

Study finds economic stimulus from research investments and PhD recipients' earnings

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Credit: Charles Rondeau/public domain

A decade ago the late Jack Marburger, a physicist and former college president who served as science advisor to President George W. Bush, challenged academics to come up with scientific evidence on the impact of federal research investment. Even more adamantly, Congress required the National Science Foundation to "better articulate the value of grants

to the national interest."

A study in the latest issue of *Science* (online Dec. 10, in print Dec. 11) led by Professors Julia Lane of New York University, Bruce Weinberg of Ohio State University and Jason Owen Smith of the University of Michigan demonstrates a significant path by which federally and non-federally funded investment in research make an impact on the economy. Inspired by the Robert Oppenheimer maxim that "The best way to send information is to wrap it up in a person," the researchers combed an array of new data, combined with Census Bureau information, to trace where doctoral recipients get their jobs and what their earnings are after receiving research training.

Lane and eight colleagues found:

- Forty percent of PhD recipients took jobs in the private sector; the others went on to jobs in academia or government.
- Recipients of doctorates in all science fields disproportionately gained placement in large and high-wage private businesses, as well as additional business characteristics associated with high productivity.
- Engineers and computer scientists whose doctoral research was federally or non-federally funded were most likely to go to young firms.
- Employers were clustered near the universities where the doctoral recipients conducted their funded research and received their training - thereby contributing to local and national economic growth.
- Across all scientific fields, those with the highest earners for recent graduates are mathematics/computer sciences and engineering. Earnings are not high for those with a PhD in life sciences, which the researchers suggest may be due to so many initially taking jobs as postdoctoral researchers.

Hunter Rawlings, president of the Association of American Universities (AAU) said of the study:

"Educating people is one of the most important things research universities do, and it benefits everyone: students themselves, the states and localities where those universities are located, and the nation. This important study is one of the first to use hard data to provide direct evidence of some of these benefits, drawing on new information being developed as a part of the UMETRICS program."

Titled "Wrapping it up in a person: Examining employment and earnings outcomes for PhD recipients," the study captures what the researchers call the "human dimension" of the impact of funded research on the economy. The findings represent a milestone in the researchers' collaborative efforts over seven years to determine how to measure the initial economic impact of research funding. The data capture the 2010-2012 earnings of 3,197 PhD recipients who were funded with research grants at the universities of Indiana, Iowa, Michigan, Minnesota, Ohio State, Purdue, Penn State, and Wisconsin.

Carol Whitacre, vice president for research at Ohio State University, commented, "Congress and the public are very interested in understanding the impact of research and how to measure it. The traditional measures of publications and patents represent one approach. One of the largest investments in research is the training of future researchers. This article provides outcomes data on that investment, showing not only income and sector but also relative location of trainees. These analyses, allowing a linkage between investment and census data, are increasingly useful for discussions about the value of research."

Lane is a professor at New York University's Robert F. Wagner Graduate School of Public Service and Center for Urban Science and Policy (CUSP), and is the NYU provostial fellow for innovation

analytics. Rebecca Rosen, also of NYU, is the associate director for data resources and data strategy at CUSP.

Asked to comment on the study, Lane said, "This work represents a next step of describing the complex ways in which investments in [research](#) contribute to economic activity. The partnership with the Census Bureau has been critical, and will permit rigorous examination of a variety of other economic effects, ranging from business startups to firm productivity, growth and employment dynamics. The data infrastructure at the new Institute for Research on Innovation in Science will provide for many other partnerships, such as with the Association of Research Libraries and the U.S. Patent and Trademark Office, to investigate scientific and other outcomes."

More information: "Wrapping it up in a person: Examining employment and earnings outcomes for Ph.D. recipients," by N. Zolas et al. *Science*, www.sciencemag.org/lookup/doi/10.1126/science.aac5949

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