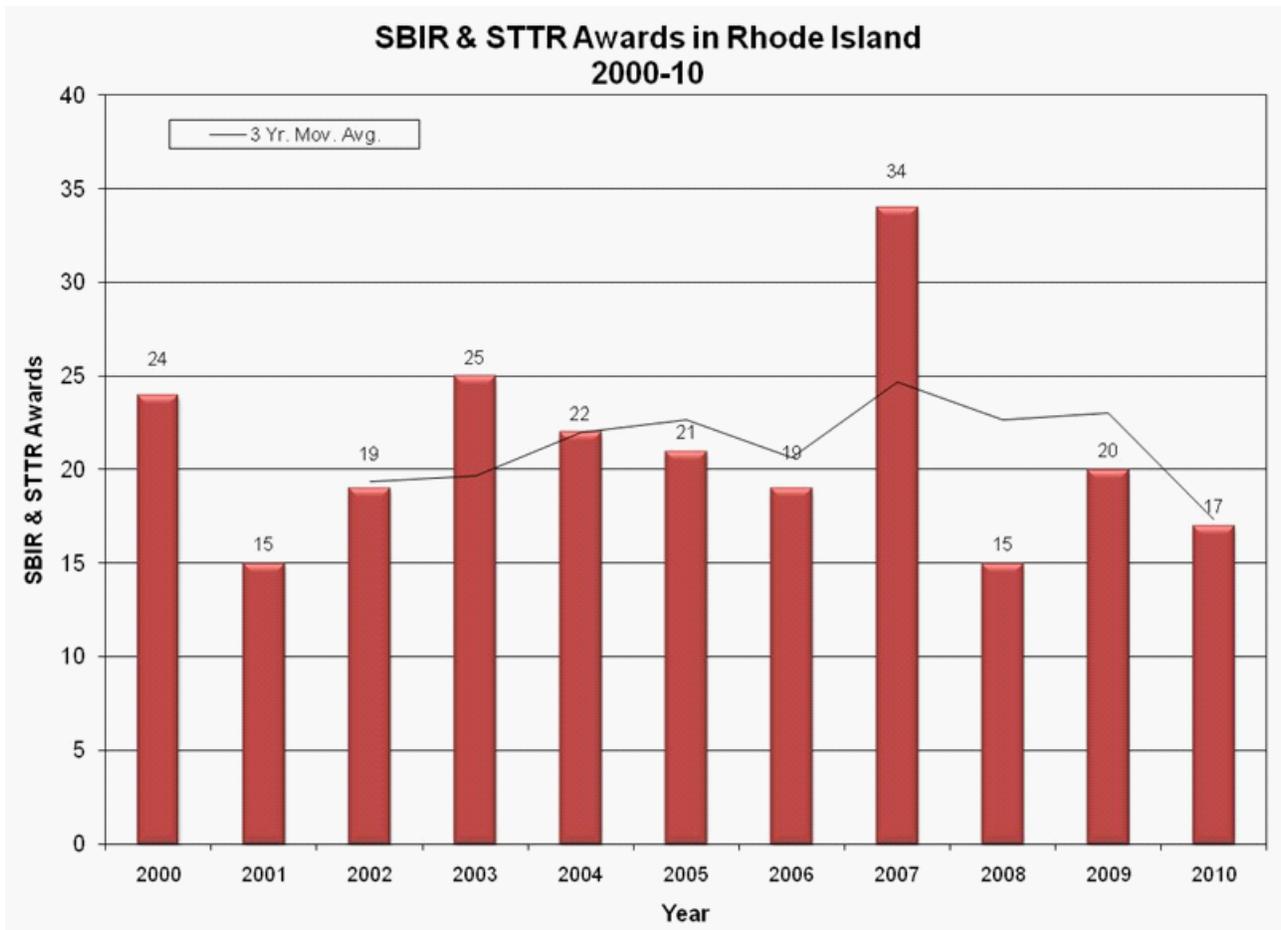
THE KNOWLEDGE BUSINESS PIPELINE

Total SBIR/STTR Investments

RELATED

In 2010, Rhode Island received \$5.5 million in SBIR and STTR funding. This was down from the 2009 level of \$12.3 million which represented the highest grossing year from 2000 to 2010 (see Figure 2-13). In 2010, Rhode Island received 17 SBIR and STTR awards (see Figure 2-14) .

Figure 2-14.



SOURCES: SBIR and STTR Awards - U.S. Small Business Administration; http://web.sba.gov/tech-net/public/dsp_search.cfm.

Gross State Product - Bureau of Economic Analysis, U.S. Department of Commerce, <http://www.bea.gov>.

THE KNOWLEDGE BUSINESS PIPELINE

Endnotes

- ¹ Includes utility patents, design patents, plant patents, reissues, defensive publications, and statutory inventions registrations. The origin of the patent is determined by the residence of the first-named inventor.
- ² All reporting completed by Brown University and University of Rhode Island.
- ³ Estimates calculated by Robert W. Fairlie, University of California, Santa Cruz, using the Current Population Survey. The index of entrepreneurial activity is the percent of individuals (ages 20–64) who do not own a business in the first survey month that start a business in the following month with fifteen or more hours worked per week. All observations with allocated labor force status, class of worker, and hours worked following month with fifteen or more hours worked per week variables are excluded. Approximate 95 percent confidence intervals for the index for each state are reported.
- ⁴ The SBIR and STTR dollar amounts for each year represents the total amount awarded in that year regardless of when the funds are expended.

RHODE ISLAND'S RESEARCH & DEVELOPMENT

OVERVIEW

Research and development (R&D) is a driving force in business and economic growth. It fuels innovation that leads to new products, processes, technologies, and services. These innovations spawn new industries, new companies, and new jobs. R&D activity also attracts and supports a highly educated and skilled workforce which in turn continues to build a cycle of innovation. It is important to note that most of the data sources used in this section currently offer data through 2007 and 2008. This of course does not fully reflect the impact of the national financial crisis, and does not include the influence of stimulus funding. That said, the data used in this section represents the most recent data that is available on the following indicators.

After being a national leader in R&D performed, Rhode Island experienced a significant drop in R&D performance in 2007, a decrease of 46% since 2006. This was driven almost entirely by a drop in industry-performed R&D (and more specifically by a drop in R&D performance by industrial defense contractors).

In terms of academic R&D performance, Rhode Island has increased its performance over the last five years, and is outpacing the reference geographies. The majority of these academic R&D funds to Rhode Island come from federal government spending, and most of the funds are directed towards work in the life sciences field of study.

For industry R&D performance, Rhode Island experienced a sharp decline from 2006 to 2007 of 69.1 percent. On this indicator, Rhode Island is ranked 31st nationally, and is currently its weakest performing indicator in this section. However, performance on this indicator has not always been lagging, and in 2003, Rhode Island was ranked 6th nationally. The decline was driven in large part by decreases in defense related R&D.

On the indicator of federal funding for non-profit organizations as a percent of GSP, in 2007, Rhode Island was ranked 4th. On this indicator,

INDICATORS

- Total R&D Performance
- Academic R&D Performance
- Industry R&D Performance
- Not-For-Profit R&D Performance
- Federal R&D Obligations



RHODE ISLAND'S RESEARCH & DEVELOPMENT

Rhode Island performed better than the EPSCoR states and the U.S., but was surpassed by New England. Rhode Island's performance on this indicator is the best in terms of national ranking, when compared with all of the indicators investigated in this section. Rhode Island Hospital was the largest recipient of funding, with \$32 million of funds received, or 46% of all federal funds to not-for-profits. In total, Rhode Island's hospitals account for 96% of all the federal funding for R&D for not-for-profits. The Department of Health and Human Services provided 98% of R&D funding to not-for-profits in the state.

Between 2003 and 2007, Rhode Island has experienced an increase of 19.91 percent in federal obligations for R&D. In 2007, Rhode Island ranked 8th nationally in this indicator. Agencies of the federal government (intramural performers) were Rhode Island's largest recipient of federally funded R&D in 2007. The Department of Defense contributes the largest portion of Rhode Island federal R&D obligations at 66.1 percent. This breakdown is similar to that of all the reference geographies.

RHODE ISLAND'S RESEARCH & DEVELOPMENT

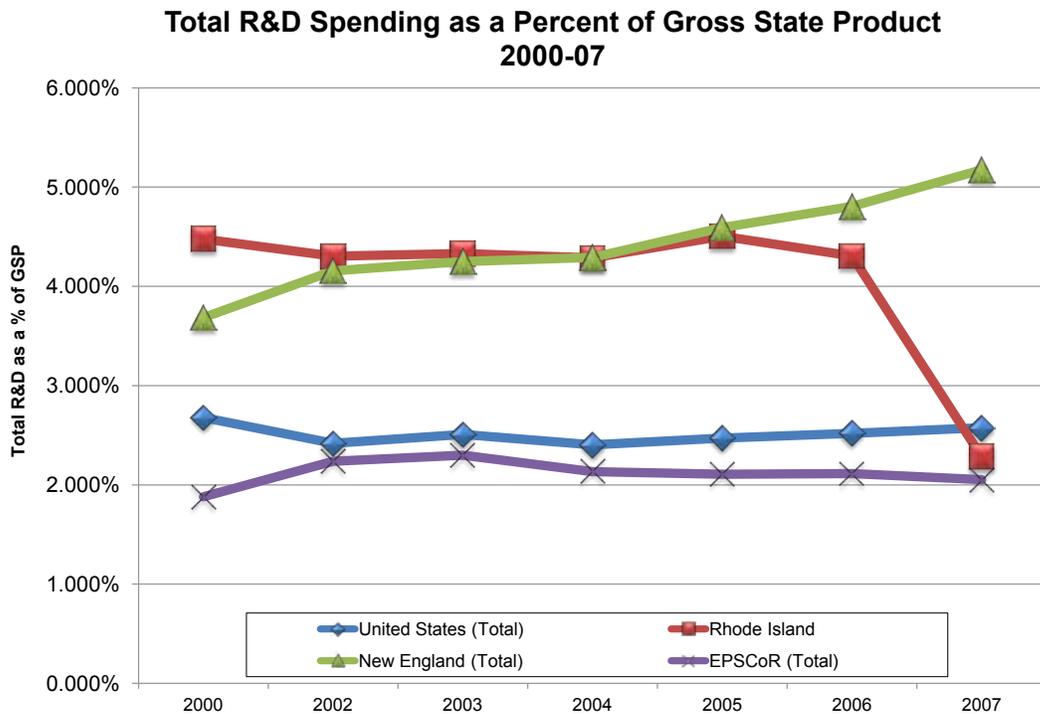
Total R&D Performance

- Rhode Island 1-Year Trend ▼
- Rhode Island 5-Year Trend ▼
- Rhode Island Compared to EPSCoR ▲
- Rhode Island Compared to New England ▼
- Rhode Island Compared to U.S. ▼
- Rhode Island's Most Recent National Ranking **19**

SUMMARY

In 2007, total R&D performance in Rhode Island represented 2.284 percent of gross state product (GSP) (see Figure 3-1). This placed Rhode Island above the other EPSCoR states but below that of New England and the U.S. as a whole on this indicator. The U.S. was at 2.575 percent, New England at 5.174 percent, and EPSCoR at 2.052 percent. From 2000 through 2006, Rhode Island was tracking with New England as a leader in R&D performed, however then experienced a major decrease in 2007. In 2007, Rhode Island ranked 19th nationally on this indicator, a decrease from 6th since 2003.

Figure 3-1.



RHODE ISLAND'S RESEARCH & DEVELOPMENT

Total R&D Performance

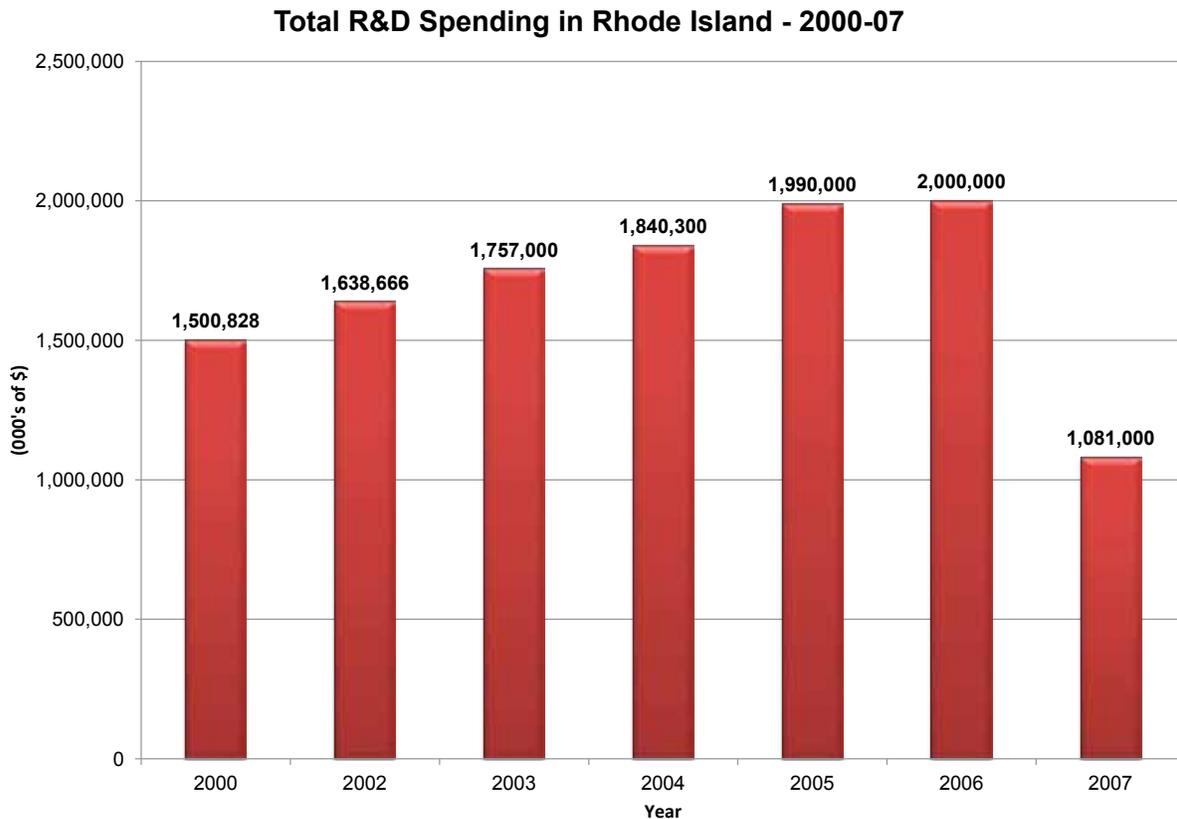
WHY THIS IS SIGNIFICANT

Research and development performance measures the creation of new knowledge and ideas within a state's economy. Since innovation and knowledge creation is one of the most important elements of productivity and economic growth, this indicator shows a state's relative competitive position. While ideas do flow between the states and around the world, there is evidence that some R&D is "sticky" and that there is value in having it performed in a particular location.

RELATED

From 2000 to 2006, Rhode Island experienced steady increases in total R&D spending, but saw a steep decline in 2007. (See Figure 3-2.) The percent decrease from 2006 to 2007 was 45.95% or \$919 million. This was driven almost entirely by a drop in industry-performed R&D (and more specifically by a drop in R&D performance by industrial defense contractors) and it had a dramatic impact on Rhode Island's total R&D performance ranking. In 2007, Rhode Island was ranked 19th among all states for total R&D spending as a percent of gross state product. This is down from 10th place in 2003.

Figure 3-2.



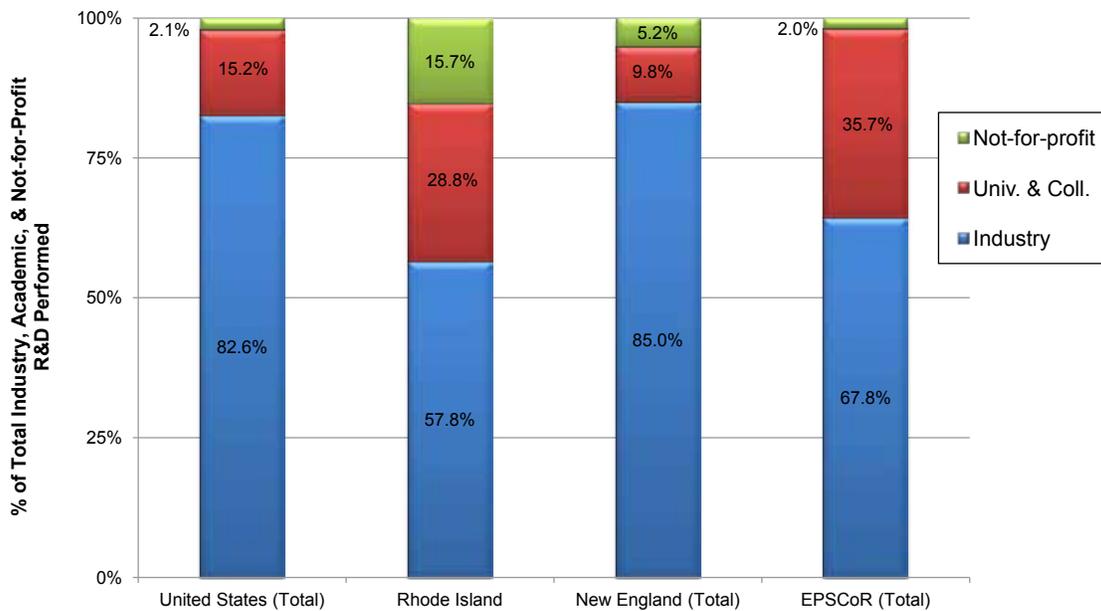
RHODE ISLAND'S RESEARCH & DEVELOPMENT

Total R&D Performance

Considering the individual sectors that make up R&D performance in Rhode Island, and the reference geographies, Rhode Island relies most on industry, followed by colleges and universities, and then the not-for-profit sector. Compared to the reference geographies, Rhode Island relies less on industry and more on not-for-profit (mostly federal intramural) R&D (see Figure 3-3).

Figure 3-3.

R&D by Performance Sector – 2007



Note: not-for-profit includes only that which is federally funded and therefore the contribution by this sector is understated

SOURCES

Total R&D spending¹ is from National Science Foundation/Division of Science Resources Statistics. National Patterns of R&D Resources (annual series), derived from four NSF surveys: Survey of Industrial R&D; Survey of R&D Expenditures at Universities and Colleges, Survey of Federal Funds for R&D, and Survey of R&D Funding and Performance by Nonprofit Organizations; <http://www.nsf.gov/statistics>.

Gross state product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2010; <http://www.bea.gov/regional/gsp>.

RHODE ISLAND'S RESEARCH & DEVELOPMENT

Academic R&D Performance

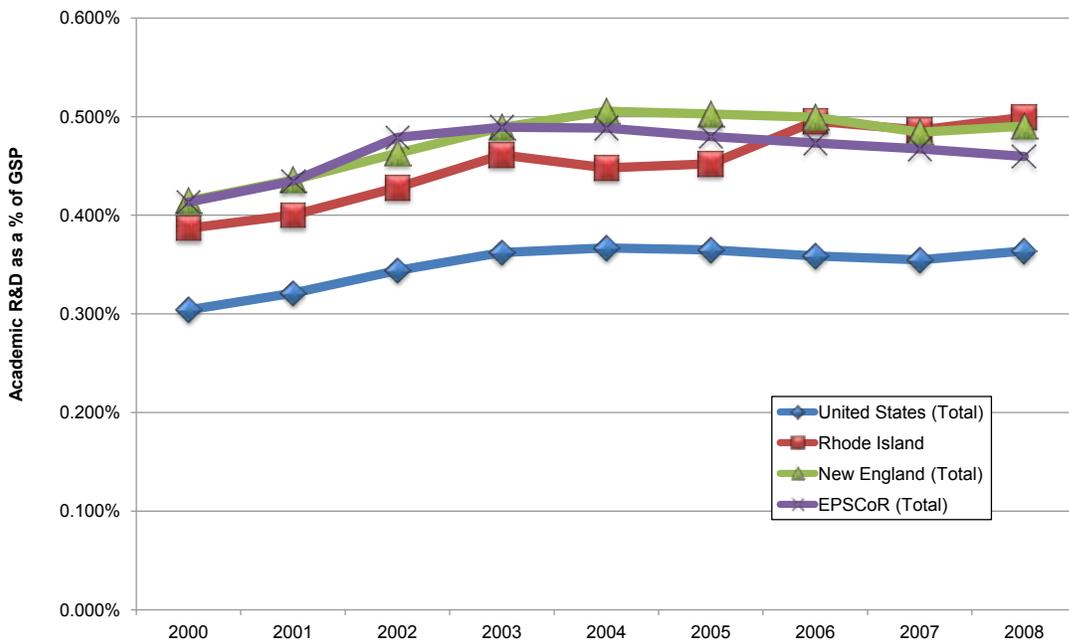
- Rhode Island 1-Year Trend ^
- Rhode Island 5-Year Trend ^
- Rhode Island Compared to EPSCoR ^
- Rhode Island Compared to New England ^
- Rhode Island Compared to U.S. ^
- Rhode Island's Most Recent National Ranking **7**

SUMMARY

In 2008, academic R&D performed in Rhode Island was 0.499 percent of Gross State Product (GSP). This placed Rhode Island above all of the reference geographies for this year (see Figure 3-4). In 2008, academic R&D performed in the U.S. as a whole was 0.364 percent of GSP, New England was 0.490 percent, and EPSCoR 0.460 percent. In 2007, Rhode Island ranked 7th nationally on this indicator.

Figure 3-4.

**Academic R&D Spending as a Percent of GSP
2000-08**



RHODE ISLAND'S RESEARCH & DEVELOPMENT

Academic R&D Performance

WHY THIS IS SIGNIFICANT

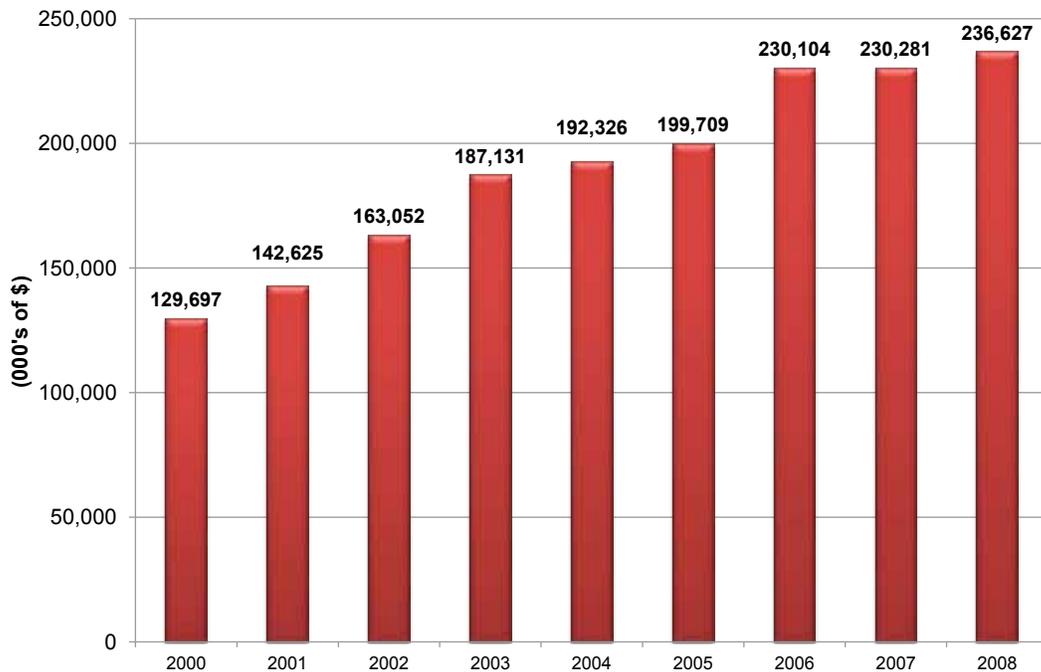
This is a measure of the strength of a state’s academic institutions, both public and private, in providing the R&D needed to grow the state’s economy. To the extent that companies are increasingly partnering with academic institutions to perform their R&D, the strength of a state’s academic sector can be very influential in attracting rapidly growing businesses and growing targeted sectors. Academic R&D also provides opportunities for students to gain valuable education and career experience in science and technology related fields.

RELATED

In 2008, R&D performed at academic institutions in Rhode Island equaled \$236.6 million, which was a 2.76 percent increase from the 2007 level of \$230.2 million (see Figure 3-5). This follows the nine-year trend of increasing each year.

Figure 3-5.

**Academic R&D Spending in Rhode Island
2000-08**



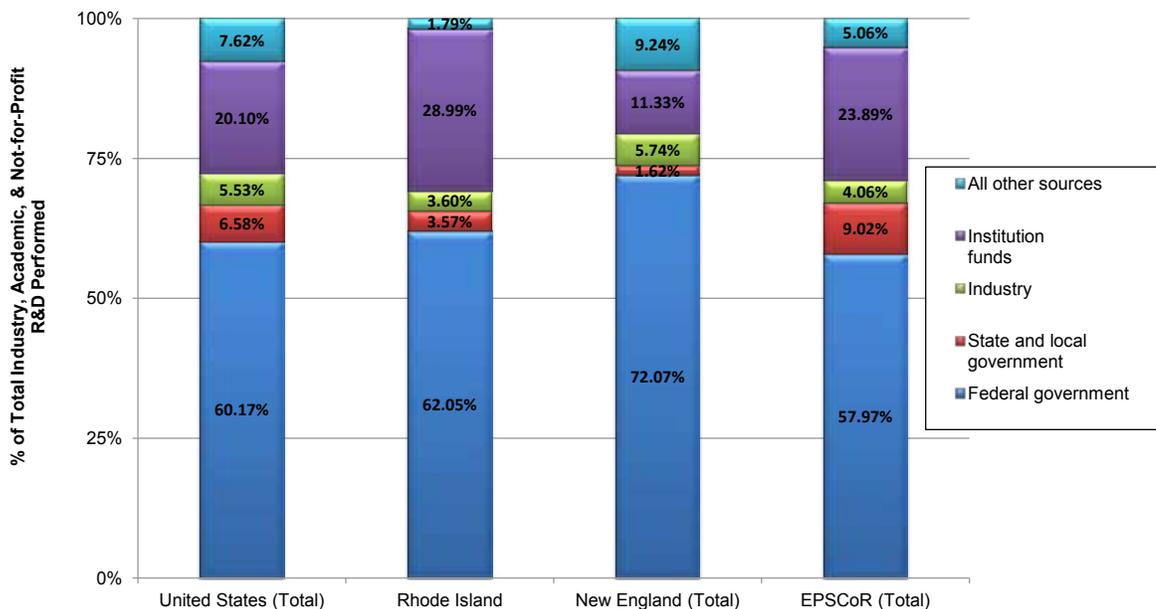
RHODE ISLAND'S RESEARCH & DEVELOPMENT

Academic R&D Performance

In 2008, the federal government was the largest source of funds for academic R&D in Rhode Island at 62.1 percent of the total \$236.6 million performed (see Figure 3-6). This was followed by institution funds (29.0 percent), and all state and local government and industry sources both with 3.6 percent. In comparison to the reference groups on a percentage basis, Rhode Island academic institutions contribute more funding towards their own R&D than the reference geographies.

Figure 3-6.

Academic R&D Spending by Source of Funds - 2008



Note: not-for-profit includes only that which is federally funded and therefore the contribution by this sector is understated

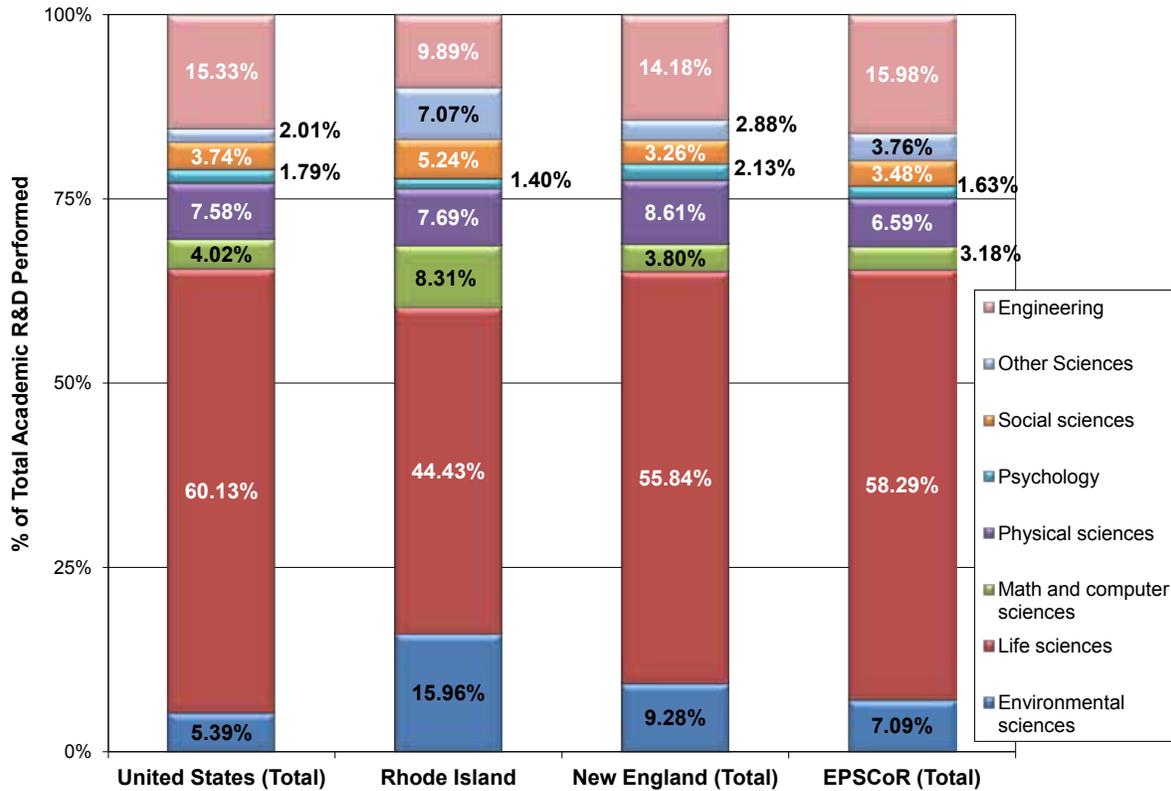
In 2008, 44.43 percent of all R&D performed by academic institutions in Rhode Island was within the life sciences field.² This was the largest field of study for academic-performed R&D in Rhode Island. Life sciences include the fields of agricultural, biological, and medical sciences. Environmental sciences followed next at 15.96 percent. These two areas alone accounted for 60.39 percent of academic-performed R&D in Rhode Island in 2008. In comparison to the reference geographies, Rhode Island performs less R&D on a percentage basis in life sciences and more in environmental and math and computer sciences (see Figure 3-7).

RHODE ISLAND'S RESEARCH & DEVELOPMENT

Academic R&D Performance

Figure 3-7.

Academic R&D by Field of Study – 2008



SOURCES: Academic R&D performance data³ is from National Science Foundation/Division of Science Resources Statistics; Academic R&D Expenditures FY2008; Survey of R&D Expenditures at Universities and Colleges 2008; <http://www.nsf.gov/statistics>.

Gross state product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2010; <http://www.bea.gov/regional/gsp/>.

University & College R&D Performed - National Science Foundation/Division of Science Resources Statistics; Survey of R&D Expenditures at Universities and Colleges 2003 & 2004; Science and Engineering State Profiles: 2005-08 NSF 08-314 | August 2008 <http://www.nsf.gov/statistics>.

RHODE ISLAND'S RESEARCH & DEVELOPMENT

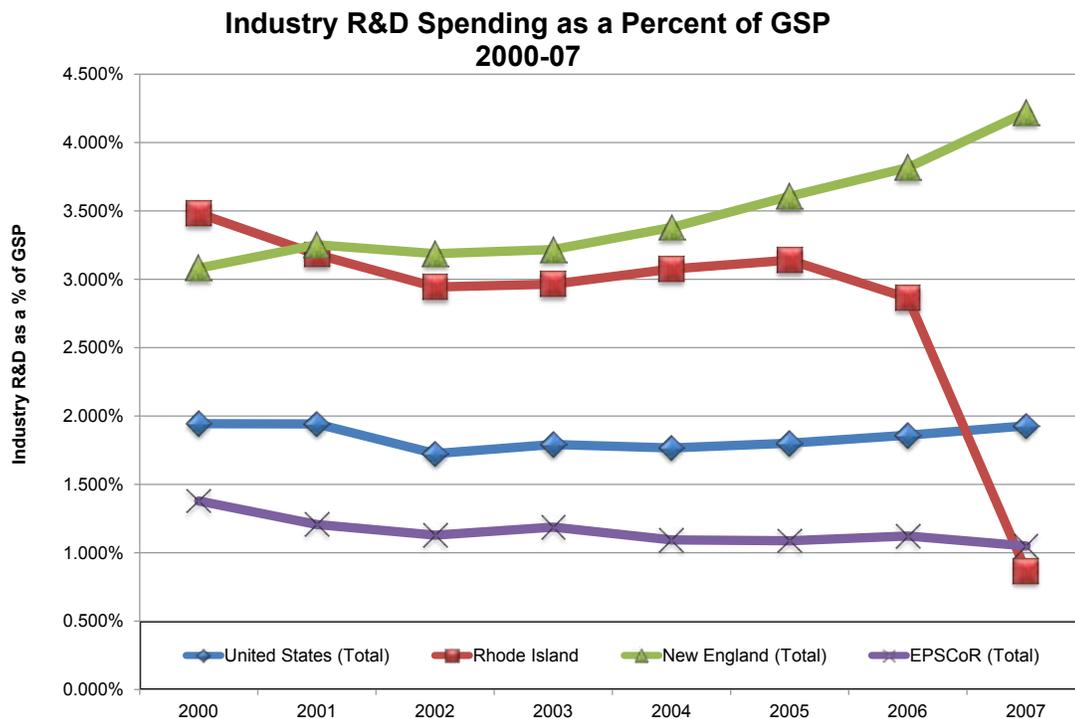
Industry R&D Performance

- Rhode Island 1-Year Trend ▼
- Rhode Island 5-Year Trend ▼
- Rhode Island Compared to EPSCoR ▼
- Rhode Island Compared to New England ▼
- Rhode Island Compared to U.S. ▼
- Rhode Island's Most Recent National Ranking **31**

SUMMARY

After seven years of tracking, keeping pace, or exceeding the other reference geographies, in 2007 Rhode Island lagged all of the reference geographies with 0.868 percent of Gross State Product (GSP) attributed to industry R&D. In 2007, New England had the highest percentage with 4.220 percent (see Figure 3-8). The 2007 percentage marks a steep decline as the 2006 percentage for Rhode Island was 2.863 percent. In 2007, Rhode Island ranked 31st nationally on this indicator, falling from 6th in 2003.

Figure 3-8.



WHY THIS IS SIGNIFICANT

Businesses that are investing in R&D are sacrificing some current profits in order to develop new products and services for future competitiveness. This measure shows the aggregate level of this investment in a state. Industry R&D supports innovative companies, high paying jobs, and attracts new investment to an area.

RHODE ISLAND'S RESEARCH & DEVELOPMENT

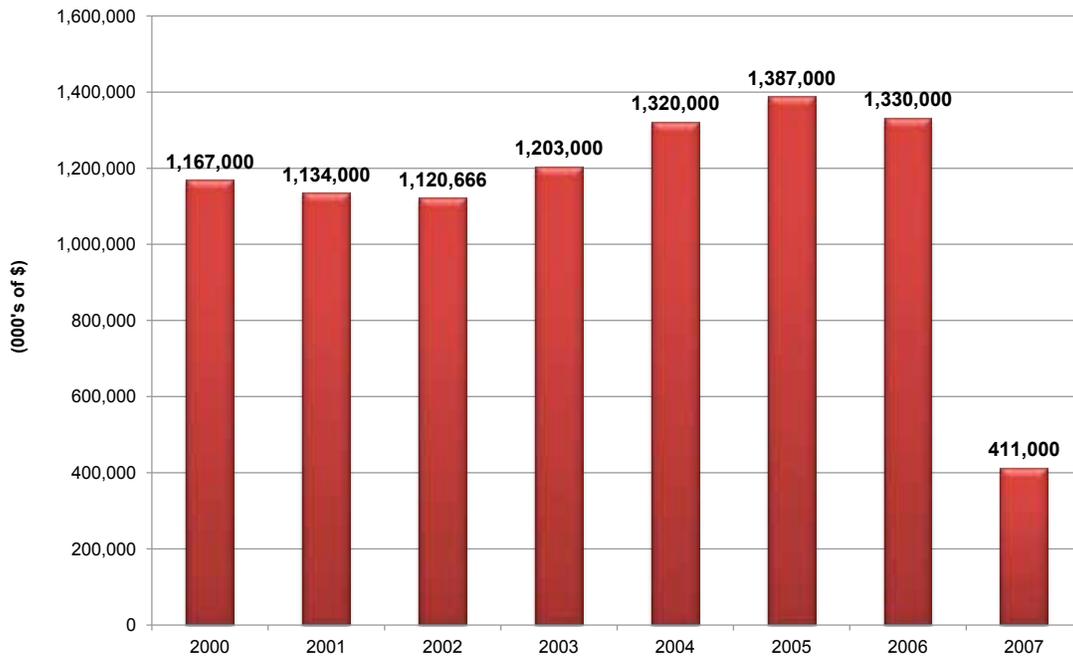
Industry R&D Performance

RELATED

In 2007, industry R&D in Rhode Island equaled \$411 million. This was down substantially from the previous year's total of \$1.33 billion (see Figure 3-9). Between 2002 and 2006, Rhode Island had steadily been increasing in this indicator. A decline in R&D performance by industrial defense contractors was the major factor in the drop in industry R&D performance between 2006 and 2007. The dramatic decline was driven in large part by reductions in defense related R&D.⁴

Figure 3-9.

**Industry R&D Spending in Rhode Island
2000-07**



SOURCES: Industry R&D performance is from National Patterns of R&D Resources: 2007 Data Update Detailed Statistical Tables | NSF 08-318 | November 2008 <http://www.nsf.gov/statistics/infbrief/nsf08313/>.

Gross state product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2010; <http://www.bea.gov/regional/gsp/>.

RHODE ISLAND'S RESEARCH & DEVELOPMENT

Not-For-Profit R&D Performance

Rhode Island 1-Year Trend ▲

Rhode Island Compared to New England ▼

Rhode Island 5-Year Trend ▼

Rhode Island Compared to U.S. ▲

Rhode Island Compared to EPSCoR ▲

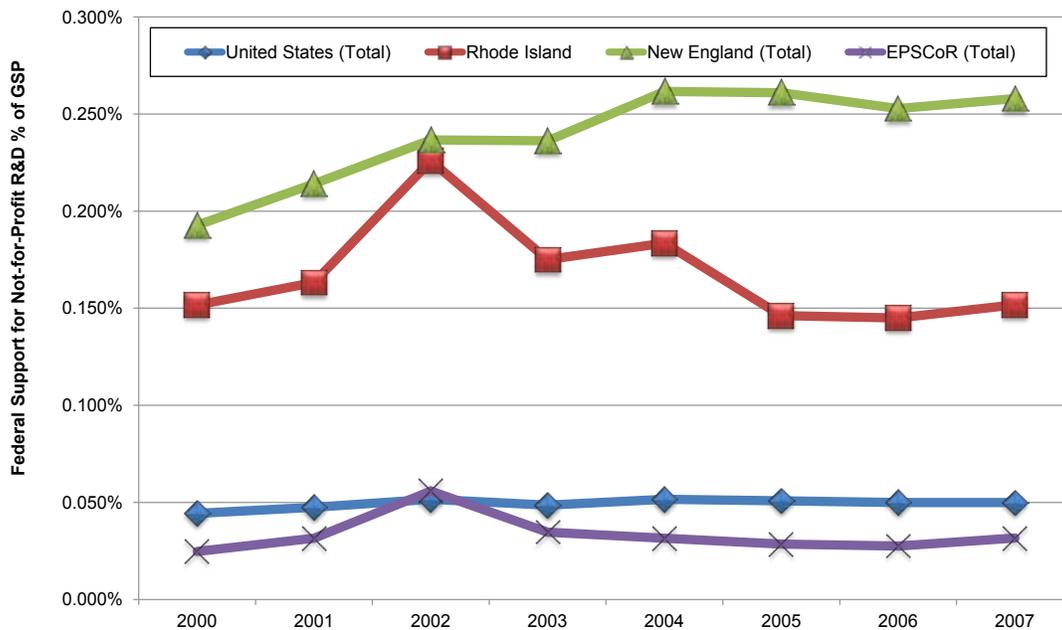
Rhode Island's Most Recent National Ranking 4

SUMMARY

In 2007, not-for-profit performance as a percent of Gross State Product (GSP) for Rhode Island was 0.152 percent. Rhode Island outpaced both the U.S. and EPSCoR states (see Figure 3-10). The total for Rhode Island in 2000 was also 0.152 percent, and the state has experienced increases and decreases over the last seven years. In 2007, Rhode Island was ranked 4th on this indicator, which is the same ranking it had in 2003.

Figure 3-10.

Federal Support for Not-for-Profit R&D Spending as a Percent of GSP – 2000-07



WHY THIS IS SIGNIFICANT

Federal funding for non-profit R&D is a vital component of an innovation economy and complements the R&D conducted at our universities, colleges and private industry. Securing federal dollars to allow non-profit organizations to engage in research and development increases the competitive advantage of a region within the knowledge economy.

RELATED

From 2000 to 2007, federal support for non-profit R&D in Rhode Island has increased overall (see Figure 3-11). The 2007 total of \$69.5 million represents the highest federal contribution over the last seven years.

RHODE ISLAND'S RESEARCH & DEVELOPMENT

Not-For-Profit R&D Performance

Figure 3-11.

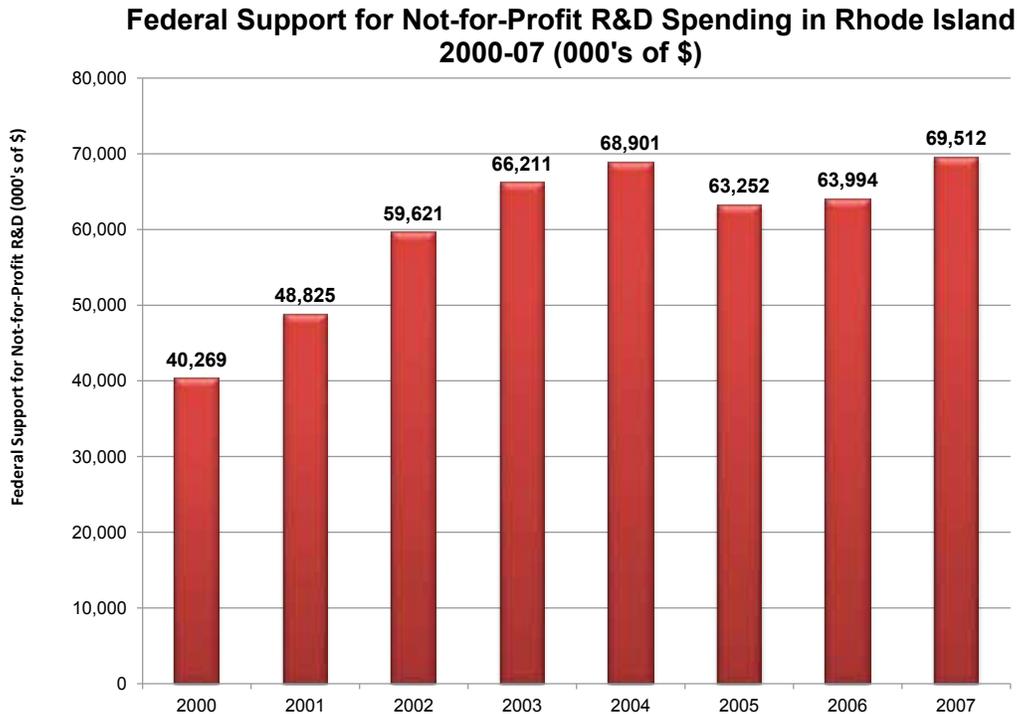


Figure 3-12 details the specific not-for-profit organizations in Rhode Island and the amount they have received in federal R&D obligations.⁵ It includes a total from all federal agencies as well as a breakout by specific agency. Rhode Island Hospital was the largest recipient of funding with \$32 million of funds received or 46% of all federal funds to not-for-profits. In total, Rhode Island's hospitals account for 96% of all federal funding for R&D for not-for-profits. The Department of Health and Human Services provided 98% of federal funding for Rhode Island not-for-profit institutions. Federal funding for non-profit R&D is a vital component of an innovation economy and complements the R&D conducted at our universities, colleges and private firms.

SOURCES: Not for Profit R&D Performed - 1987-2001 from National Science Foundation/Division of Science Resources Statistics; National Patterns of R&D Resources 2002 Data Update, derived from Survey of R&D Funding and Performance by Nonprofit Organizations; 2002 & 2003 from National Science Foundation/Division of Science Resources Statistics, Survey of Federal Funds for Research and Development: Fiscal Years 2002, 2003, 2004, and 2005; <http://www.nsf.gov/statistics>.

Gross state product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2010; <http://www.bea.gov/regional/gsp/>.

Specific entity and agency data - National Science Foundation/Division of Science Resources Statistics, Survey of Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions, FY 2007.

RHODE ISLAND'S RESEARCH & DEVELOPMENT

Not-For-Profit R&D Performance

Figure 3-12.
Federal Obligations for Research & Development and R&D plant to Nonprofit Institutions in Rhode Island by Performing Institution and Agency
FY 2007 Thousands of \$

INSTITUTION	All Agencies	DOC	DOD	DOE	DOI	ED	EPA	HHS	NASA	NSF	USDA	Other
RI Hospital	\$31,794	\$0	\$115	\$0	\$0	\$0	\$0	\$31,679	\$0	\$0	\$0	\$0
Miriam Hospital	\$11,934	\$0	\$0	\$0	\$0	\$0	\$0	\$11,934	\$0	\$0	\$0	\$0
Butler Hospital	\$10,838	\$0	\$0	\$0	\$0	\$0	\$0	\$10,838	\$0	\$0	\$0	\$0
Women and Infants Hospital	\$7,433	\$0	\$0	\$0	\$0	\$0	\$0	\$7,433	\$0	\$0	\$0	\$0
Roger Williams General Hospital	\$3,689	\$0	\$0	\$0	\$0	\$0	\$0	\$3,689	\$0	\$0	\$0	\$0
Gordon Research Conferences	\$2,130	\$0	\$144	\$153	\$8	\$0	\$12	\$1,258	\$102	\$418	\$35	\$0
Memorial Hospital (Pawtucket, RI)	\$1,001	\$0	\$0	\$0	\$0	\$0	\$0	\$1,001	\$0	\$0	\$0	\$0
American Mathematical Society	\$356	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$356	\$0	\$0
Emma Pendleton Bradley Foundation	\$156	\$0	\$0	\$0	\$0	\$0	\$0	\$156	\$0	\$0	\$0	\$0
Dorcas Place	\$92	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$92
Research in Substance Abuse	\$69	\$0	\$0	\$0	\$0	\$0	\$0	\$69	\$0	\$0	\$0	\$0
Association for Symbolic Logic	\$20	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$20	\$0	\$0
RHODE ISLAND TOTAL	\$69,512	\$0	\$259	\$153	\$8	\$0	\$12	\$68,057	\$102	\$794	\$35	\$92

DOC = Department of Commerce; DOD = Department of Defense; DOE = Department of Energy; DOI = Department of the Interior; ED = Department of Education; EPA = Environmental Protection Agency; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; NSF = National Science Foundation; USDA = U.S. Department of Agriculture.

RHODE ISLAND'S RESEARCH & DEVELOPMENT

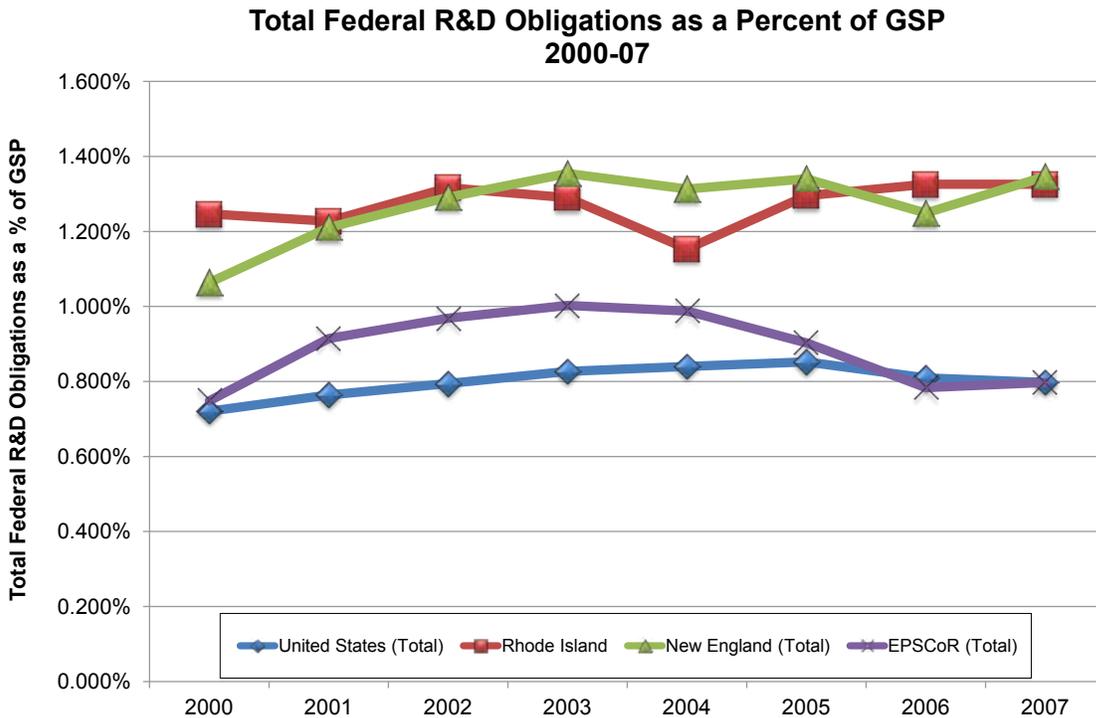
Federal R&D Obligations

- Rhode Island 1-Year Trend =
- Rhode Island 5-Year Trend ^
- Rhode Island Compared to EPSCoR ^
- Rhode Island Compared to New England v
- Rhode Island Compared to U.S. ^
- Rhode Island's Most Recent National Ranking 8

SUMMARY

Rhode Island's federal R&D obligations as a percent of Gross State Product (GSP) remained relatively constant through 2007.⁶ During this period, the state's levels remained similar to levels throughout New England as a whole and higher than that of the U.S. and EPSCoR levels (see Figure 3-13). In 2007, federal R&D obligations represented 1.326 percent of GSP, which is higher than the U.S. percentage of .798, and of EPSCoR states (.797 percent), but was below the New England percentage of 1.347. In 2007, Rhode Island ranked 8th on this indicator nationally.

Figure 3-13.



RHODE ISLAND'S RESEARCH & DEVELOPMENT

Federal R&D Obligations

WHY THIS IS SIGNIFICANT

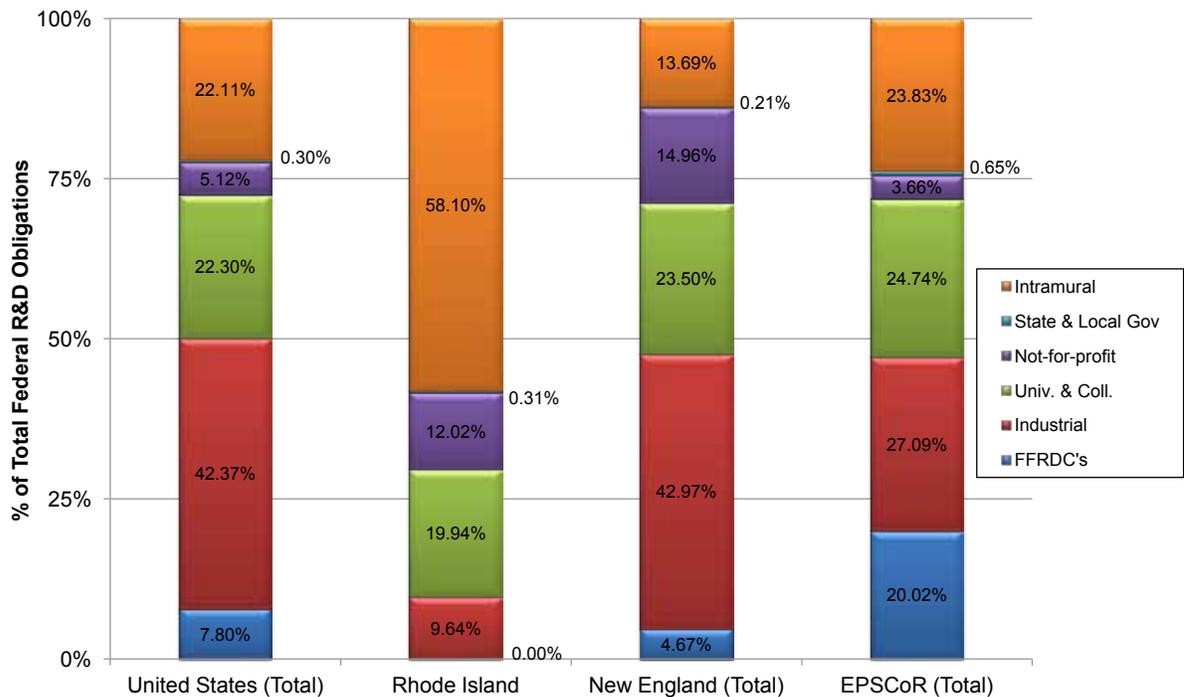
Federal grants and contracts for R&D are a significant source of funding for states and, since most federal R&D grants and contracts are competitive, the relative position of states on this measure reflects the strength of their R&D performers. They also help leverage additional R&D funding from other sources. The agencies that support the most R&D in a state is another indicator of the relative strength of the state in particular sectors, and demonstrates the contributions of state R&D efforts to building targeted clusters if these are aligned.

RELATED

In 2007, intramurals (any agency of the federal government) were Rhode Island's largest performer of federally-funded R&D, accounting for 58.1 percent of the state's federal R&D obligations (see Figure 3-14). Rhode Island is far behind the reference geographies in industrial performance at 9.64 percent, and in federally funded research and development centers⁷ (FFRDC's) at 0.00%. The percentage of university and college federal R&D obligations is just below that of the reference geographies at 19.94 percent. The total federal R&D obligations for Rhode Island across all performance sectors in 2007 were \$628 million.

Figure 3-14.

Federal R&D Obligations by Performance Sector – 2007



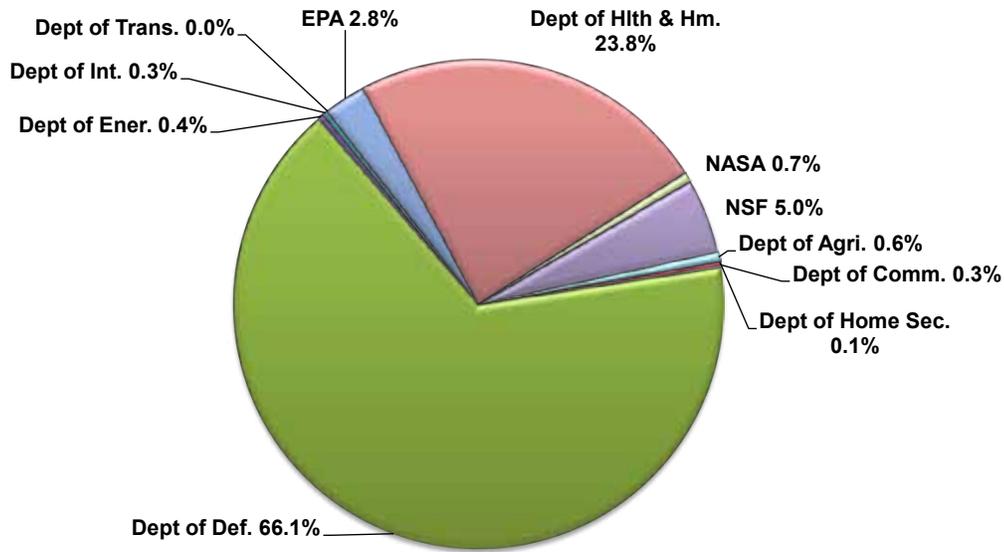
RHODE ISLAND'S RESEARCH & DEVELOPMENT

Federal R&D Obligations

For all of the reference geographies, the Department of Defense contributes the largest share of all federal R&D obligations (see Figure 3-15). The percentage attributable to the Department of Defense for Rhode Island, 66.1 percent, is larger than that of all the reference geographies: U.S. was 52.45 percent, New England at 58.65 percent, and EPSCoR at 42.25 percent. For all geographies, the Department of Health and Human Services came in second, except for EPSCoR, where the Department of Energy made up the second largest category with 23.39 percent.

Figure 3-15.

Federal R&D Obligations by Funding Agency – Rhode Island-2007



Total Federal R&D Obligations: \$627,538,000

RHODE ISLAND'S RESEARCH & DEVELOPMENT

Federal R&D Obligations

Figure 3-16 details the National Institute of Health extramural research awards over the last four years. Brown University with \$261 million in funding for all years combined was the largest recipient followed by Rhode Island Hospital at \$132 million.

Figure 3-16.

NIH Extramural Research Awards in Rhode Island 2007-2010					
	2007	2008	2009	2010	Total 2007-10
Brown University	\$58,898,926	\$61,987,608	\$75,657,972	\$65,198,312	\$261,742,818
Rhode Island Hospital	\$33,083,136	\$28,130,907	\$39,212,270	\$31,632,739	\$132,059,052
Miriam Hospital	\$13,505,524	\$11,631,632	\$15,640,388	\$14,508,978	\$55,286,522
University of Rhode Island	\$7,869,952	\$9,842,305	\$14,989,644	\$12,992,878	\$45,694,779
Women and Infants Hospital - Rhode Island	\$7,477,456	\$9,518,504	\$11,197,749	\$9,066,092	\$37,259,801
Butler Hospital	\$10,837,829	\$9,710,348	\$7,421,672	\$6,247,435	\$34,217,284
Roger Williams Hospital	\$3,497,841	\$2,579,683	\$2,772,325	\$2,785,424	\$11,635,273
Memorial Hospital of Rhode Island	\$806,814	\$1,269,182	\$2,817,685	\$2,058,364	\$6,952,045
Gordon Research Conferences	\$1,257,963	\$988,032	\$1,261,763	\$1,303,484	\$4,811,242
Emma Pendleton Bradley Hospital	\$155,786	\$791,613	\$1,539,850	\$1,354,421	\$3,841,670
Prothera Biologics, LLC	\$1,654,416		\$1,362,176	\$1,000,000	\$4,016,592
QUALITYMETRIC, INC.	\$2,470,017	\$1,073,982			\$3,543,999
Epivax Inc.	\$716,900	\$1,406,231	\$523,593	\$173,764	\$2,820,488
Pro-Change Behavior Systems, Inc.	\$144,116	\$533,634	\$1,048,511	\$346,558	\$2,072,819
Myomics Inc.	\$99,912	\$348,137	\$489,231	\$502,757	\$1,440,037
BCR Diagnostics	\$99,930	\$431,079	\$267,928		\$798,937
Rhode Island College	\$108,000	\$319,622	\$131,339		\$558,961
NABSYS, INC.	\$249,137	\$248,597			\$497,734
In CYTU, Inc.				\$333,214	\$333,214
Foresight Science and Technology, Inc.		\$300,000			\$300,000
Providence College				\$266,290	\$266,290
Cellcure, Inc.	\$250,001				\$250,001
Assn/Medical Educ & Res in Subs Abuse	\$69,369	\$70,865	\$34,500	\$34,500	\$209,234
MJ Data Corporation, Ltd.	\$129,972				\$129,972
American Academy of Addiction Psychiatry	\$25,000	\$50,000	\$50,000		\$125,000
Latino Public Radio		\$16,387	\$13,265		\$29,652
Neurohealth	\$27,000				\$27,000
TOTAL	\$143,434,997	\$141,248,348	\$176,431,861	\$84,606,898	\$545,722,104

RHODE ISLAND'S RESEARCH & DEVELOPMENT

Federal R&D Obligations

SOURCES: Federal R&D obligations⁸ are from National Science Foundation/Division of Science Resources Statistics; Survey of Federal Funds for Research and Development: Fiscal Years 2003-07; <http://www.nsf.gov/statistics>.

Gross state product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2010; <http://www.bea.gov/regional/gsp/>.

NIH Funding - U.S. Department of Health and Human Services. NIH; National Institute of Health. Research Portfolio Online Reporting Tools. <http://report.nih.gov/award/state/state09.cfm>.

RHODE ISLAND'S RESEARCH & DEVELOPMENT

Endnotes

¹ Total R&D includes R&D for all performance sectors including industry, universities and colleges, non-profit institutions, federal government, and federally funded research development centers from all sources of funding. Not-for-profit performed R&D as reported by NSF includes only that which is funded by the federal government. Therefore, this data understates the intensity of not-for-profit performed R&D.

² Academic Fields of Study are defined as: Engineering (aeronautical and astronautical, bioengineering and biomedical, chemical, civil, electrical, mechanical, metallurgical and materials); Physical Sciences (astronomy, chemistry, physics); Environmental Sciences (atmospheric, earth sciences, oceanography); Mathematical Sciences; Computer Sciences; Life Sciences (agricultural, biological, medical); Psychology; Social Sciences (economics, political science, sociology); unclassified.

³ Academic R&D performance excludes federally funded research and development centers administered by academic institutions.

⁴ For more detail on the dramatic decline of Industrial R&D, please see *The Defense Industry in Rhode Island Industry Sector Report December 2008* by Ninigret Partners, and *Rhode Island R&D 2010: Research and Engineering Investments for Economic Growth* by The Alliance for Science and Technology Research in America.

⁵ Obligations are the amounts for orders placed, contracts awarded, services received, and similar transactions during a given period, regardless of when the funds were appropriated and when future payment of money is required. Obligations differ from expenditures in that funds allocated by federal agencies during one fiscal year may be spent by the recipient institution either partially or entirely during one or more subsequent years.

⁶ Ibid.

⁷ This includes federally funded research and development centers (FFRDC's). These are R&D-performing organizations that are exclusively or substantially financed by the Federal Government and are supported by the Federal Government either to meet a particular R&D objective or, in some instances, to provide major facilities at universities for research and associated training purposes. Each center is administered either by an industrial firm, a university, or another nonprofit institution. Intramural performers are the agencies of the Federal Government. Their work is carried on directly by federal agency personnel.

⁸ Includes the obligations of the 10 or 11 major R&D supporting agencies that were requested to report this information; together they represent 96 percent or more of the total R&D obligations.

WORKFORCE FOR THE KNOWLEDGE ECONOMY

OVERVIEW

Success in developing math and science skills begins at the K-12 level. Rhode Island eighth grade students performed at a level below that of the reference groups. Rhode Island's average math score in 2009 on the National Assessment of Educational Progress (NAEP) placed its eighth graders 37th in the nation. In 2009, Rhode Island eighth graders turned in the 33rd highest science scores in the country on the NAEP.

Today's science and technology intensive careers demand an education beyond that of a high school level. Rhode Island has seen its public high school graduation rates decline steadily from 2005 to 2008, placing it lower than most reference groups but still slightly higher than the U.S. rate. Rhode Island has, however, remained in front of the reference groups in regard to Science and Engineering degrees awarded per 1,000 residents.

Supporting a vibrant technology and innovation economy requires a regular supply of workers with college and advanced degrees in science and engineering related fields. Graduate enrollments in Science and Technology per 1,000 residents have remained steady with an increase since 2000, and in 2008, Rhode Island remained below New England but above the other reference groups.

With the percent of population 25 and older that holds a bachelor's degree, Rhode Island saw a peak and then a slump, followed by a rebound. On both the bachelor's degree or higher and the advanced degree indicators, in 2009, Rhode Island remained behind the New England states but ahead of the other reference groups.

Degrees and knowledge must convert to jobs to grow the state's economy. Rhode Island performs better than the EPSCoR states as a whole in terms of scientists and engineers in the workforce but below that of the U.S and the New England totals. Ph.D. scientists and engineers are the individuals who lead the curve, creating a vibrant research and innovation environment. Rhode Island has seen a decrease in the amount of scientists and engineers in the workforce per 1,000 people from 2004 to 2008.



INDICATORS

Math Scores for 8th Graders

Science and Engineering Degrees Awarded

Education Attainment - Percent of Population 25 or older with a BA or More

Scientists and Engineers in the Workforce

WORKFORCE FOR THE KNOWLEDGE ECONOMY

Math Scores for 8th Graders

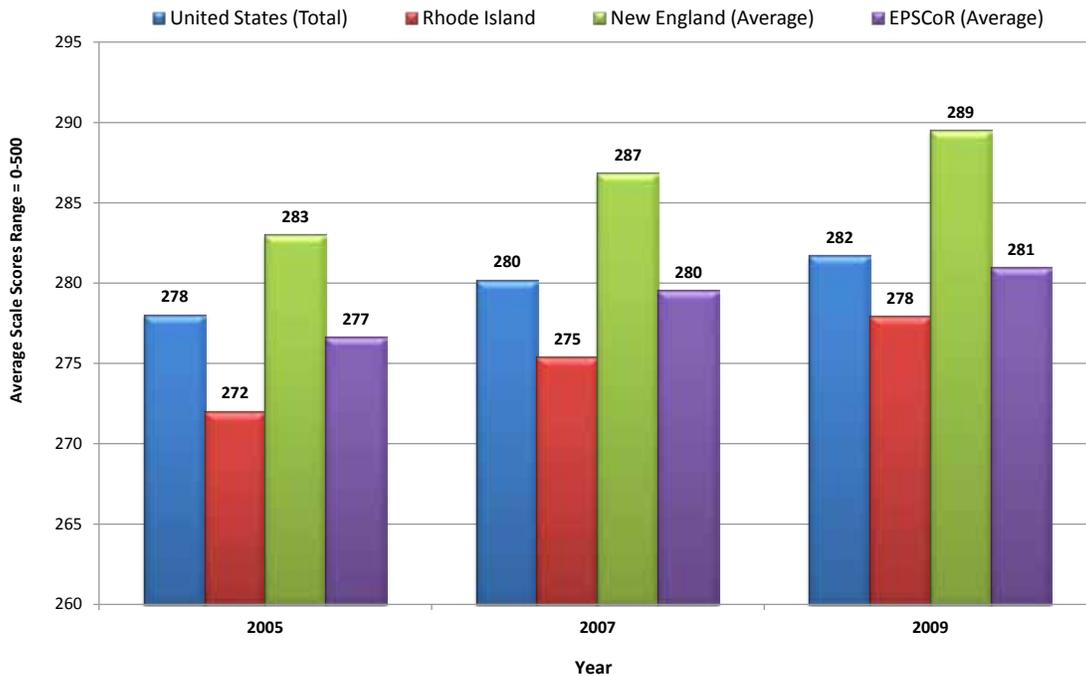
- Rhode Island 1-Year Trend ▲
- Rhode Island 5-Year Trend ▲
- Rhode Island Compared to EPSCoR ▼
- Rhode Island Compared to New England ▼
- Rhode Island Compared to U.S. ▼
- Rhode Island's Most Recent National Ranking **37**

SUMMARY

The National Assessment of Educational Progress measures academic scores among 8th grade students. Scores for states are based on a scale from 0-500. In 2009, Rhode Island math scores on average for the state were 278, which lagged that of the reference groups (see Figure 4-1). New England states overall had an average score of 289 and scores for the nation as a whole and for EPSCoR states were 282 and 281 respectively in 2009. All reference geographies experienced increases in scores since 2005.

Figure 4-1.

National Assessment of Educational Progress – Math Scores (Average Scale Scores) for 8th Graders – 2005, 2007, 2009



WORKFORCE FOR THE KNOWLEDGE ECONOMY

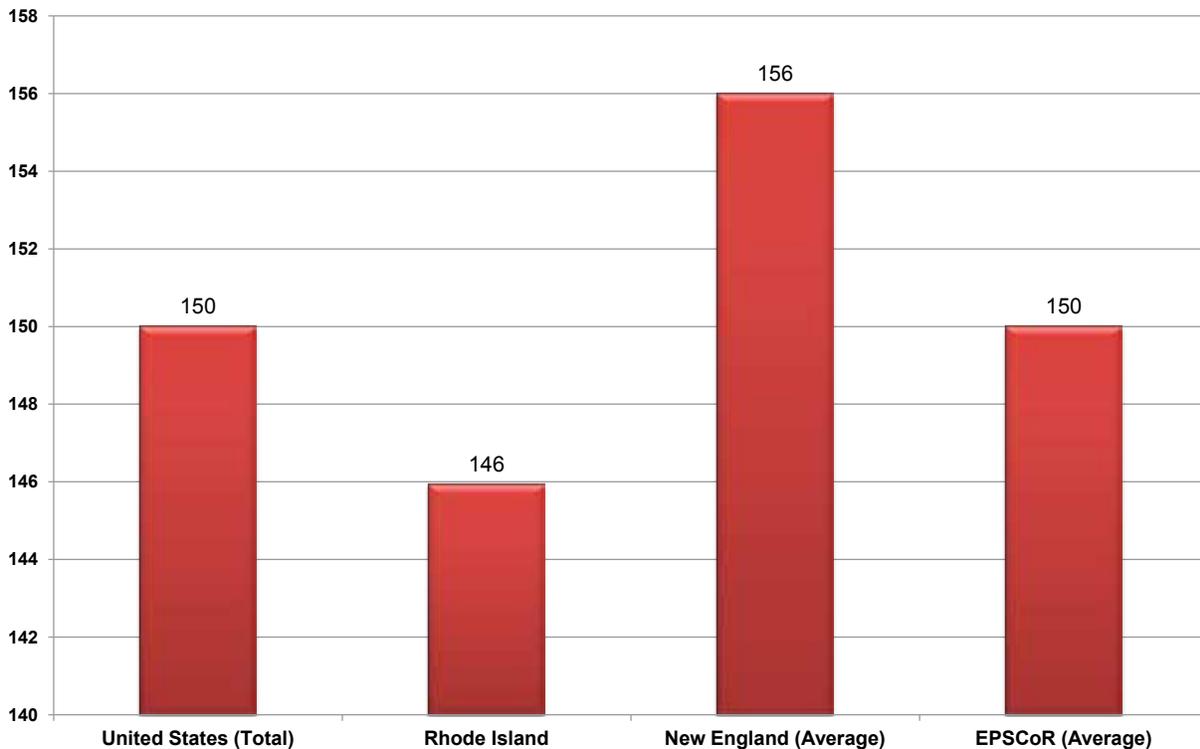
Math Scores for 8th Graders

WHY THIS IS SIGNIFICANT

Student performance on standardized tests can provide insight into the potential knowledge economy of a given state. Eighth grade students' math and science scores in particular are an indicator of a state's ability to prepare their students for jobs in the research and development fields. National Assessment of Educational Progress scores also provide an indicator of the size of a state's future workforce in R&D¹.

Figure 4-2.

**National Assessment of Educational Progress –
Science Scores
(Average Scale Scores) for 8th Graders – 2009**



RELATED

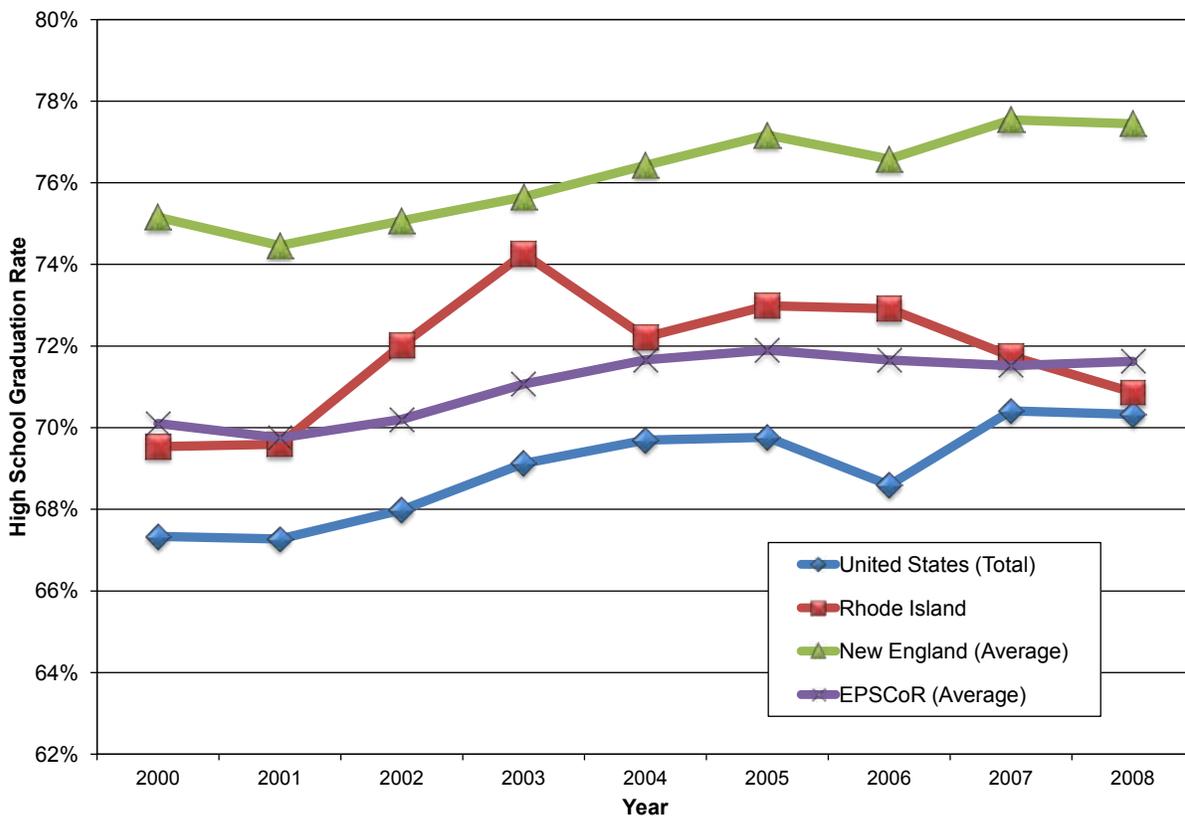
As with math scores, science scores can provide insight into the preparedness of the future workforce. In 2009, Rhode Island lagged the reference groups with an average score of 146 (see Figure 4-2). The New England states had the highest at 156, while the EPSCoR states and the United States as a whole had an average score of 150. Compared to previous years,² Rhode Island has dropped in rank from 21st in 1996 and 2000 to 28th in 2005 and 33rd in 2009

WORKFORCE FOR THE KNOWLEDGE ECONOMY

Math Scores for 8th Graders

In addition to standardized test scores, high school graduation rates are an indicator of future workforce skills and abilities. In Rhode Island, the high school graduation rate³ rose from 69.5% in 2000 to 74.3% in 2003 (see Figure 4-3). Since then, graduation rates in Rhode Island have declined to 70.9% in 2008, placing it below both the New England states and EPSCoR states.

Figure 4-3.
High School Graduation Rate 2000-08



SOURCES: Math and Science Scores for 8th Graders - U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NEAP), 1992, 1996, 2000, 2003, 2005, 2007, and 2009 Mathematics Assessments. <http://www.nces.ed.gov/nationsreportcard/>.

Public High School Graduation Rate - "Chance for College by Age 19 - 1986-2008," Thomas Mortenson, Postsecondary Education Opportunity; 8/5/2010; <http://www.postsecondary.org>.

WORKFORCE FOR THE KNOWLEDGE ECONOMY

Science and Engineering Degrees Awarded

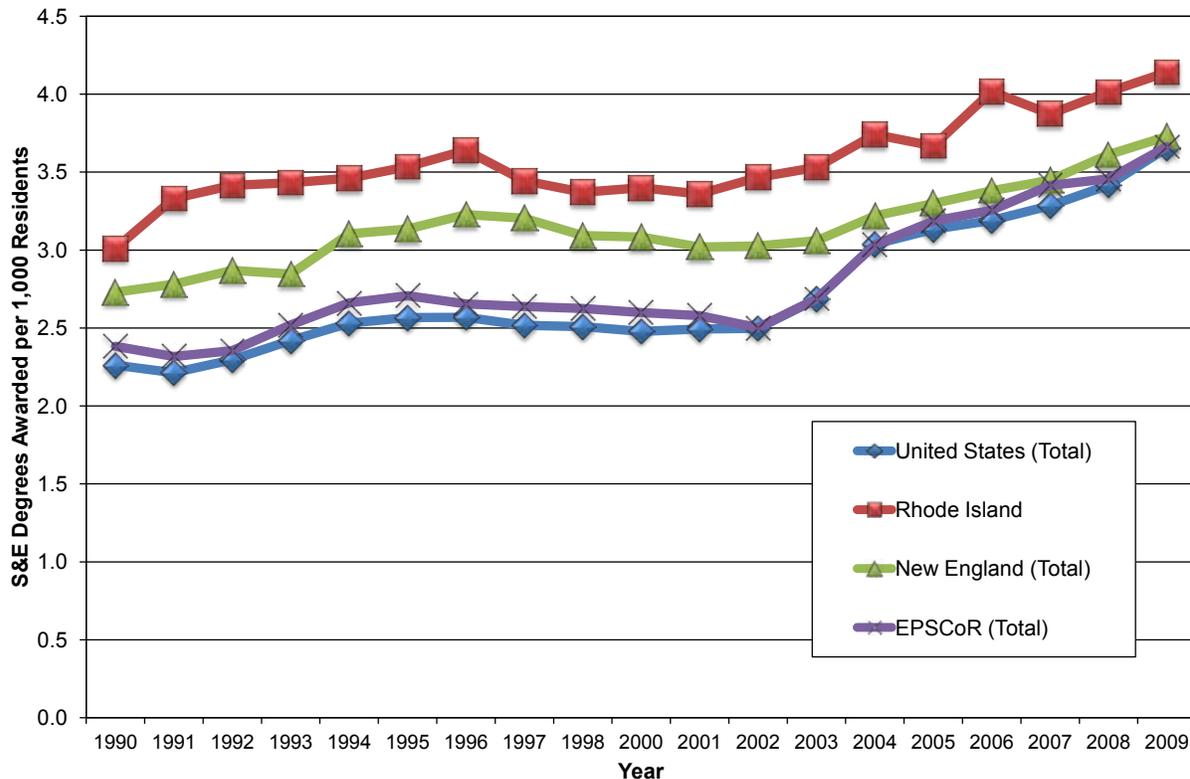
- Rhode Island 1-Year Trend [^](#)
- Rhode Island 5-Year Trend [^](#)
- Rhode Island Compared to EPSCoR [^](#)
- Rhode Island Compared to New England [^](#)
- Rhode Island Compared to U.S. [^](#)
- Rhode Island's Most Recent National Ranking **15**

SUMMARY

In 2009, Rhode Island awarded 4.140 science and engineering degrees for every 1,000 residents which places the state ahead of the U.S., New England, and EPSCoR comparison groups (see Figure 4-4). Rhode Island showed an increase of over 21% in the number of science and engineering degrees awarded from 2000 to 2009.

Figure 4-4.

**S&E Degrees Awarded per 1,000 Residents
2000-09**



WORKFORCE FOR THE KNOWLEDGE ECONOMY

Science and Engineering Degrees Awarded

WHY THIS IS SIGNIFICANT

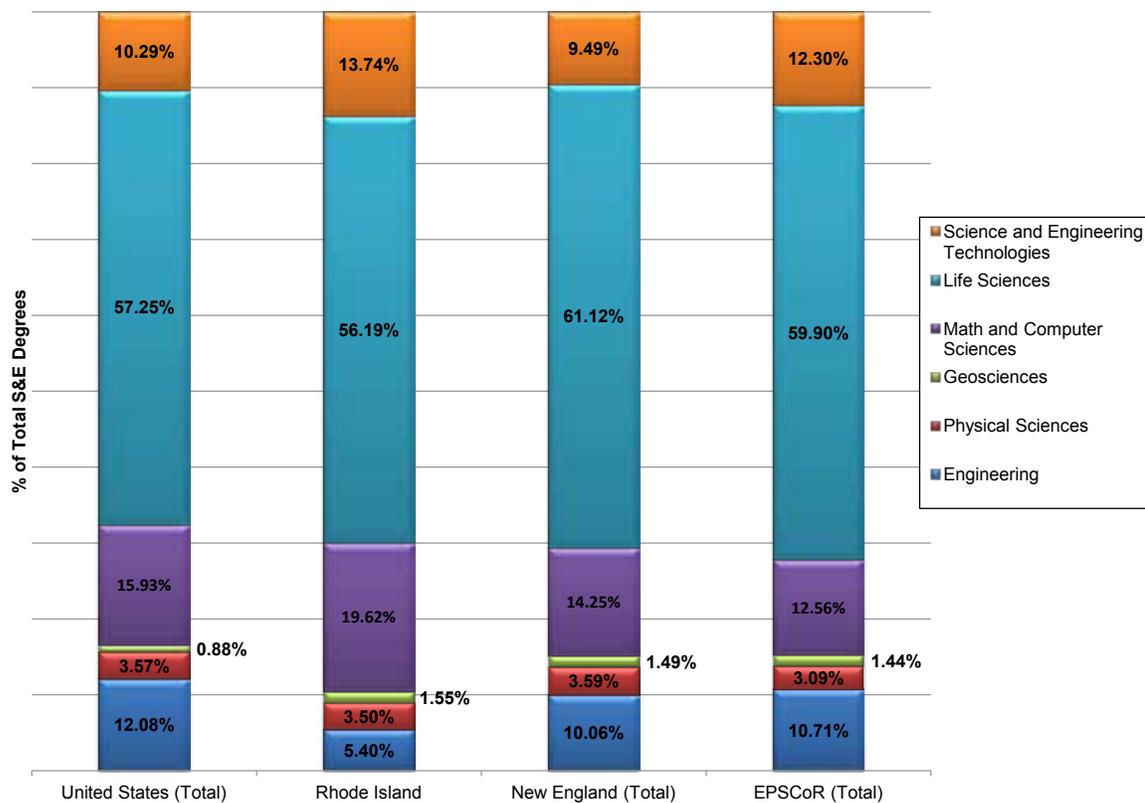
This is a measure of the state's creation of a workforce geared toward research and development and the skills and knowledge to support a technology-driven economy. The awarding of degrees in the science and engineering fields is a good determinant of whether students will enter these fields in the workforce.

RELATED

In 2009, Rhode Island had a higher concentration of degrees in Science and Engineering Technologies and Math and Computer Sciences compared to all the other reference groups (see Figure 4-5).

Figure 4-5.

Science & Engineering Degrees by Discipline – 2009



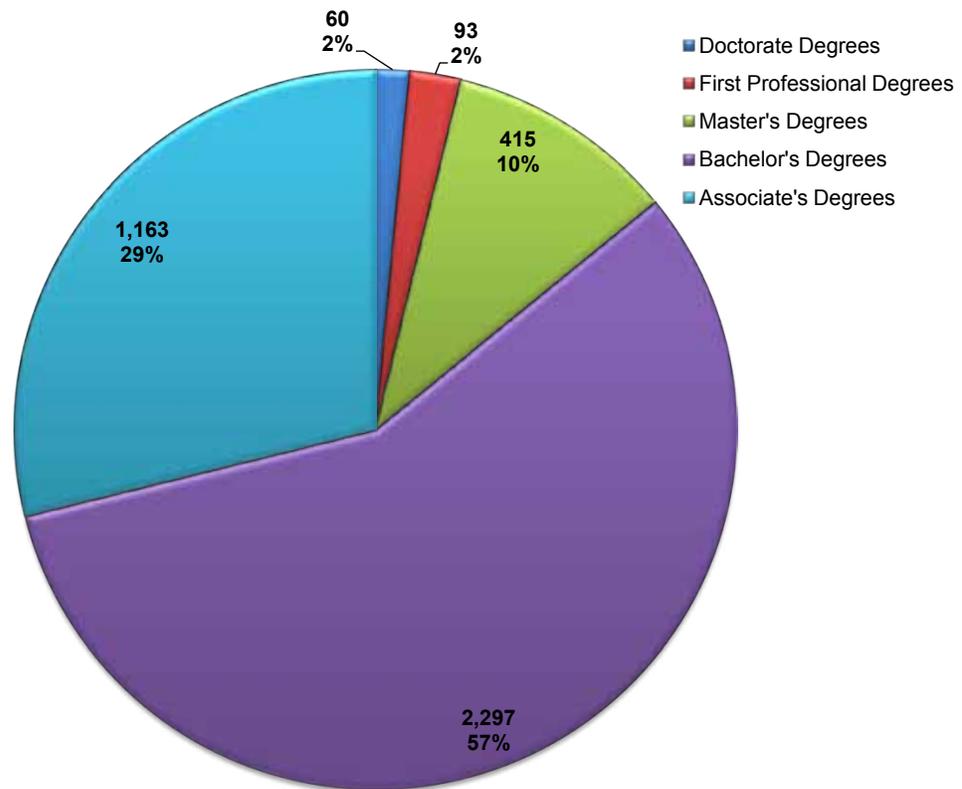
WORKFORCE FOR THE KNOWLEDGE ECONOMY

Science and Engineering Degrees Awarded

Research and development and technology based businesses often require skilled workers with advanced degrees. Of the 4,028 science and engineering degrees awarded in Rhode Island in 2009, 568, or 14.1 percent were master’s degrees or higher (see Figure 4-6).

Figure 4-6.

S&E Degrees Awarded in Rhode Island by Degree Level - 2009



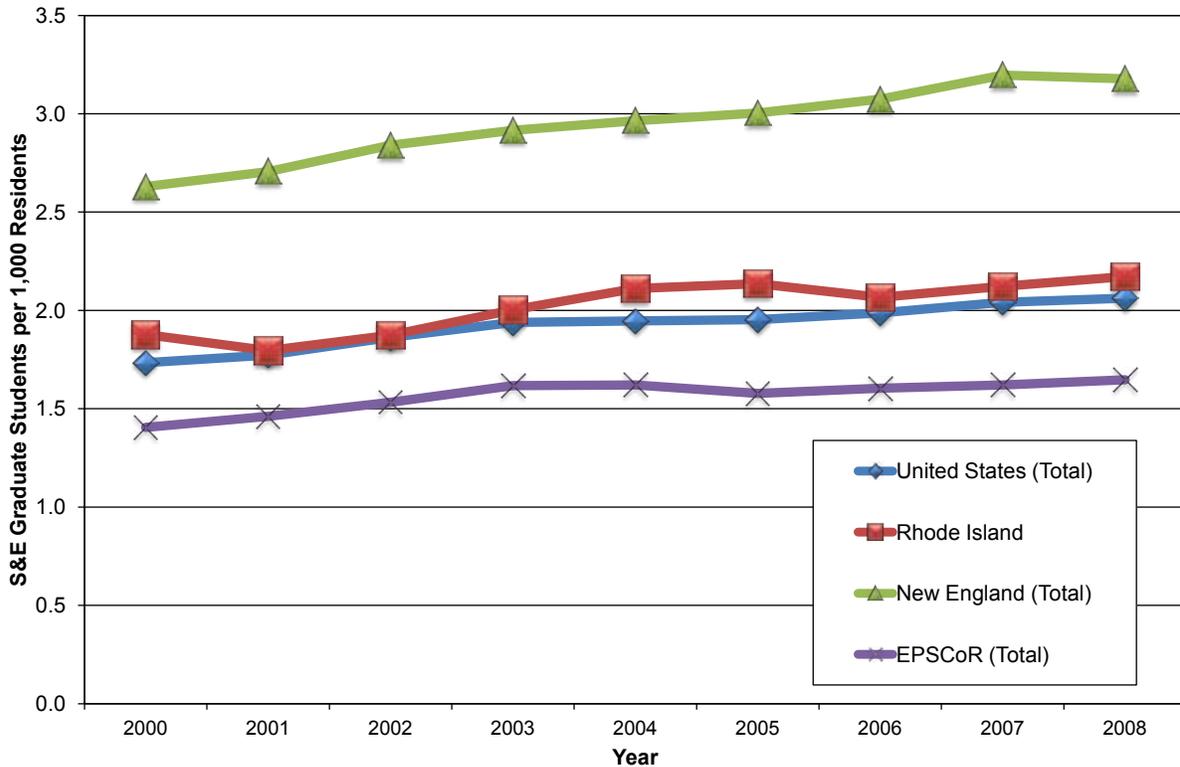
Future degrees at the graduate level are driven by existing graduate enrollments. In 2008, Rhode Island had 2.172 graduate enrollments per 1,000 residents (see Figure 4-7) ranking it 18th nationally on this indicator. In 2008, Rhode Island’s level was above that of the U.S. as a whole (2.062) and the EPSCoR states (1.647), but below the New England states as a whole (3.178).

WORKFORCE FOR THE KNOWLEDGE ECONOMY

Science and Engineering Degrees Awarded

Figure 4-7.

**S&E Graduate Student Enrollments per 1,000 Residents
2000-08**



SOURCES: S&E Degrees Awarded - Extracted from NSF WebCASPAR Database System, <http://webcaspar.nsf.gov>, based on the Higher Education General Information Survey and Integrated Post-Secondary Education Data System, National Center for Education Statistics, U.S. Department of Education, www.nces.ed.gov. (Data for 1999 was unavailable.)

Population - April 1, 1990 to April 1, 2000; Population Division, U.S. Census Bureau; Release Date: April 11, 2002; July 2000-July 2010 -Table 1: Annual Estimates of the Population for the United States and States, and for Puerto Rico: April 1, 2000 to July 1, 2010 (NST-EST2010-alldata), Population Division, U.S. Census Bureau, Release Date: February, 2011; <http://www.census.gov/popest/estimates.php>.

S&E Graduate Students - NSF WebCASPAR Database System based on "Survey of Graduate Students and Postdoctorates in Science and Engineering," National Science Foundation and National Institutes of Health; <http://webcaspar.nsf.gov>.

WORKFORCE FOR THE KNOWLEDGE ECONOMY

Education Attainment - Percent of Population 25 or older with a BA or More

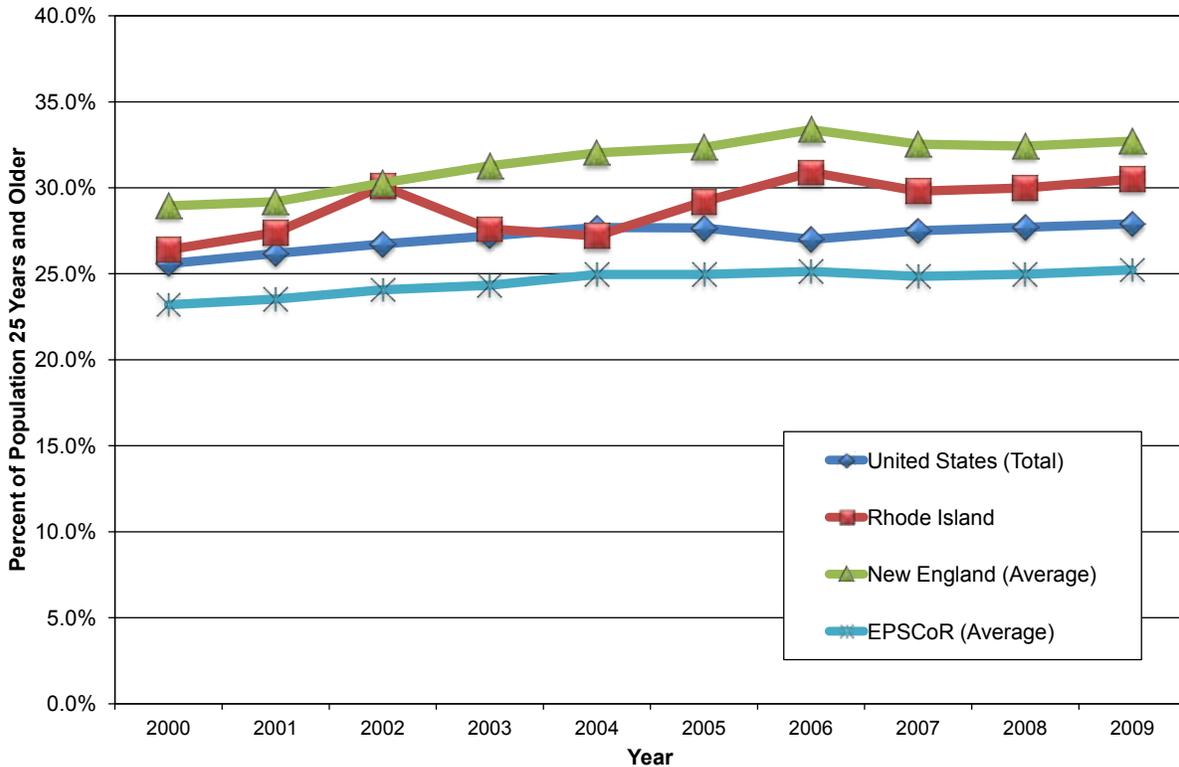
- Rhode Island 1-Year Trend ▲
- Rhode Island 5-Year Trend ▲
- Rhode Island Compared to EPSCoR ▲
- Rhode Island Compared to New England ▼
- Rhode Island Compared to U.S. ▲
- Rhode Island's Most Recent National Ranking 14

SUMMARY

In 2009, 30.5% of Rhode Island's population had a bachelor's degree; that was higher than the United States (27.9%) and the EPSCoR states (25.2%) but remained behind the New England states (32.7%) (See Figure 4-8). Rhode Island ranks 14th on this indicator.

Figure 4-8.

Percent of Population 25 Years and Older With a BA Degree or More 2000-09



WORKFORCE FOR THE KNOWLEDGE ECONOMY

Education Attainment - Percent of Population 25 or older with a BA or More

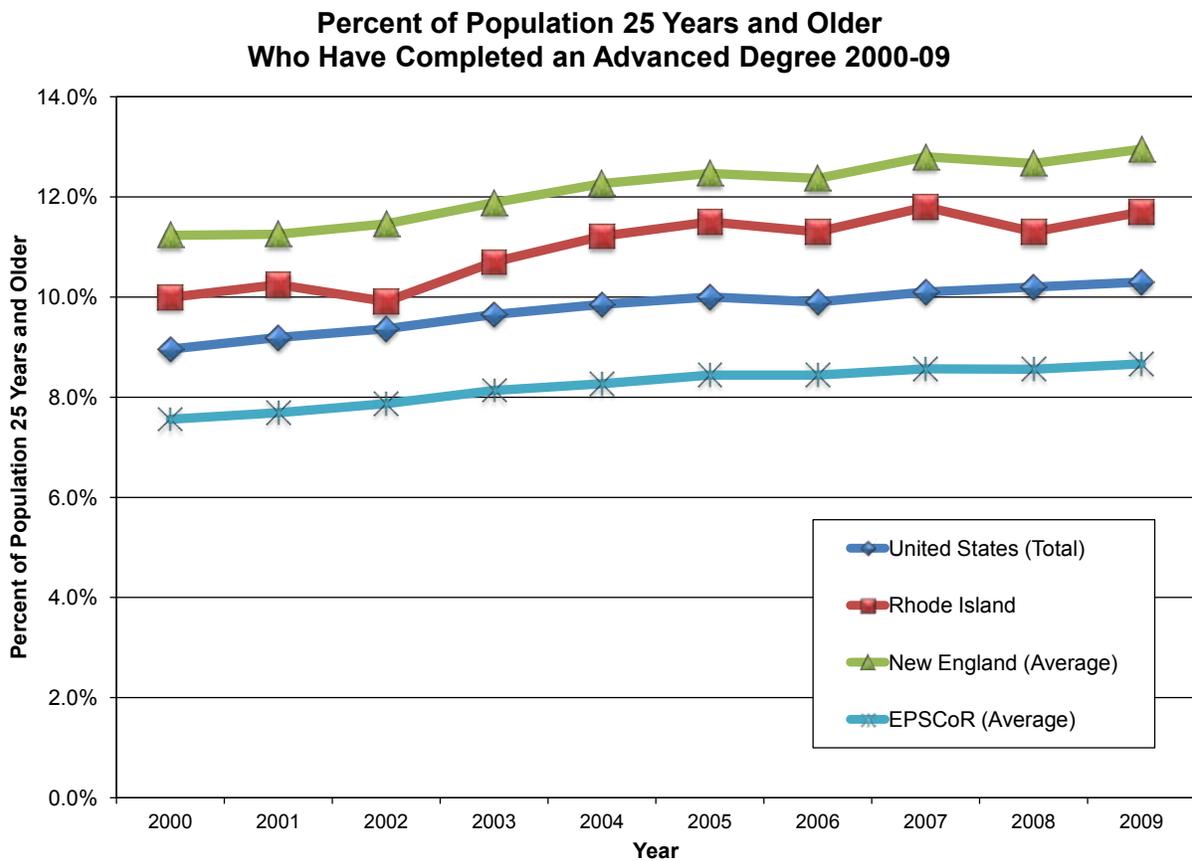
WHY THIS IS SIGNIFICANT

National research indicates that the economic well-being of a state is strongly tied to educational attainment (bachelor's degree or higher). Wages are typically higher in technology-intensive industries; these are the same industries that increasingly require workers with postsecondary degrees. Income levels are considerably higher for persons with college and advanced degrees.

RELATED

In 2009, 11.7% of Rhode Island's population 25 years and older held an advanced degree (masters and beyond). The state remains below New England, but above both the EPSCoR states and the U.S. (see Figure 4-9).

Figure 4-9.



SOURCES: Education Attainment - U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement; 1995-2006; <http://www.census.gov/population/www/socdemo/educ-attn.html>; U.S. Census Bureau, American Community Survey; 2007-09; <http://www.census.gov/acs/www/>.

WORKFORCE FOR THE KNOWLEDGE ECONOMY

Scientists and Engineers in the Workforce

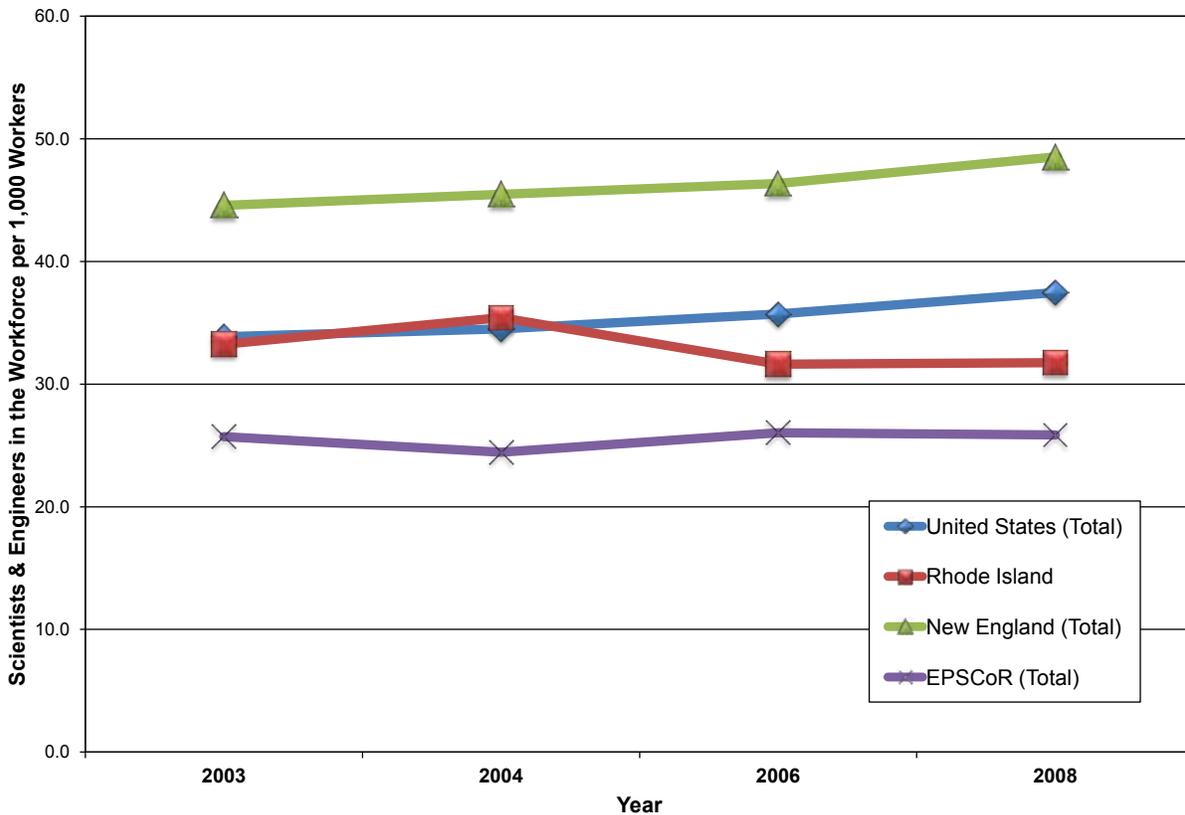
- Rhode Island 1-Year Trend =
- Rhode Island 5-Year Trend ▼
- Rhode Island Compared to EPSCoR ▲
- Rhode Island Compared to New England ▼
- Rhode Island Compared to U.S. ▼
- Rhode Island's Most Recent National Ranking **30**

SUMMARY

In 2008, Rhode Island had 18,090 scientists and engineers in its workforce representing 31.76 scientists and engineers per 1,000 workers (see Figure 4-10). In 2008, Rhode Island lagged New England (48.53) and the U.S. as a whole (37.47) on this indicator, but exceeded the level of the EPSCoR states (25.86). In 2008, Rhode Island ranked 30th on this indicator.

Figure 4-10.

Scientists & Engineers in the Workforce Per 1,000 Workers 2003-08



WORKFORCE FOR THE KNOWLEDGE ECONOMY

Scientists and Engineers in the Workforce

WHY THIS IS SIGNIFICANT

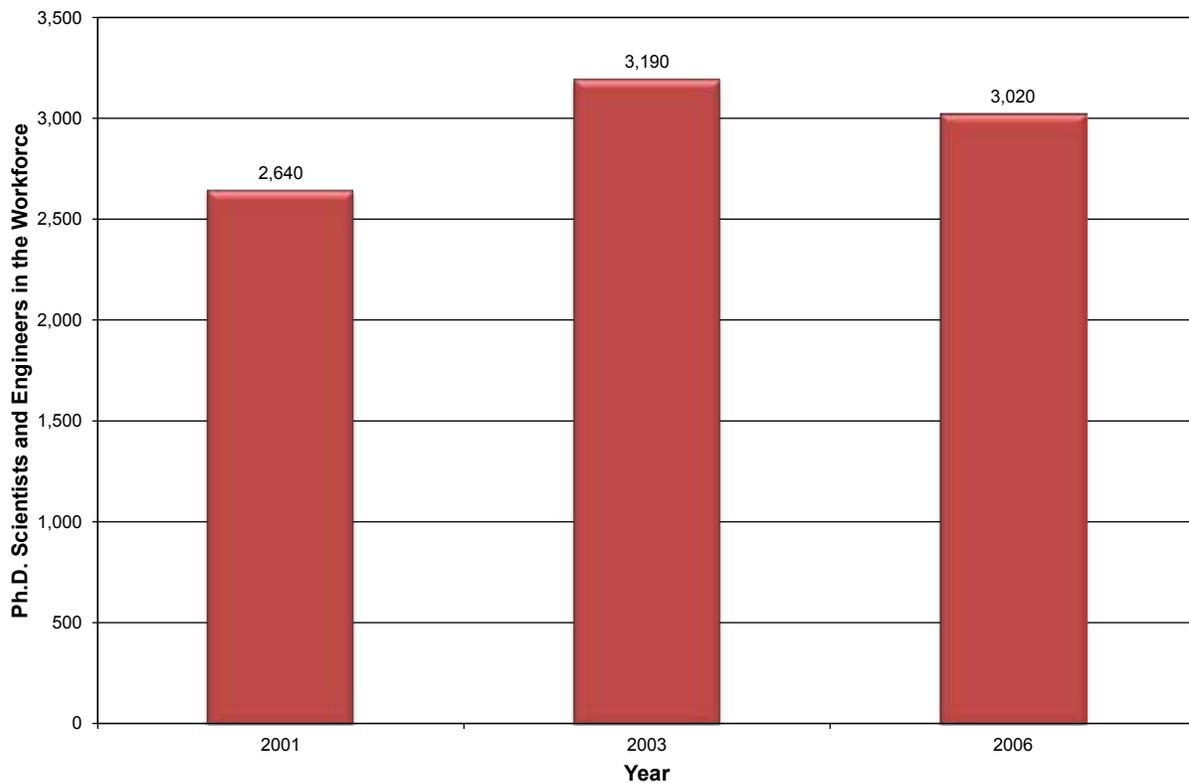
A labor market of scientists and engineers is essential to creating a vibrant research, development and technology enterprise. There is a direct correlation between the percent of the labor force in science and engineering occupations and the growth of the innovation-based industries. This indicator is a measure of the state's ability to attract and retain highly skilled and highly educated workers who are critical to an innovation driven economy.

RELATED

Doctoral level researchers design and lead the research and development programs that generate new products, processes, technologies, and services. They also build vital linkages between Rhode Island businesses and institutions with international R&D expertise. In 2006, Rhode Island had 3,020 Ph.D. scientists and engineers in its workforce, down from the 2003 level of 3,190 (see Figure 4-11).

Figure 4-11.

**Ph.D. Scientists & Engineers in the Workforce in Rhode Island
2001-06**



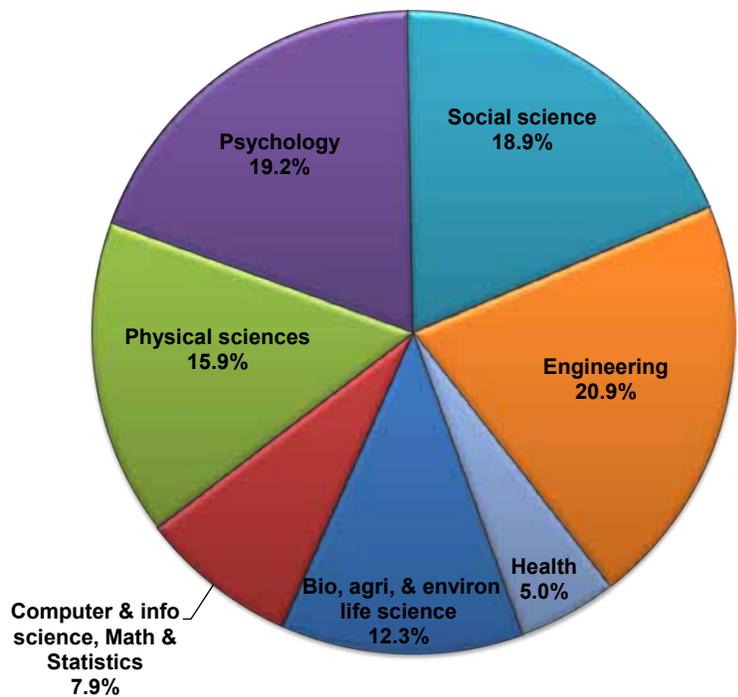
WORKFORCE FOR THE KNOWLEDGE ECONOMY

Scientists and Engineers in the Workforce

Engineering is the largest field of study among Rhode Island scientists and engineers with a Ph.D., followed by social sciences and psychology (see Figure 4-12).

Figure 4-12.

**Ph.D. Scientists & Engineers in the Workforce by Field of Study
Rhode Island – 2006**



Total Ph.D Scientists & Engineers in the Workforce: 3,020

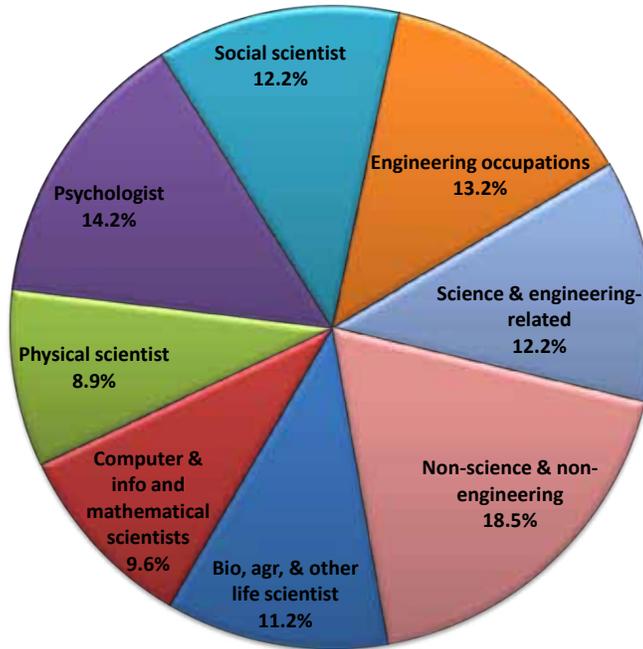
In 2008, Rhode Island Ph.D. level Scientists & Engineers were employed in a variety of occupations, with non-science & non-engineering occupations representing the biggest segment (see Figure 4-13).

WORKFORCE FOR THE KNOWLEDGE ECONOMY

Scientists and Engineers in the Workforce

Figure 4-13.

**Ph.D. Scientists & Engineers in the Workforce by Occupation
Rhode Island – 2006**



Total Ph.D Scientists & Engineers in the Workforce: 3,020

SOURCES: PhD Scientists and Engineers - National Science Foundation, Division of Science Resources Statistics, Science and Engineering Indicators 2008, from the Survey of Doctorate Recipients; <http://www.nsf.gov/statistics/seind08>.

Workers - Civilian Labor Force - U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics - <http://www.bls.gov/lau/home.htm>; 1990-2000 reflects new modeling approach and reestimation as of March 2009; 2000-2009 reflects revised population controls and model reestimation through 2009.

WORKFORCE FOR THE KNOWLEDGE ECONOMY

Endnotes

¹ For assessment, Rhode Island uses New England Common Assessment Program (NECAP) which was developed in partnership with New Hampshire and Vermont to evaluate how well students and schools are achieving the learning targets contained in the Grade Level and Grade Span Expectations. NECAP score results for the referenced time period resulted in similar student achievement levels.

² 2009 NAEP Science scores cannot directly be compared to previous years due to changes in the assessment, however the ranking of Rhode Island against other states is comparable.

³ Public High School Graduation Rate equals high school graduates divided by the number of 9th grade enrollments 4 years prior. Data is based on "Public Elementary and Secondary Education Statistics," National Center for Education Statistics, www.nces.ed.gov.

⁴ See the Mortenson Research Seminar on Public Policy Analysis of Opportunity for Postsecondary Education, www.postsecondary.org for further analysis on this subject.

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Benchmarking the Rhode Island Knowledge Economy

November 2011



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