New Data for STEM Education Research

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http://iris.isr.umich.edu

And many many coauthors and collaborators, particularly Jason Owen Smith, Bruce Weinberg, Matt Ross, Reza Sattari, Akina Ikudo, Wei Chen, Evgeny Klochikhin, John Cuffe, Kaye Husband Fealing, John King, Stan Johnson, Nathan Goldschlag Ron Jarmin, and Nik Zolas This research was supported by NSF Education and Human Resources DGE Awards 1348691, 1547507, 1348701, 1535399, 1535370; NSF NCSES award 1423706; NIHP01AG039347, the Ewing Marion Kaufman and Alfred P. Sloan Foundations, USDA AFRI grant number 1005677, NSF SciSIP Awards 1064220 and 1262447;..

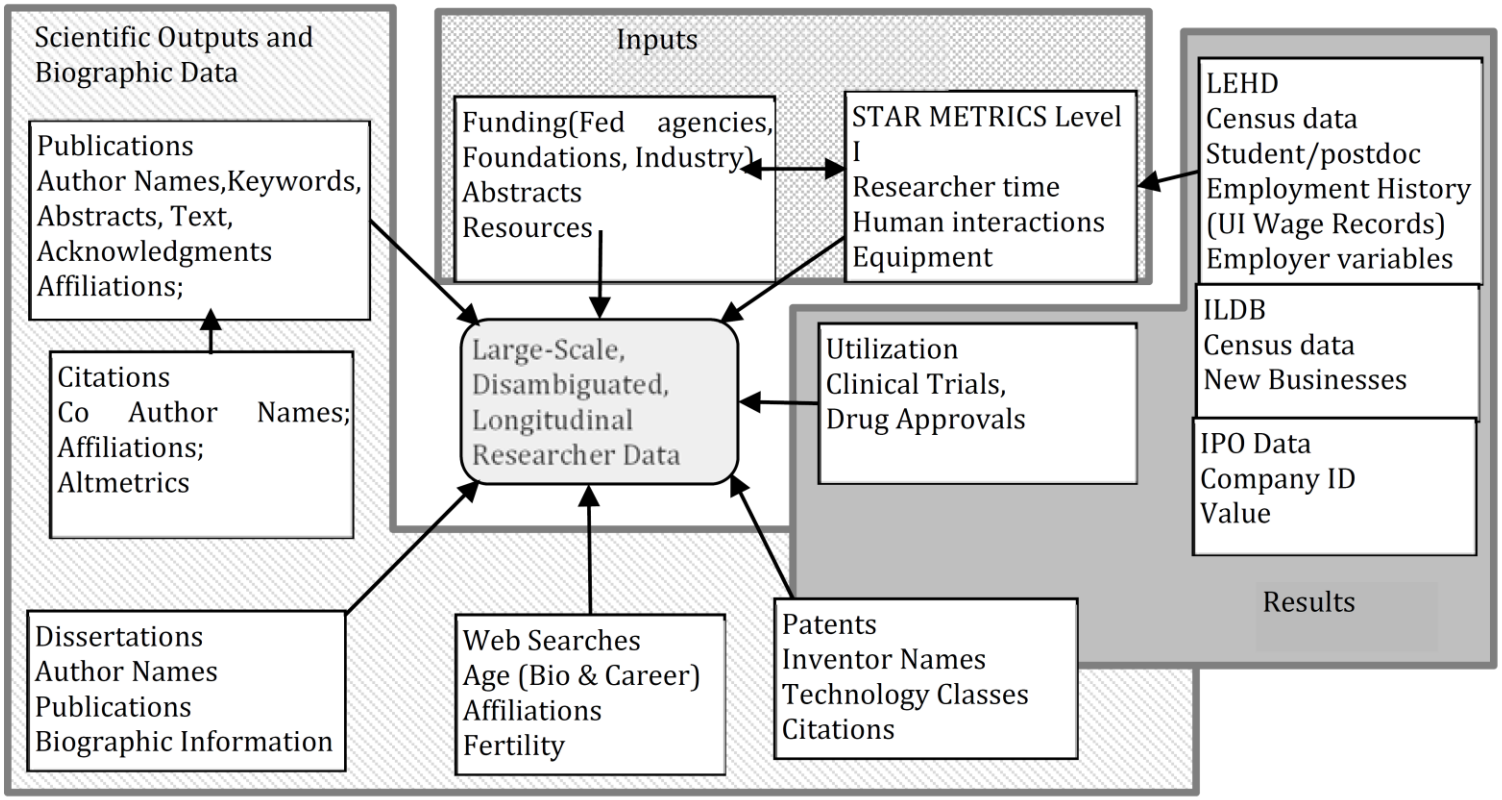
Context: Not documents - people

Transmission of research ideas can occur through:

- People employed doing research (measured with grants)
  - Placement of individuals (Oppenheimer – the best way to send knowledge is to wrap it up in a human being)
  - Start up of businesses
  - Through social networks
- Purchases of equipment and services
  - Consumer led innovation
  - Development of comparative advantage
  - Economies of scale

A conceptual framework

Data Architecture



Specific Operational structure

Universitie
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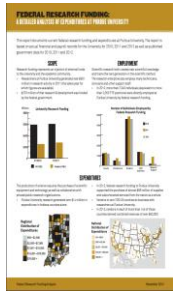
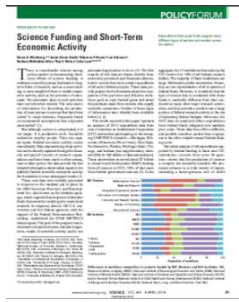
tified,

Create New research and reports





United States Census Bureau | U.S. Department of Commerce
Economics and Statistics Administration
U.S. CENSUS BUREAU
census.gov

FUTURE ON
Activating Change.

Mashing up University Admin data and Census Bureau Data to Create New Statistics

- Key Census Datasets
  - Business Register – Employer and Nonemployer
    - Used for Matching business records
  - PVS System
    - Used for Matching person records
  - LBD
    - Data underlying the Business Dynamics Statistics
  - LEHD
    - Data underlying the Quarterly Workforce Indicators

United States Census Bureau | U.S. Department of Commerce
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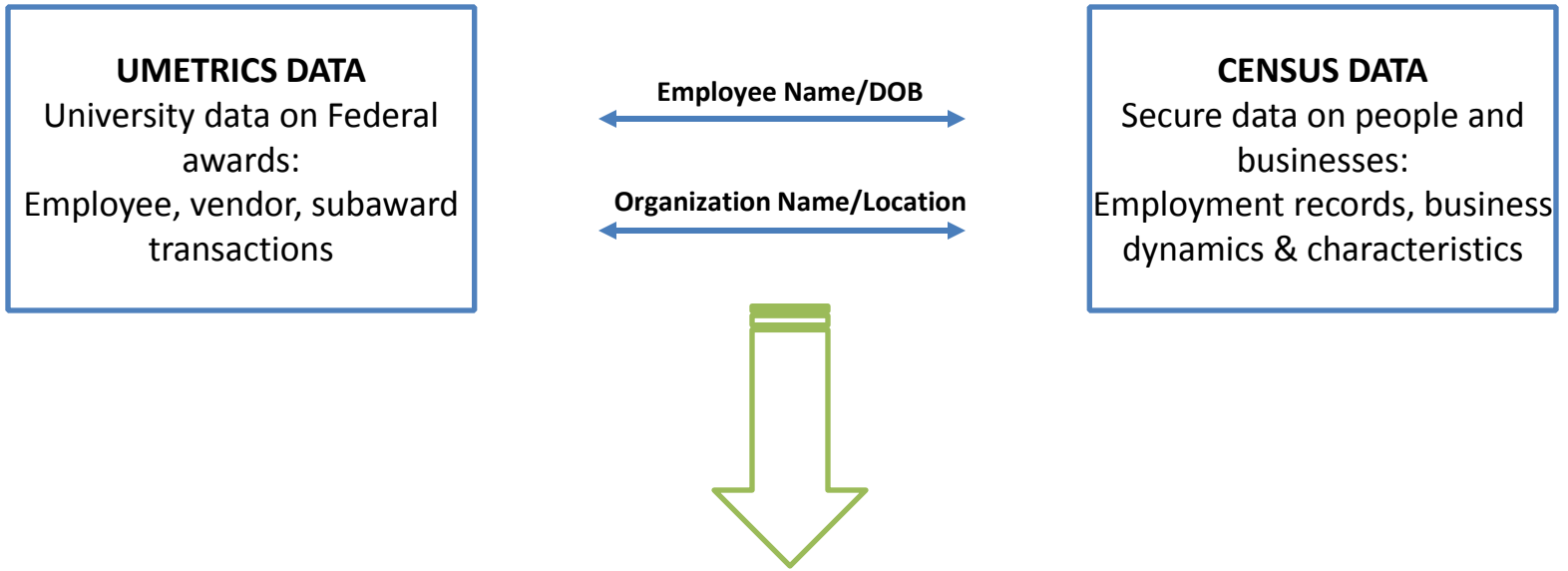
census.gov

FUTURE ON
Activating Change.

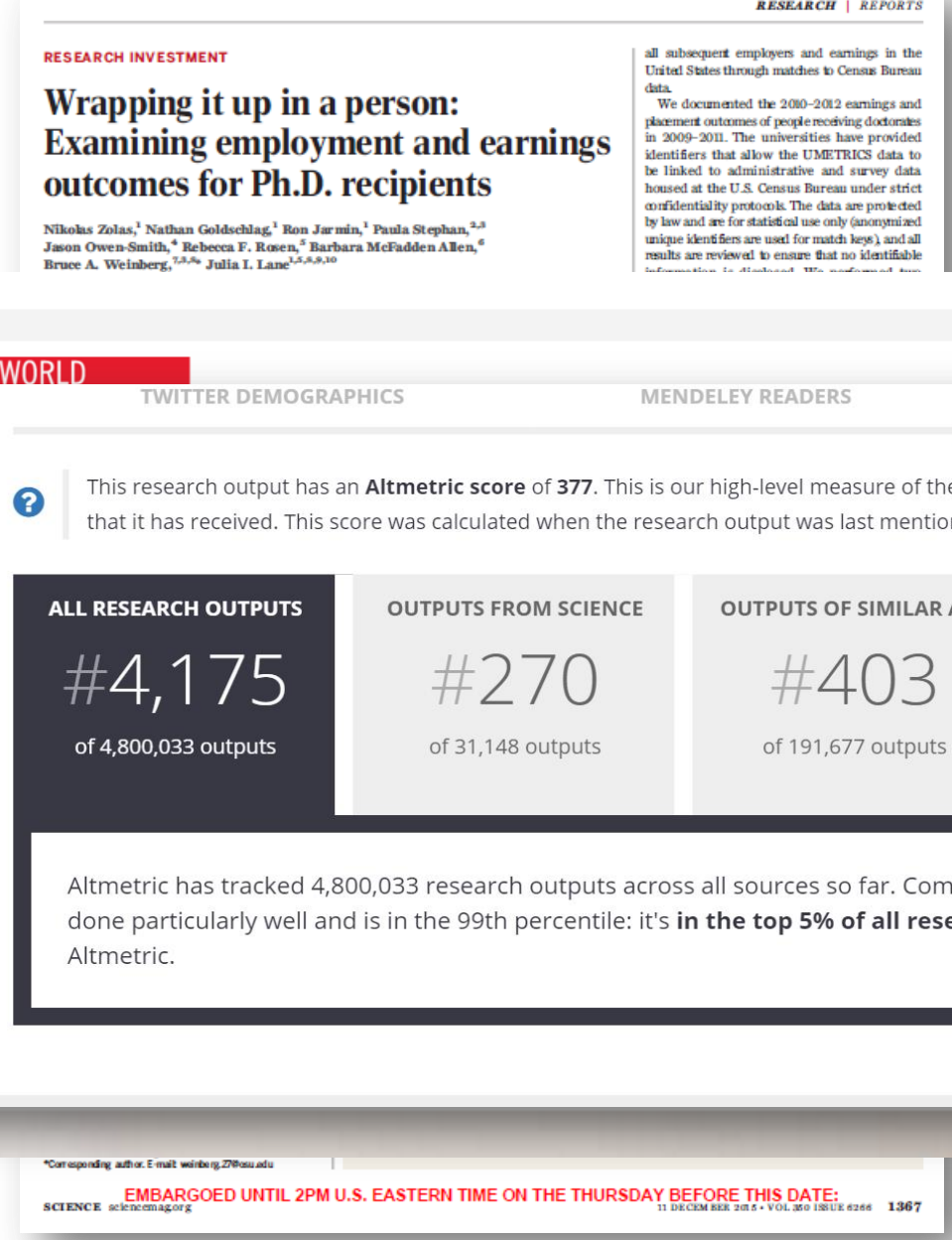
"NPR membership" Model

63 researchers have accessed data

What results



Analyze by: Occupational category | Funding agency | Research area | Years since leaving university



RESEARCH | REPORTS

RESEARCH INVESTMENT

Wrapping it up in a person: Examining employment and earnings outcomes for Ph.D. recipients

Nikolas Zolas,[1] Nathan Goldschlag,[1] Ron Jarmin,[1] Paula Stephan,[2,3] Jason Owen-Smith,[4] Rebecca F. Rosen,[5] Barbara McFadden Allen,[6] Bruce A. Weinberg,[7,8,9] Julia I. Lane[1,2,8,9,10]

all subsequent employers and earnings in the United States through matches to Census Bureau data.

We documented the 2010–2012 earnings and placement outcomes of people receiving doctorates in 2009–2011. The universities have provided identifiers that allow the UMETRICS data to be linked to administrative and survey data housed at the U.S. Census Bureau under strict confidentiality protocols. The data are protected by law and are for statistical use only (anonymized unique identifiers are used for match keys), and all results are reviewed to ensure that no identifiable

WORLD

About this score

In the top 5% of all research outputs scored by Altmetric

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- **333** tweeters
- **11** Facebook pages
- **1** Google+ user
- **2** Redditors

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- **111** Mendeley
- **3** CiteULike

TWITTER DEMOGRAPHICS | MENDELEY READERS | SCORE IN CONTEXT

This research output has an **Altmetric score** of **377**. This is our high-level measure of the quality and quantity of online attention that it has received. This score was calculated when the research output was last mentioned on **08 February 2016**.

ALL RESEARCH OUTPUTS	OUTPUTS FROM SCIENCE	OUTPUTS OF SIMILAR AGE	OUTPUTS OF SIMILAR AGE FROM SCIENCE
#4,175	#270	#403	#17
of 4,800,033 outputs	of 31,148 outputs	of 191,677 outputs	of 732 outputs

Altmetric has tracked 4,800,033 research outputs across all sources so far. Compared to these this one has done particularly well and is in the 99th percentile: it's **in the top 5% of all research outputs ever tracked** by Altmetric.

*Corresponding author. E-mail: weinberg.279@osu.edu

EMBARGOED UNTIL 2PM U.S. EASTERN TIME ON THE THURSDAY BEFORE THIS DATE:

http://www.sciencemag.org/content/350/6266/1367.abstract

Firm characteristics

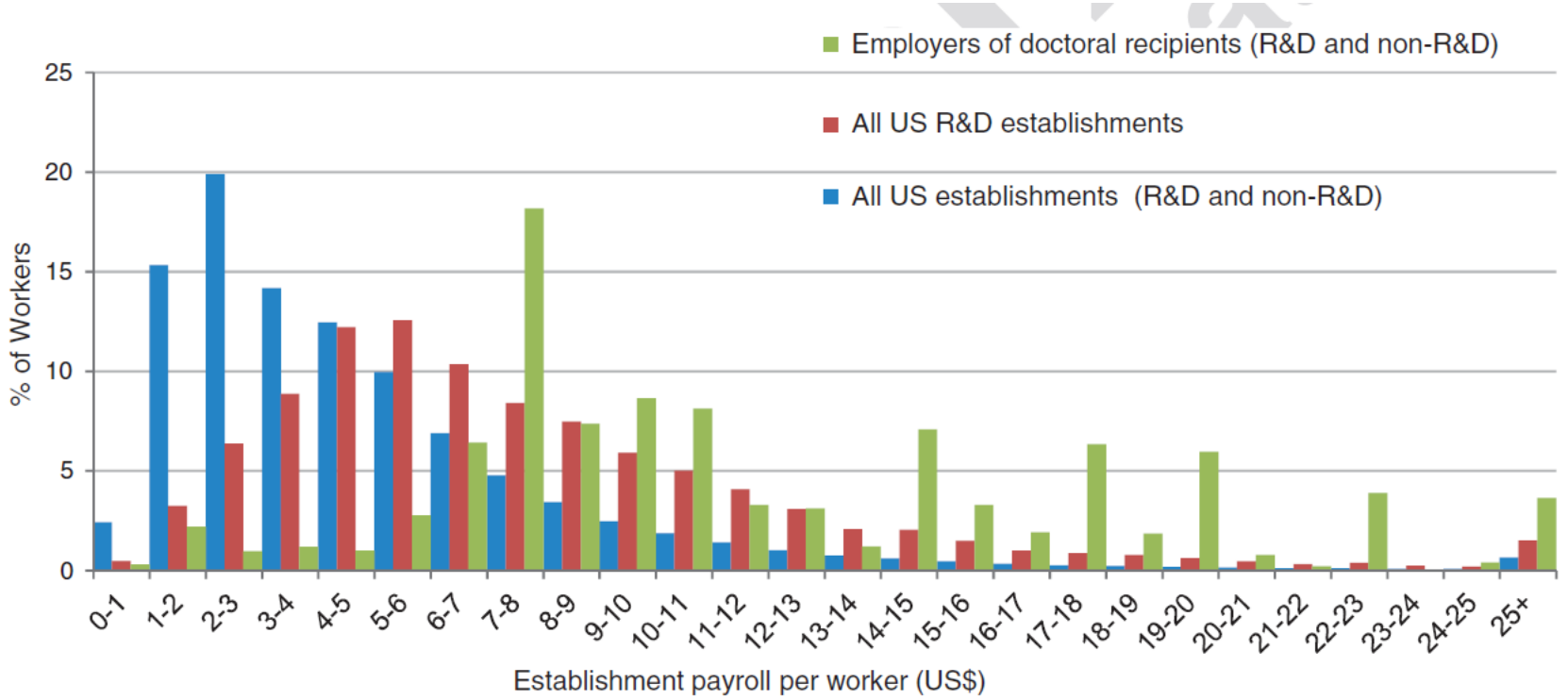
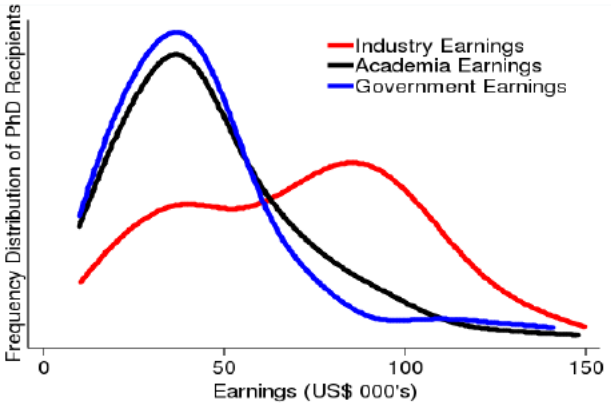
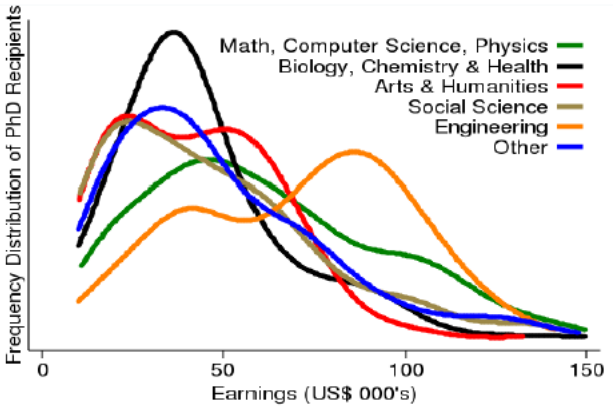


Fig. 2. Annual payroll per worker at establishments that employed UMETRICS doctoral recipients, establishments owned by firms that perform R&D, and all U.S. establishments. Values for average annual payroll per employee are (U.S.$1 ×1000).

Earnings


Industry Earnings
Academia Earnings
Government Earnings
Frequency Distribution of PhD Recipients
0
50
100
150
Earnings (US$ 000's)


Math, Computer Science, Physics
Biology, Chemistry & Health
Arts & Humanities
Social Science
Engineering
Other
Frequency Distribution of PhD Recipients
0
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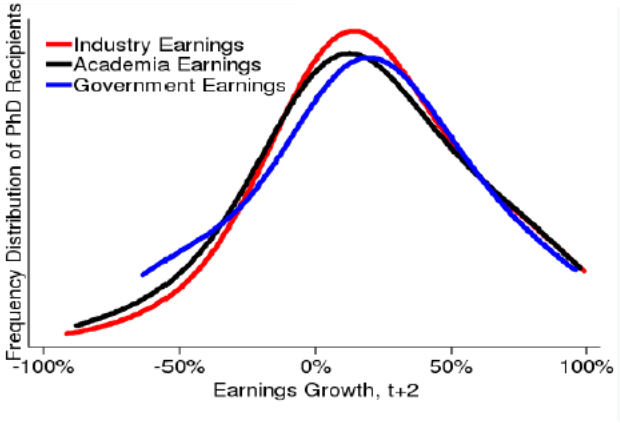
Earnings (US$ 000's)


Industry Earnings
Academia Earnings
Government Earnings
Frequency Distribution of PhD Recipients
-100%
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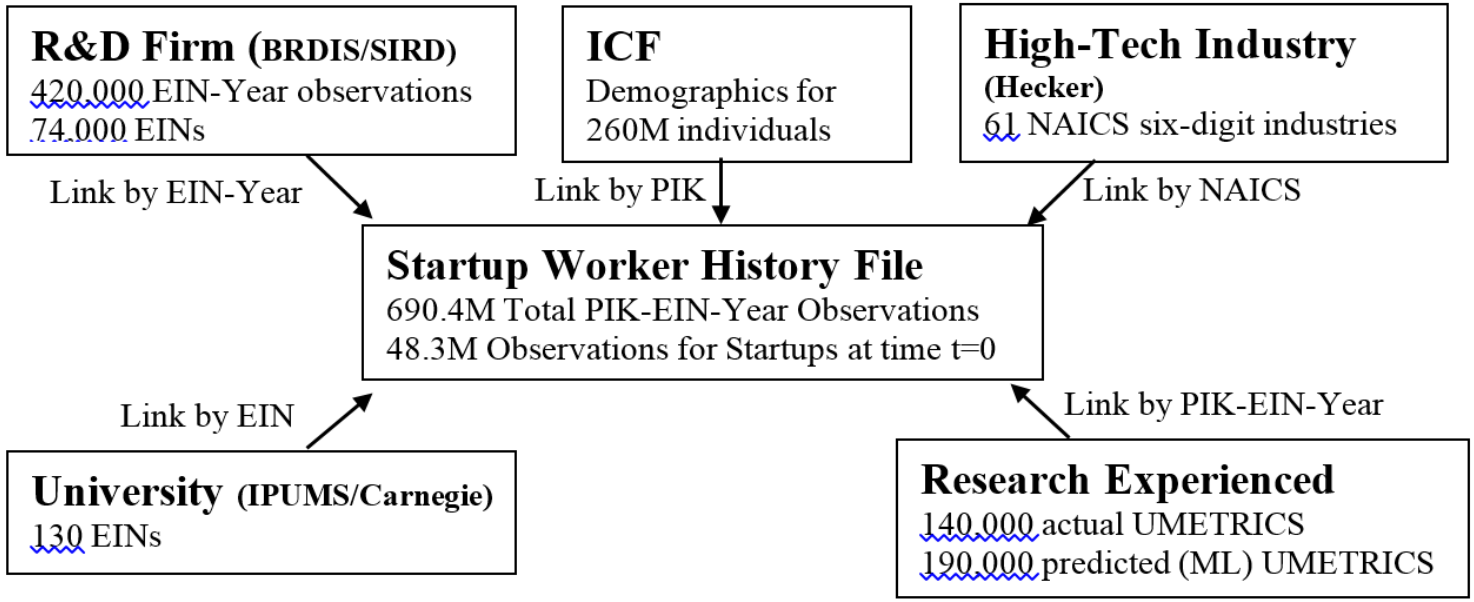
Earnings Growth, t+2

Startups/Entrepreneurship

Figure 2: Data Construction for Human Capital Measures of Startups

Step 1: Identify person and firm types in three years prior to startup



Step 2: Collapse and tabulate human capital totals by startup EIN

Startup EIN
5.3M Startup Observations
48.3M Employees

	R&D Lab	High-Tech	University	Research Experience	Female	Foreign Born
Startup Count	1.6M	900,000	400,000	35,000	2.8M	1.7M
Employee Count	8.1M	3.0M	950,000	50,000	22.5M	8.4M

Estimating the Contribution of Research Trained Individuals on Local Economies

Akina Ikudo, University of California, Los Angeles

Matthew B. Ross*, Ohio State University

IRIS Research Meeting, 2017

June 20, 2017

ASSESSMENT

Academic re

A broader understanding of 'impact' cou to measure the diverse benefits of their in

BY MICHAEL EISENSTEIN

When Julia Lane began working in scientific-funding policy she was quickly taken aback by how unscientific the discipline was compared with the rigorous processes she was used to in the labour-economics sector. "It was a relatively weak and marginalized field," says Lane, an economist at New York University.

In 2005, John Marburger, science adviser to then-President George W. Bush, felt much the same. He called on researchers and policymakers to focus on the "science of science policy", an empirical assessment of outcomes and returns from funding agencies such as the National Institutes of Health (NIH) and National Science Foundation (NSF). "When the Congressional Budget Office does simulations of the effects of investment in areas like tax or education policy, they have models and processes," says Lane. "But he said that when it comes to science, essentially all we say is 'send more money.'"

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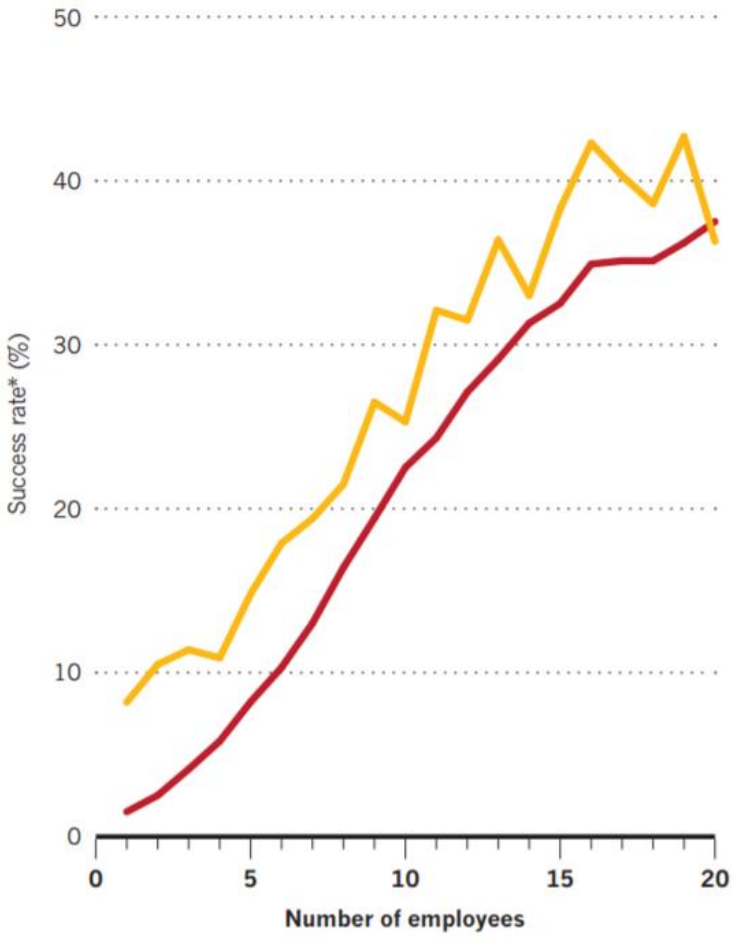
SCIENCE-LED ECONOMIES

Start-ups with research-trained staff are more likely to succeed and benefit from high growth than start-ups with no research-trained staff.

Start-ups with research-trained employees
Start-ups with no research-trained employees

YEAR-ON-YEAR SUCCESS RATE



SOURCE: GOLDSCHLAG, N. ET AL. IN NEW SPRING AND ACCOUNTING FOR INNOVATION IN THE 21ST CENTURY (EDS CORRADO, C., HASKEL, J., MIRANDA, J. & SICHEL, D. E.) (UNIVERSITY OF CHICAGO PRESS, 2018).

COMMENT
JULIA LANE

, NOT THE SCOREBOARD

pers, will lead to better science in the United States.

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evaluation exercise, the Research Excellence Framework.

The UMETRICS platform is not just used for evaluation. I am among about 70 researchers affiliated with IRIS analysing the data to get a better understanding of the role of science in society. Results are beginning to reveal how scientists support the economy. Research-trained PhD-holders moving into industry are more likely than other workers to join younger, larger, R&D intensive, high-wage firms in high-skills industries — factors associated with productivity. Adding one researcher-experienced worker to a start-up increases its five-year survival rate by nearly 42% and more than doubles the likelihood of its going on to employ at least 10 people.

Researchers at the University of Maryland and the University of North Carolina at Chapel Hill are calculating the proportion of UMETRICS-tracked researchers flowing to specific industries, which could be used to identify sectors where highly skilled workers are needed. Sociologists and economists at the National Bureau of Economic Research are using UMETRICS data to analyse the impact of education and training on the earnings of research-trained scientists at all levels, which should help quantify the demand for PhDs in the workforce.

In June 2017, the Census Bureau's Federal Statistical Research Data Centers released the matched Census–UMETRICS data to the wider research community, which should reveal many more insights. Recent work showed, for example, that while early-career female researchers earn 31% less than male researchers overall, the gap disappears when controlling for the impact that marital status and children have on women's pay.

Investment in science can take years to bear fruit, but I am optimistic that sensible measurements of US science and scientists will help both flourish. ■

Julia Lane is a professor at the Wagner School of Public Policy and Center for Urban Science and Progress at New York University.

What is needed:

National program

- Current: 32 universities participating in IRIS; 30 more at varying stages of commitment (about 50% of federal university R&D funding)
- Initial 3 year commitment to
  - Sign IRIS MOU
  - Provide annual data feeds
  - Identify data and communication contacts
  - Contribute a yearly fee to support infrastructure

- Members receive
  - Individual and collective reports
  - Underlying tables and graphics for your use
  - Benchmarking against aggregates
  - Access to de-identified data for researchers
  - A seat at the table for new product design
  - Other products and services with additional investments

Why it matters: Not documents - people

Transmission of research ideas can occur through:

- People employed doing research (measured with grants)
  - Placement of individuals (Oppenheimer – the best way to send knowledge is to wrap it up in a human being)
  - Start up of businesses
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Questions

- Julia Lane

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