Data Driven Approaches to Tracking Postdocs

Examining Administrative Research Data to Track Postdoc Career Outcomes

National Postdoctoral Association 2017 Annual Meeting
March 18, 2017
Today’s discussion

• What do we know about postdoc career outcomes?
• What is IRIS and how can IRIS data contribute to a better understanding of postdoc career outcomes?
• Some research findings with IRIS data
• Preliminary findings from a pilot study of postdoc data
• Questions, next steps, limitations
What we know

• Postdoc experience = traditionally viewed as an apprenticeship for independent academic research career

• More people are training at the doctoral & postdoctoral levels than there are academic research positions

• A variety of approaches have been taken to track postdoc career outcomes
PhD Biomedical Research Workforce

College Graduates
- 16,000 in 2009
- 83,000 Graduate Education & Training in 2009
- Time to Degree: 5.5-7 yrs
- 9,000 2009 Graduates
- 5,800 in 2009
- 4,000 in 2009
- 8% of graduates leave the US
- Of graduates who stay in the US, 30% skip a postdoc, 70% do a postdoc

Postdoctoral Training
- 2009 Total: 37,000 to 68,000
- Median Length: 4 years
- 1,900 to 3,900 in 2009

Post-Training Workforce (128,000 Biomedical US-trained PhDs)
- Science Related Non-Research
  - 18% Biomedical US-trained PhD
    - 2008 ~24,000
- Government Research
  - 6% Biomedical US-trained PhD
    - 2008 ~7,000
- Academic Research or Teaching
  - 43% (23% tenured) Biomedical US-trained PhD
    - 2008 ~55,000
- Industrial Research
  - 18% Biomedical US-trained PhD
    - 2008 ~22,500
- Non-Science Related
  - 13% Biomedical US-trained PhD
    - 2008 ~17,000
- Unemployed
  - 2% Biomedical US-trained PhD
    - 2008 ~2,500
Framework

Science Investments

Universities

Discovery Learning Dissemination

Knowledge, People, Skills

Innovation Entrepreneurship Economic Growth Public Health Food Safety Security (More) Rational Policy ...

Jobs Stimulus

Hiring, Spending

Fund
What is IRIS?

Institute for Research on Innovation and Science (IRIS)

- IRIS is a data repository whose purpose is to gather and curate administrative research data about the productivity and public value of the research enterprise in support of policy-making, outreach, research management, and expansion of knowledge.
- Jason Owen-Smith (Executive Director)
- Established in 2015 with 3 years seed funding for infrastructure from Sloan & Kauffman Foundations
- Core facility at University of Michigan

Leadership Team: Julia Lane (NYU), Jason Owen-Smith (Michigan), Bruce Weinberg (Ohio State), Ron Jarmin (U.S. Census), Barbara McFadden Allen (B10AA)
**MEMBERS:** Universities contribute data, support infrastructure and receive campus-specific and aggregate reports

**NODES:** Approved nodes materially improve data, develop products, and expand user communities

**USERS:** Approved users securely access de-identified aggregate datasets

**PARTNERS:** Approved partners receive data from IRIS which they improve and make accessible through their own secure systems
UMETRICS DATA
University data on Federal awards:
Employee, vendor, subaward transactions

Employee Name/DOB

Organization Name/Location

CENSUS DATA
Secure data on people and businesses:
Employment records, business dynamics & characteristics

JOB PLACEMENTS
Where research employees get their next jobs

START-UP ACTIVITY
What types of businesses research employees found

VENDOR CHARACTERISTICS
What types of businesses supply research

Analyze by: Occupational category | Funding agency | Research area | Years since leaving university
“Wrapping it up in a person: Tracing flows from funded research into the economy using linked administrative records.” *Science*. 350:1367-1371

Placements by Sector & Location

Table 1. Postgraduation employment of UMETRICS doctoral recipients who were paid by research grants and left the university between 2009 and 2011. The national workforce distribution is calculated from all employment in all establishments covered by the Census’s LBD between 2010 and 2012.

<table>
<thead>
<tr>
<th>Locale and small</th>
<th>Industry</th>
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<tbody>
<tr>
<td></td>
<td>R&amp;D firms</td>
<td>Non-R&amp;D firms</td>
<td>Academia</td>
<td>Government</td>
<td>All</td>
<td></td>
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<tr>
<td>Placed within sector</td>
<td>17.0</td>
<td>21.7</td>
<td>57.1</td>
<td>4.1</td>
<td>100.0</td>
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<tr>
<td>National sample (M)</td>
<td>10.8</td>
<td>75.0</td>
<td>10.7</td>
<td>3.5</td>
<td>100.0</td>
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<td>Of those in sector, percent placed:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Within 50 miles</td>
<td>10.1</td>
<td>23.5</td>
<td>8.9</td>
<td>18.2</td>
<td>12.7</td>
<td></td>
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<tr>
<td>Within state</td>
<td>16.6</td>
<td>36.0</td>
<td>18.0</td>
<td>25.8</td>
<td>22.0</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1. UMETRICS Doctoral Recipients are placed at establishments that are larger and have higher payrolls per worker.
Earnings by sector, discipline
Exploration of earnings by sex, industry sector

• “STEM training and early career outcomes of female and male graduate students: Evidence from UMETRICS data linked to the 2010 Census” American Economic Review, 106(5), 333-8

• Buffington, C., Cerf, B., Jones, C., & Weinberg, B.A.
Earnings Distributions

(a) All Sectors
(b) Government & Academia
(c) Other Sectors

Source: UMETRICS linked to 2010 Census, ProQuest, LEHD, W2, LBD, BR, and iLBD.

Note: Sample includes STEM students in the 2007–2010 graduating cohort. Wages are in 2012 dollars and are from one year following graduation or leaving the university payroll, whichever was later. The tails of the kernel-density plots and the bandwidth size are not displayed to satisfy confidentiality requirements.
Visualizing networks

• “UMETRICS as a tool for quantifying the value of research and assessing underrepresentation.” AWIS, Summer 2015.

• McFadden Allen, B., Lane, J.I., Rosen, R., Owen-Smith, J., & Weinberg, B.A.
One possibility: Team composition and gender

Source: “UMETRICS as a tool for quantifying the value of research and assessing underrepresntation” Mcfadden-Allen et al. 2015
How can IRIS help add to the understanding of postdoc career outcomes?

• Use the methods that have been employed to study doctoral recipients to understand postdoc career outcomes

• Work with the National Postdoc Association to refine outcomes & identify other useful data sources

• Make research datasets available to explore postdoc outcomes
Questions to consider for postdocs

• Equity
• Career trajectories
• Training
• Outcomes
• Data
• Your questions?
Limitations

- Administrative data says nothing about the experiences or motivation of individuals
- Limitations of matching to Census data
- Privacy & confidentiality
- Individuals paid on research grants
- Idiosyncratic job titles
Future directions

• First IRIS research data release
• As the IRIS membership grows the data tell a more complete story
• We are exploring analyses of various groups – CTSA institutions, AAU institutions, EBSCoR states, etc.
• Ongoing development of new data products
IRIS Research Data Now Available!

• Visit our website for data access application, data use agreement, VDI user guide, acceptable use policy, data file description, and data access workflow

• http://iris.isr.umich.edu/research/data-access-faq/
Learn more about IRIS:

Get in touch with us at 734.615.0015
Visit http://iris.isr.umich.edu/

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