

Performance of EPSCoR States On Science and Technology Indicators

An overview prepared by:

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Introduction and Summary

Introduction

This overview was prepared by PolicyOne Research, Inc. in association with Catherine Renault of RTI International. Included in this overview is an examination of how states that are part of the Experimental Program to Stimulate Competitive Research (EPSCoR) are performing in the aggregate on key indicators of science and technology based economic development. This overview is meant to provide state and federal policymakers and others interested in the success of the EPSCoR program with a starting point for assessing progress.

The Experimental Program to Stimulate Competitive Research (EPSCoR) is a joint program of the National Science Foundation (NSF) and 25 U.S. states and territories. As indicated on the EPSCoR Website:

“The program promotes the development of the states' science and technology (S&T) resources through partnerships involving a state's universities, industry, and government, and the Federal research and development (R&D) enterprise. EPSCoR operates on the principle that aiding researchers and institutions in securing Federal R&D funding will develop a state's research infrastructure and advance economic growth. EPSCoR's goal is to maximize the potential inherent in a state's S&T resources and use those resources as a foundation for economic growth. EPSCoR focuses on those states that have historically received lesser amounts of Federal R&D funding and have demonstrated a commitment to develop their research bases and to improve the quality of science and engineering research conducted at their universities and colleges. The program currently operates in 25 states: Alabama, Alaska, Arkansas, Delaware, Hawaii, Idaho, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Dakota, Oklahoma, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, West Virginia, and Wyoming, as well as the Commonwealth of Puerto Rico and the U.S. Virgin Islands.”

Summary

The following is an overview of findings derived from the science and technology indicators. These are simply meant to be observations for further discussion and analysis and are not meant to represent strategies or solutions.

- ❖ EPSCoR states have historically performed less total R&D than the nation as a whole and since 1987; this gap has continued to grow.
- ❖ Compared to the nation as a whole, the EPSCoR states have less R&D performed by industry as a percent of all R&D and more R&D performed by universities and colleges.

Introduction and Summary

- ❖ One of the biggest differences between EPSCoR states and other states with regard to R&D capacity is on the level of industry R&D. EPSCoR states perform significantly less industry R&D than the rest of the nation.
- ❖ The gap between R&D performed by academic institutions in EPSCoR states and the U.S. as a whole is smaller than the gap in R&D performed within other sectors. Academic R&D for the EPSCoR states represents nearly 80% of the U.S. level.
- ❖ Federal support for R&D to EPSCoR states has not kept pace with federal R&D support nationwide. This gap increased in the 1990's.
- ❖ Historically lower than the U.S. as a whole, research and equipment expenditures at universities and colleges among EPSCoR states have caught up to the nation.
- ❖ EPSCoR states as a whole are less successful than other states at securing federal SBIR and STTR funding, though the gap since 1997 has declined.
- ❖ Venture capital trends among EPSCoR states typically follow national trends, with both being driven by the health of the national economy. However, EPSCoR states as a whole receive less venture capital investments than the U.S state combined.
- ❖ The number of patents issued to residents of EPSCoR states is less than half the national average.
- ❖ While high technology employment is growing among the EPSCoR states, it is growing at a slower rate than the nation as a whole.
- ❖ The EPSCoR states as a whole attract less Ph.D. scientists and engineers into the labor force than the U.S. as a whole.

In summary and as would be expected the EPSCoR states do not perform as well as their state counterparts on science and technology related indicators. This is expected because it is historical low performance which leads to EPSCoR designation. Over time however, it is reasonable to expect that these states, with support from the federal EPSCoR program, as well as other state and federal programs, should begin to perform more in line with other states. This should occur as investments are made in R&D capacity at research institutions and the R&D capacity begins to attract additional private investment.

The data presented here indicates that this positive trend among EPSCoR states is occurring with regard to academic R&D performance, investments in research and equipment expenditures, and securing funding from the federal SBIR/STTR programs. With regard to other indicators, little progress has been made over the past ten years.

Introduction and Summary

This overview suggests two important points. First, EPSCoR and other programs to build science and technology capacity in the states are much needed. Many states have not had the luxury of attracting sufficient private investment without additional federal and state support. Second, while progress is being made among EPSCoR states, regular assessment and evaluation is needed to help target support and policies to effectively build state science and technology capacity throughout the nation. There are simply not enough public resources at all levels of government to support investment without feedback and assessment.

About PolicyOne Research, Inc.

PolicyOne Research, Inc. of Portland, Maine is owned by Jim Damiciis and A. Mavourneen Thompson. Damiciis and Thompson each have over 15 years' experience in public policy research and analysis. PolicyOne leverages the principals' broad experience in core research and analysis techniques to provide clients with a full range of services within the areas of economic and community development, education policy, science and technology policy, program and service evaluation, state and local fiscal analysis, demographic analysis, survey design and analysis, and research and analysis to support advocacy.

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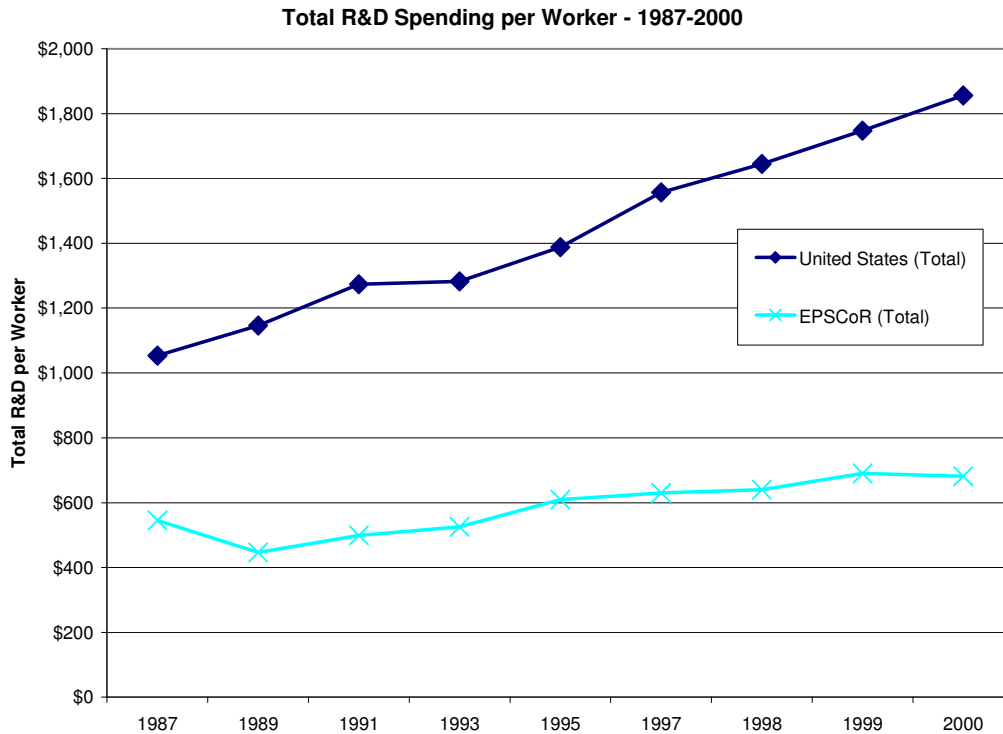
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Total R&D Performance

Summary

EPSCoR states have historically performed less total R&D than the nation as a whole and since 1987; this gap has continued to grow. In 2000, the EPSCoR states combined performed a total of \$682 in R&D per worker. This is less than 40% of the level for the U.S. as a whole during the same year at \$1,856 per worker.

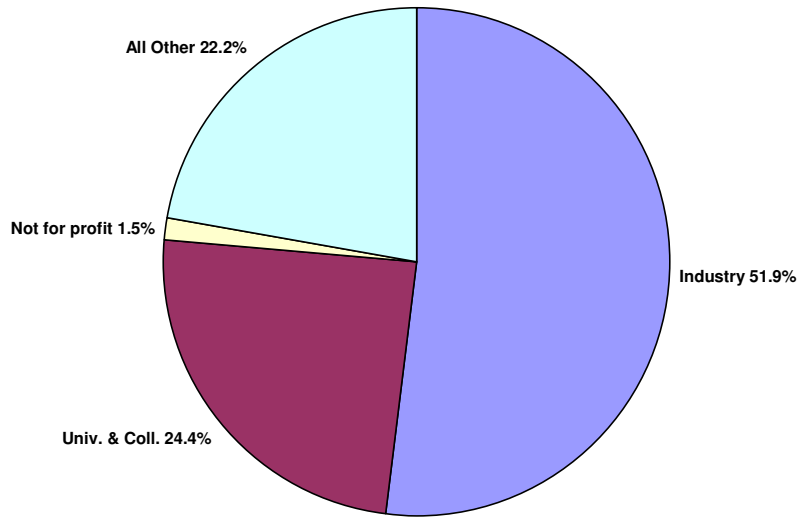


Related

In 2000, among all EPSCoR state combined, total R&D performed by industry accounted for the largest share of total R&D performance at 52 percent, followed by university and college R&D at 24 percent. Compared to the nation as a whole, the EPSCoR states have less R&D performed by industry as a percent of all R&D and more R&D performed by universities and colleges.

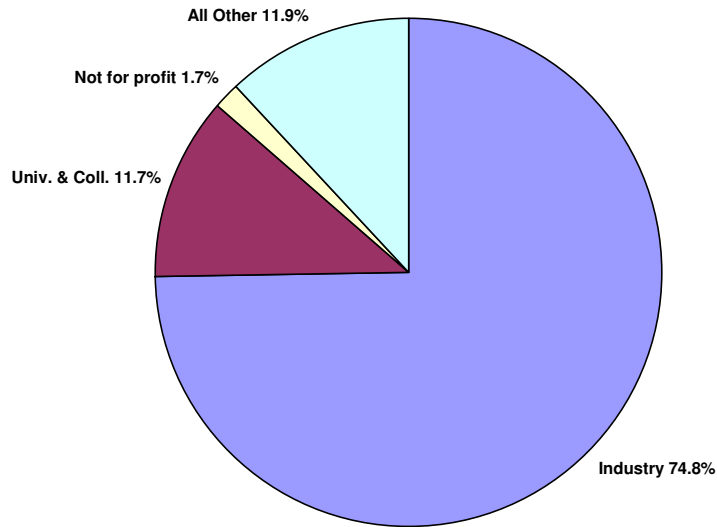
Science & Technology Indicators

R&D by Performance Sector - EPSCoR States - 2000



Total R&D Performed: \$14,456,271,000

R&D by Performance Sector - U.S. - 2000



Total R&D Performed: \$264,616,000,000

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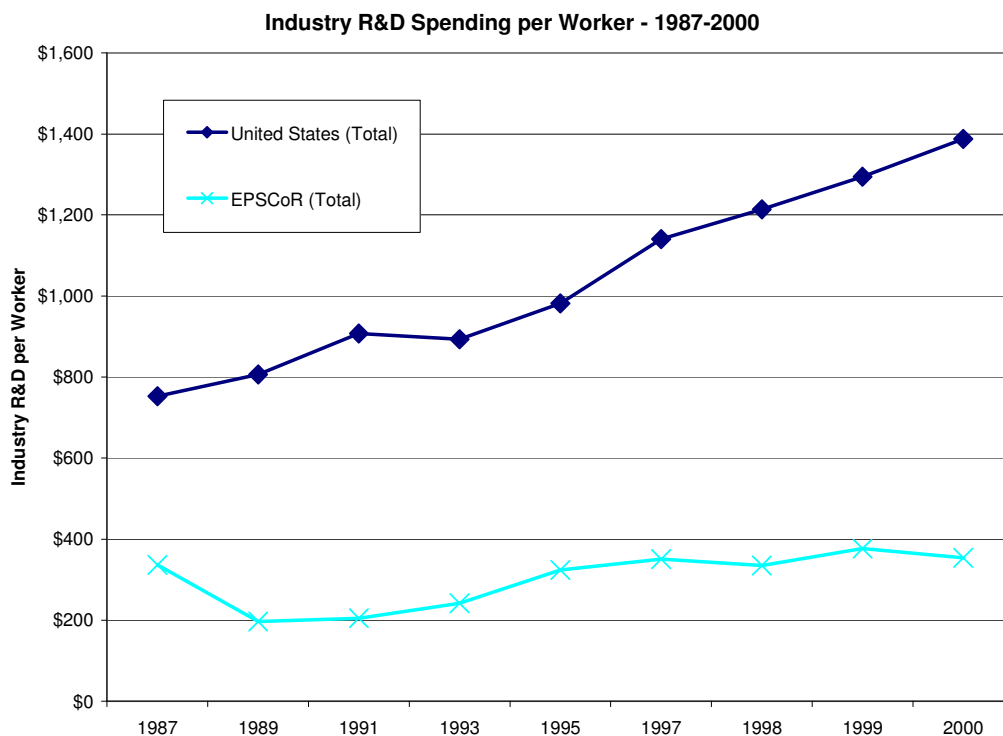
Sources

Total R&D spending¹ and R&D spending by performer are from *National Patterns of R&D Resources 2002 Data Update*, the National Science Foundation, Division of Science Resources Statistics, <http://www.nsf.gov/sbe/srs/nsf03313/start.htm>. The data is 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 Non-profit Organizations*. Worker data is from Civilian Labor Force data, U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics - <http://www.bls.gov/lau/staadoc.htm>.

Industry R&D Performance

Summary

One of the biggest differences between EPSCoR states and other states with regard to R&D capacity is the level of industry R&D. EPSCoR states perform significantly less industry R&D than the rest of the nation. On a per worker basis in 2000, industry-performed R&D represented \$354 per worker among all EPSCoR states combined. This is 26% of the level of \$1,388 for industry R&D per worker in 2000 for the U.S. as a whole.



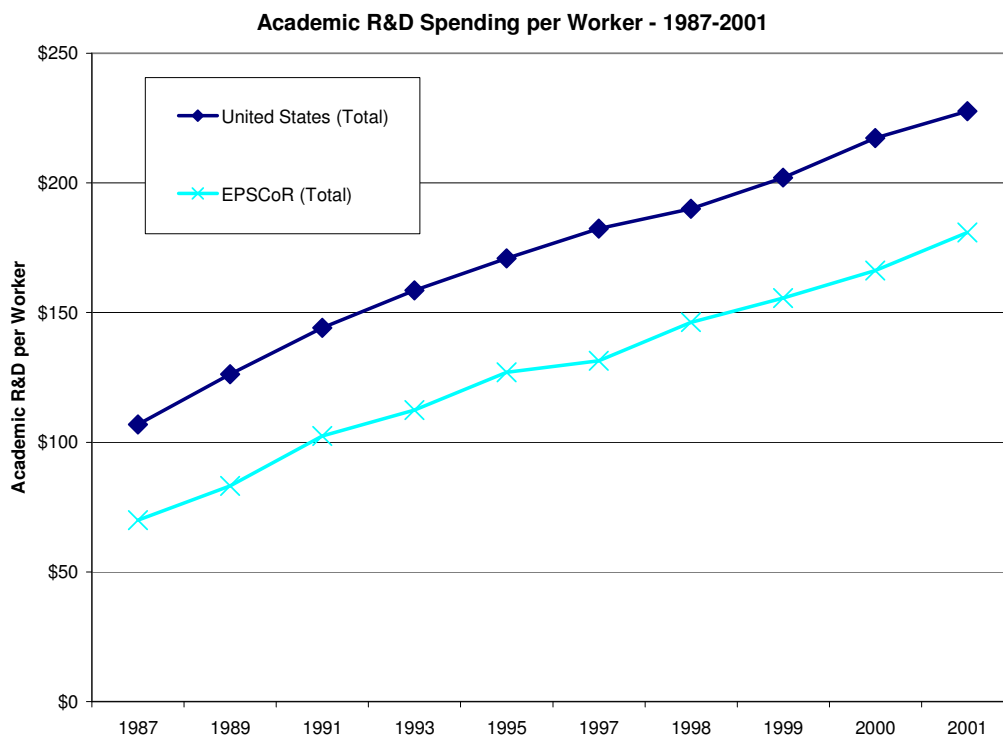
Sources

Industry R&D performance is from *National Patterns of R&D Resources 2002 Data Update*, National Science Foundation/Division of Science Resources Statistics and is derived from NSF Survey of Industrial R&D; <http://www.nsf.gov/sbe/srs/nsf03313/start.htm>. Worker data is from Civilian Labor Force data, U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics - <http://www.bls.gov/lau/staadoc.htm>.

Academic R&D Performance

Summary

The gap between R&D performed by academic institutions in EPSCoR states and the U.S. as a whole is less significant than the gap in R&D performed within other sectors. In terms of academic R&D per worker, in 2001, academic institutions in all EPSCoR states combined performed \$181 worth of R&D per worker. This compares to \$228 for the U.S. as a whole. Academic R&D for the EPSCoR states represents nearly 80% of the U.S. level.



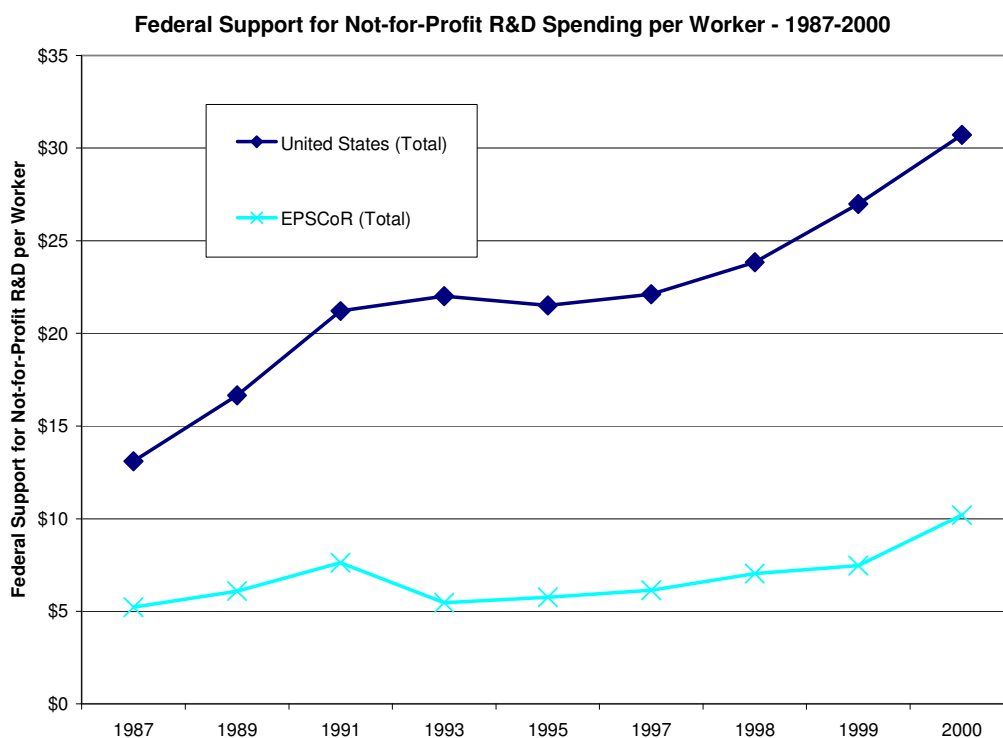
Sources

Pre-2001 Academic R&D performance data² is from the National Science Foundation/Division of Science Resources Statistics; National Patterns of R&D Resources 2002 Data Update, derived from Survey of R&D Expenditures at Universities and Colleges; <http://www.nsf.gov/sbe/srs/nsf03313/start.htm>. 2001 data is from Survey of R&D Expenditures at Universities and Colleges 2001; <http://www.nsf.gov/sbe/sr>. Worker data is from Civilian Labor Force data, U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics - <http://www.bls.gov/lau/staadoc.htm>.

Not-for-Profit Laboratory R&D Performance³

Summary

On a per worker level, federally funded R&D performed among not-for-profit research labs among all EPSCoR states combined equaled \$10 per worker. This compares to \$31 per worker for the U.S. as a whole. The EPSCoR level is 32 percent of the U.S. level on this indicator.



Sources

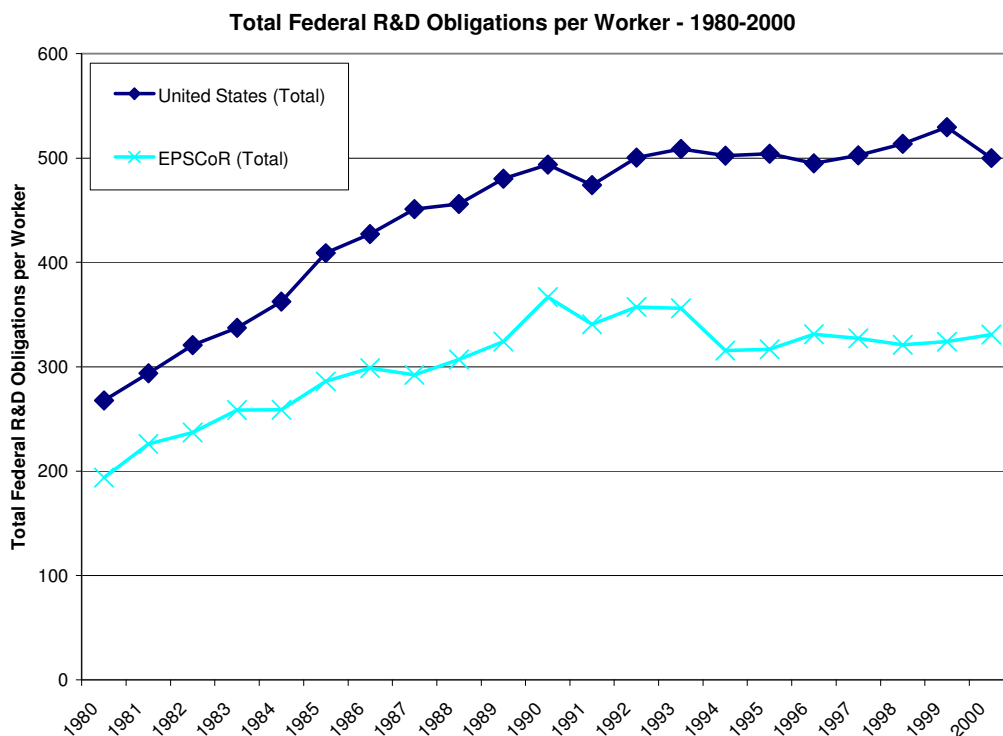
Not-for-Profit R&D performed is from the National Science Foundation/Division of Science Resources Statistics; *National Patterns of R&D Resources 2002 Data Update*, derived from Survey of R&D Funding and Performance by Nonprofit Organizations;

<http://www.nsf.gov/sbe/srs/nsf03313/start.htm>. Worker data is from Civilian Labor Force data, U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics - <http://www.bls.gov/lau/staadoc.htm>.

Federal R&D Obligations

Summary

Federal support for R&D to EPSCoR states has not kept pace with federal R&D support nationwide. This gap increased in the 1990's. In terms of federal obligations per worker in 2000, EPSCoR states received \$331, compared to \$500 for the U.S. as a whole.



Sources

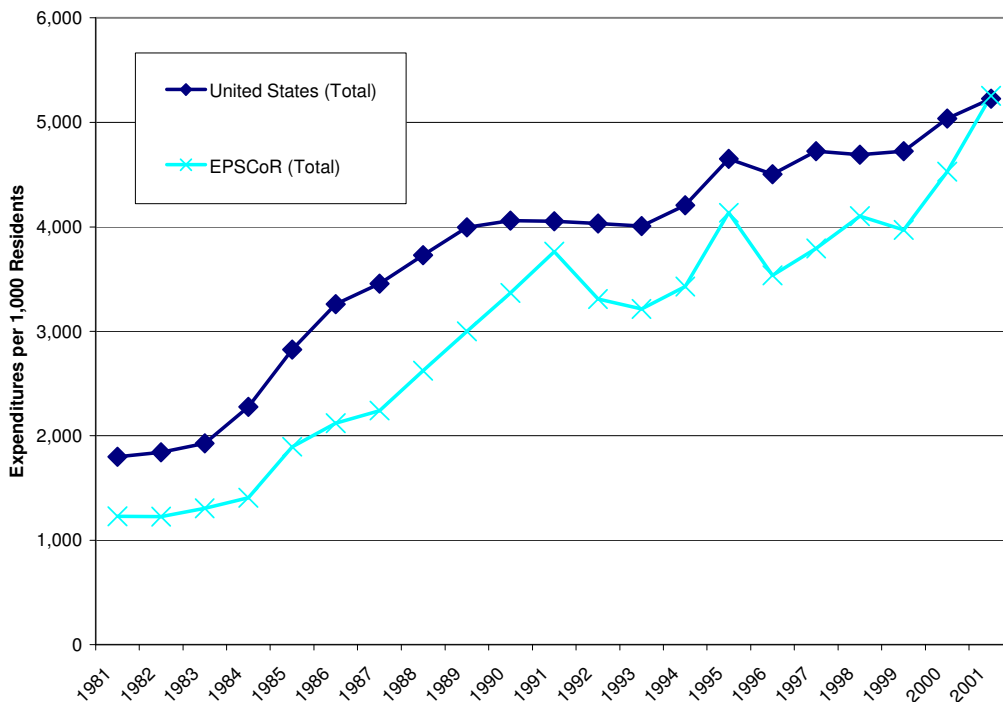
Federal R&D obligations⁴ are from the National Science Foundation/Division of Science Resources Statistics; Survey of Federal Funds for Research and Development: Fiscal Years 2000, 2001, and 2002; <http://www.nsf.gov/sbe/srs/nsf02321/start.htm>. Worker data is from Civilian Labor Force data, U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics - <http://www.bls.gov/lau/staadoc.htm>.

Research Equipment Expenditures at Academic Institutions

Summary

Historically lower than the U.S. as a whole, research and equipment expenditures at universities and colleges among EPSCoR states have caught up to the nation. In 2001, total research and equipment expenditures per 1,000 residents among EPSCoR states equaled \$5,254. The level in the U.S. was \$5,228 per 1,000 residents.

Research Equipment Expenditures at Universities & Colleges per 1,000 Residents
1981-2001



Sources

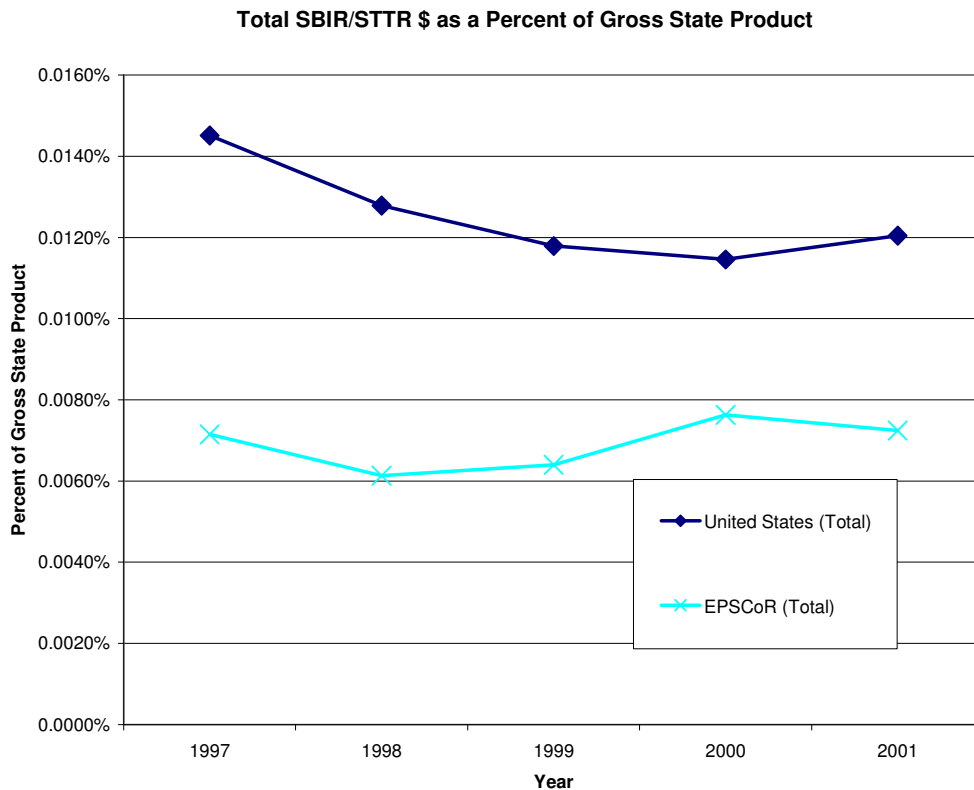
Research equipment expenditures⁵ are from the National Science Foundation, WebCAS-PAR Database System from "Survey of Research and Development Expenditures at Universities and Colleges"; <http://caspar.nsf.gov>. Population data is from: 1981-1989 Intercensal Estimates of the Total Resident Population of the States, release date Aug. 1996; 1990-1999 - Table CO-EST2001-12-00 - Time Series of Intercensal State Population Estimates; 1990 to April 1, 2000; Population Division, U.S. Census Bureau; release Date: April 11, 2002; July 2000-July 2001 - Table NST-EST2003-01 - Annual Estimates of the Population for the United States and States, and for Puerto Rico: April 1, 2000 to July 1, 2003; Population Division, U.S. Census Bureau; release Date: December 18, 2003.

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SBIR/STTR Funding

Summary

EPSCoR states as a whole are less successful than other states at securing federal SBIR and STTR funding, though the gap since 1997 has declined. In 2001, SBIR/STTR funding as a percent of gross state product for all EPSCoR states combined equaled 0.0072 percent while the total for the U.S. equaled 0.0120.



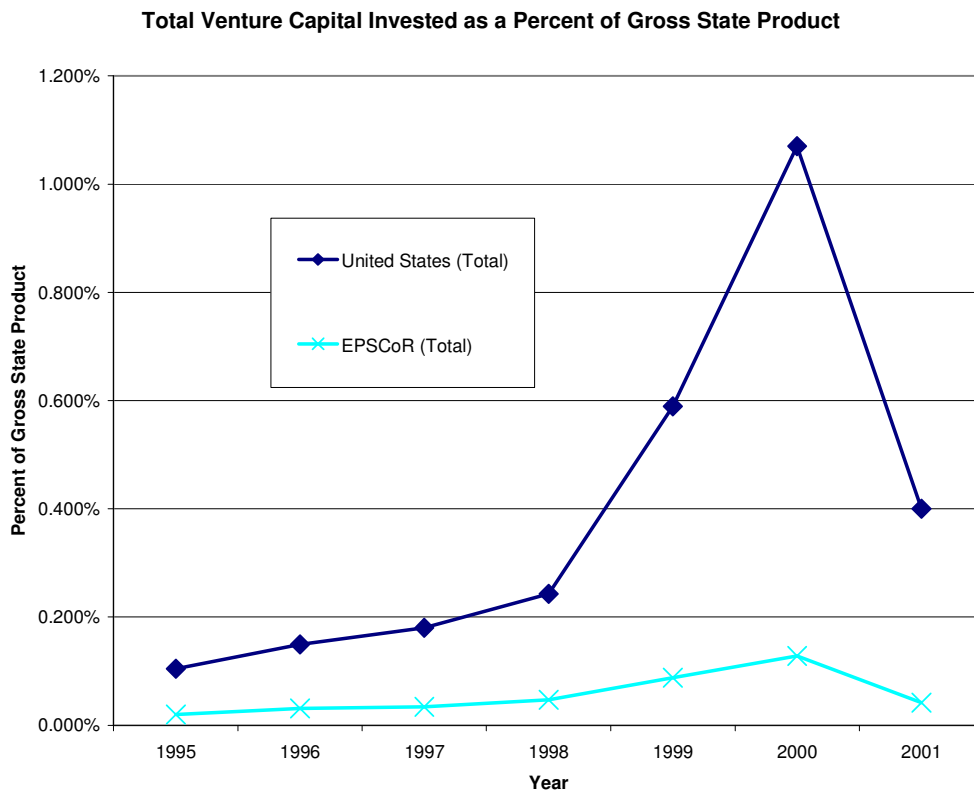
Sources

SBIR/STTR data is from the U.S. Small Business Administration, www.sba.gov/SBIR. Gross State Product data is from the Bureau of Economic Analysis, U.S. Department of Commerce, <http://www.bea.doc.gov/bea/regional/gsp/A33>; released May 22, 2003.

Venture Capital Investments

Summary

Venture capital trends among EPSCoR states typically follow national trends, with both being driven by the health of the national economy. However, EPSCoR states as a whole receive less venture capital investments than the U.S. state combined. In 2001, venture capital investments in EPSCoR states combined represented 0.04 percent of gross state product. This was significantly lower than the U.S. level of 0.40 percent for the same year.



Sources

Venture capital investments data are from MoneyTree “Venture Capital Profiles by State”, based on PricewaterhouseCooper/Venture Economics/National Venture Capital Association Surveys; <http://www.ventureeconomics.com/vec/stats>. Gross state product is from the Bureau of Economic Analysis, U.S. Department of Commerce, <http://www.bea.doc.gov/bea/regional/gsp/A33>, released May 22, 2003.

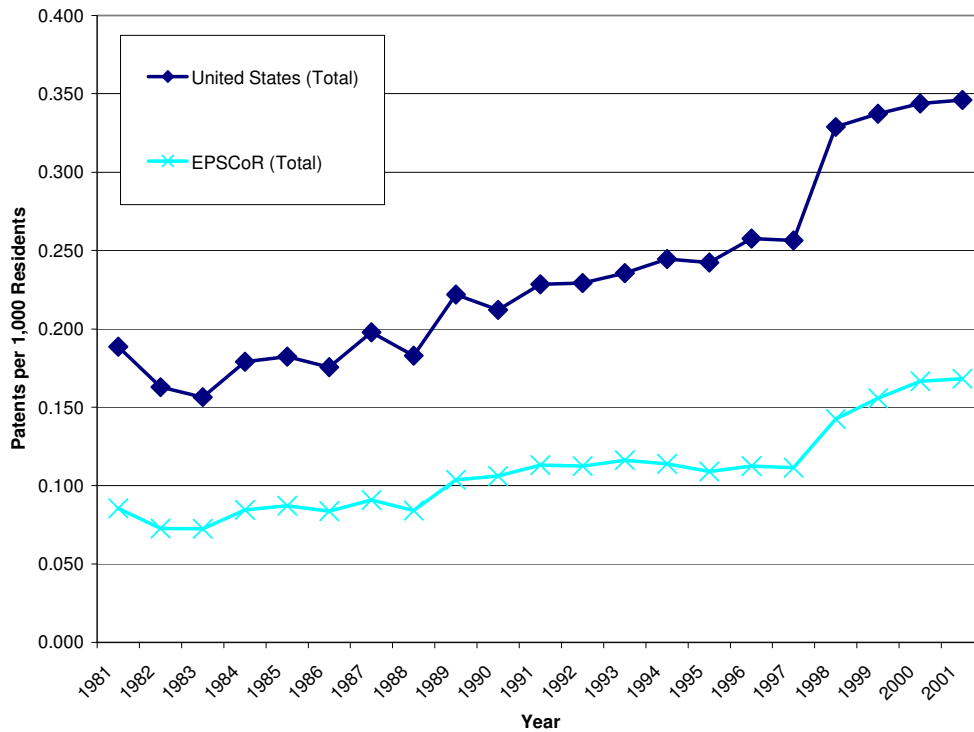
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Patents Issued

Summary

The number of patents issued to residents⁶ of EPSCoR states is less than half the national average. In 2001 there were 0.17 patents issued per 1,000 residents for the EPSCoR states combined. This compares to 0.35 for the U.S. as a whole.

Patents Issued (all types) per 1,000 Residents - 1980-2001



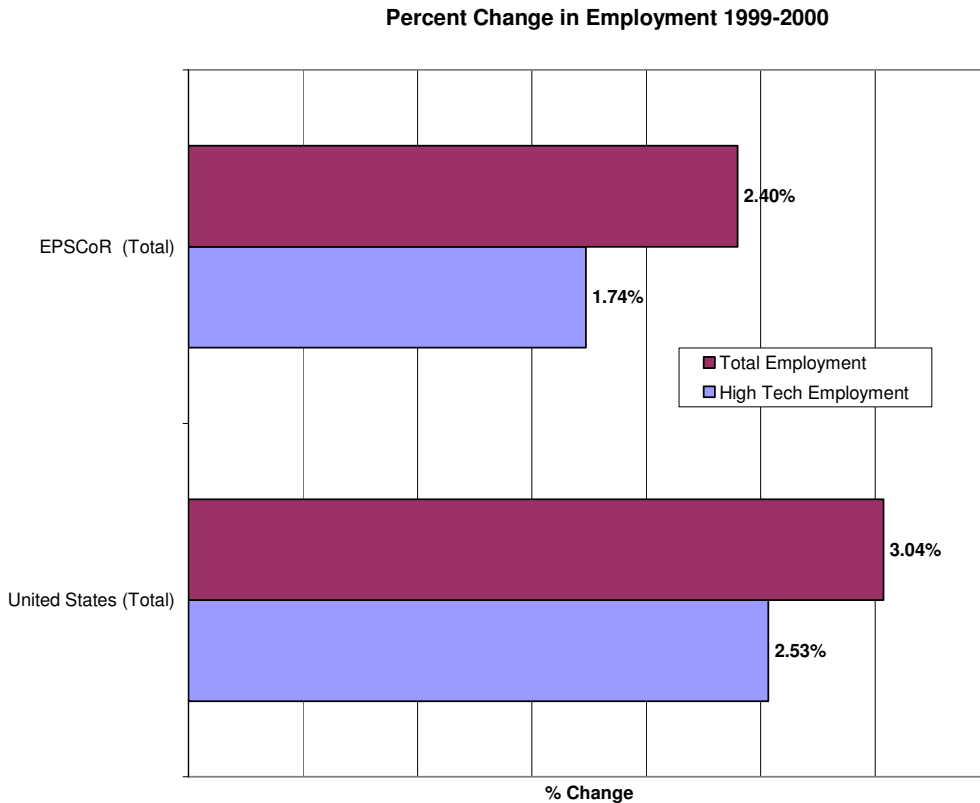
Sources

Total patents issued is from “Patent Counts by Country/State and Year, All Patents, All Types, 1/1/1977-12/31/01,” U.S. Patent and Trademark Office, www.uspto.gov. Population is from Population Estimates Program, Population Division, U.S. Census Bureau, www.census.gov/population/estimates.

High Technology Employment

Summary

While high technology employment is growing among the EPSCoR states, it is growing at a slower rate than the nation as a whole. Between 1999 and 2000, high technology employment in all EPSCoR states combined grew 1.7 percent. During this same period, high technology employment grew 2.5 percent in the U.S. as a whole



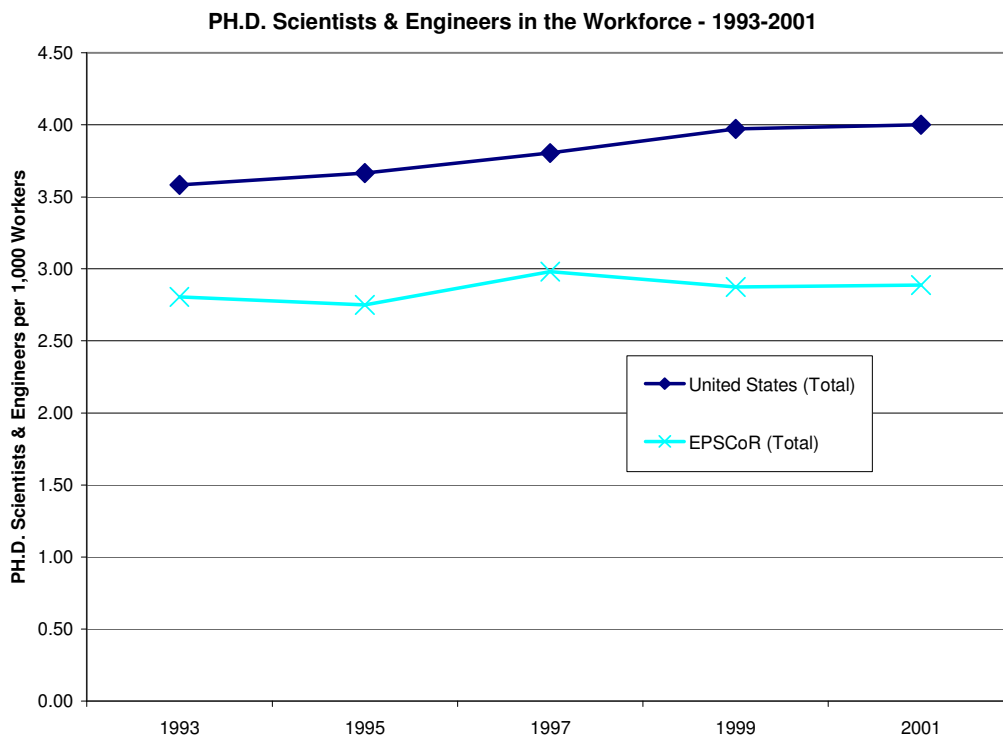
Sources

High technology employment data is based on special data tabulations from the County Business Patterns, U.S. Census Bureau, U.S. Department of Commerce. Total employment is from U.S. Census Bureau, County Business Patterns, and is available at <http://www.census.gov>.

Ph.D. Scientists and Engineers in the Labor Force

Summary

The EPSCoR states as a whole attract less Ph.D. scientists and engineers into the labor force than the U.S. as a whole. In 2001, Ph.D. scientists and engineers represented 2.9 doctoral scientists and engineers for every 1,000 workers. During the same year, the U.S. as a whole had 4.0 employed doctoral scientists and engineers per 1,000 workers.



Sources

Ph.D. scientist and engineer data is from the National Science Foundation/Division of Science Resources Statistics, *Survey of Doctorate Recipients*, <http://www.nsf.gov/sbe/srs>. Data for workers is based on the civilian labor force and is from U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics - <http://www.bls.gov/lau/staadoc.htm>.

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

³ Excludes nonprofit federally funded research and development centers administered by academic institutions. Also, the not-for-profit data only includes research expenditures funded by the federal government because data from other funding sources is not available on a state basis.

⁴ 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.

⁵ This includes research equipment expenditures at all degree-granting institutions, public and private.

⁶ The residence of the first-named inventor determines the origin of a patent.