Economics of Postdoctoral Position

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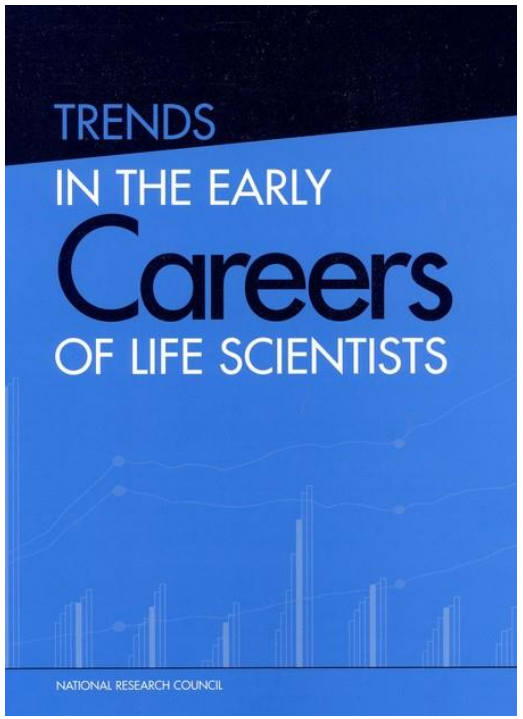
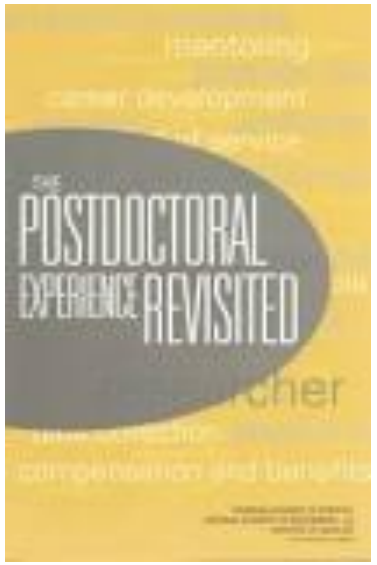
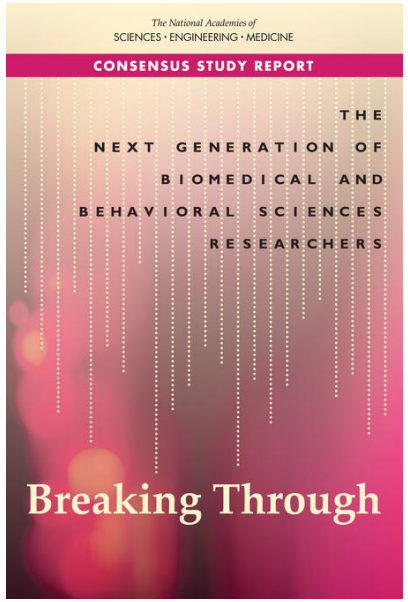
Perspective from 25 Years of Committee Work







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Economics Is about Incentives and Costs

- Incentives and costs have significant impact on number of postdoctoral scholars employed in United States and elsewhere

Incentives from PI's Perspective

- Increased importance of
  - Specialization in research
  - Funding for research
  - Role published research plays in funding

1. Specialization

- Sole author is dinosaur when it comes to research
- Specialization means faculty increasingly look for individuals to work with them on research and to staff their labs

2. Importance of Funding

- Faculty increasingly under pressure to bring in funding for research
- Reflects importance of indirect cost recovery and salary buyout to university finances;
- Important role funding plays in university rankings
- Not just in US: Importance of funding has grown dramatically in Europe in recent years
- Grants take time: PIs on Federal grants spend 42% of research time in grant-related administration (Kean survey)

3. Importance of Publishing

- PIs under extreme pressure to be productive
- Publications play key role in grant review and grant success

Staffing of Labs

- Forces of specialization, funding and publications lead PIs to seek clever, productive and hardworking individuals to staff labs and help in production of research
- Three groups to choose from:
  - graduate students
  - postdocs
  - staff scientists
- This is where costs begin to play a large role

Costs of a Graduate Student

- Stipend between $16,000 to more than $40,000
- Can cost an additional $16,000 or more once tuition is included, depending upon limits set by funding agency and policies of university; one estimate puts total cost at $51,000
- GRAs work approximately 1200 to 1500 hours per year
- Hourly rate as high as $33.00 on some campuses before fringes; low of around $13.00 (without tuition)

Cost of Postdoctoral Scholars

- NIH stipulated rate for FY 2021 is $53,760 for NRSA first-year postdoctoral scholar; up from $42,840 in 2015; $39,264 in 2013.
- Increase represents “threat” of FLSA coverage in 2016
- Many institutions follow NRSA rate for other postdocs
- Average postdoc reported working 2650 hours a year in life and physical sciences; 2550 in engineering and 2500 in math and computer sciences
- Hourly rate before fringes is currently about $20.30 in the biomedical sciences

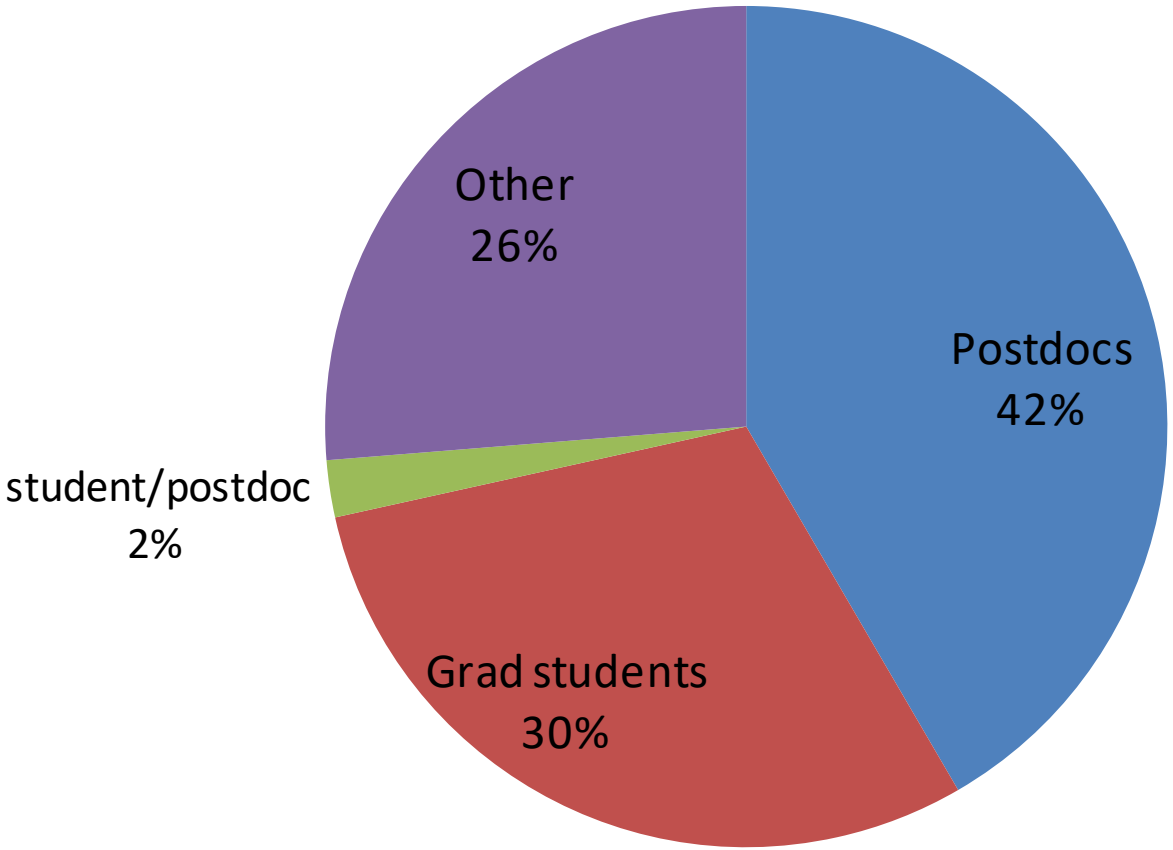
Cost of Staff Scientist

- Start at approximately $60,000 to $70,000; average $79,000
- Fringe benefits are significantly higher than those for a postdoc because they are treated as employees by university
- Hourly rate of approximately $30.00 to $40.00 before fringes; could be significantly higher

Cost Advantage Lies with Postdoctoral Scholar on Many Campuses

- Relatively low salary and long hours of work mean postdoctoral scholars are between one-half to two-thirds as expensive as graduate student or staff scientist on many campuses
- Plus
  - Higher level of skill than graduate student
  - Possibly more motivated than staff scientist
  - Flexible period of commitment from PI's point of view
  - Some come with fellowships

First Authors: N=137



"The Economics of University Lab Science and the Role of Foreign Graduate Students and Postdoctoral Scholars." (Grant C. Black and Paula Stephan), in American Universities in a Global Market," edited by Charles Clotfelter, University of Chicago Press, 2010, pp. 129-162.

“Cost Advantage” Suggests a Closer Look at Why Postdoctoral Wages Are Low

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Salary Relative to Alternatives Is Low

- PhD in S&E (2019 SED data)
  - Median salary starting in academe: $67,000-$83,000 depending on field
  - Median salary starting in industry: $110,000 to $140,500, depending on field

https://ncses.nsf.gov/pubs/nsf21308/data-tables

Starting Faculty Salaries
Assistant Professors, Research Public Universities 2013-2014

- Engineering: $84,011
- Biological and Biomedical: $74,176
- Math and Statistics: $67,382

Classmates without Graduate Training Getting More

- Employees without training beyond BA getting $56,000 recently;
- Classmates who did not get training beyond a BA were earning about $49,911 in 2012, seven years after graduating when postdocs were earning less than $39,000

http://www.census.gov/hhes/www/income/data/historical/people/

Why Low?

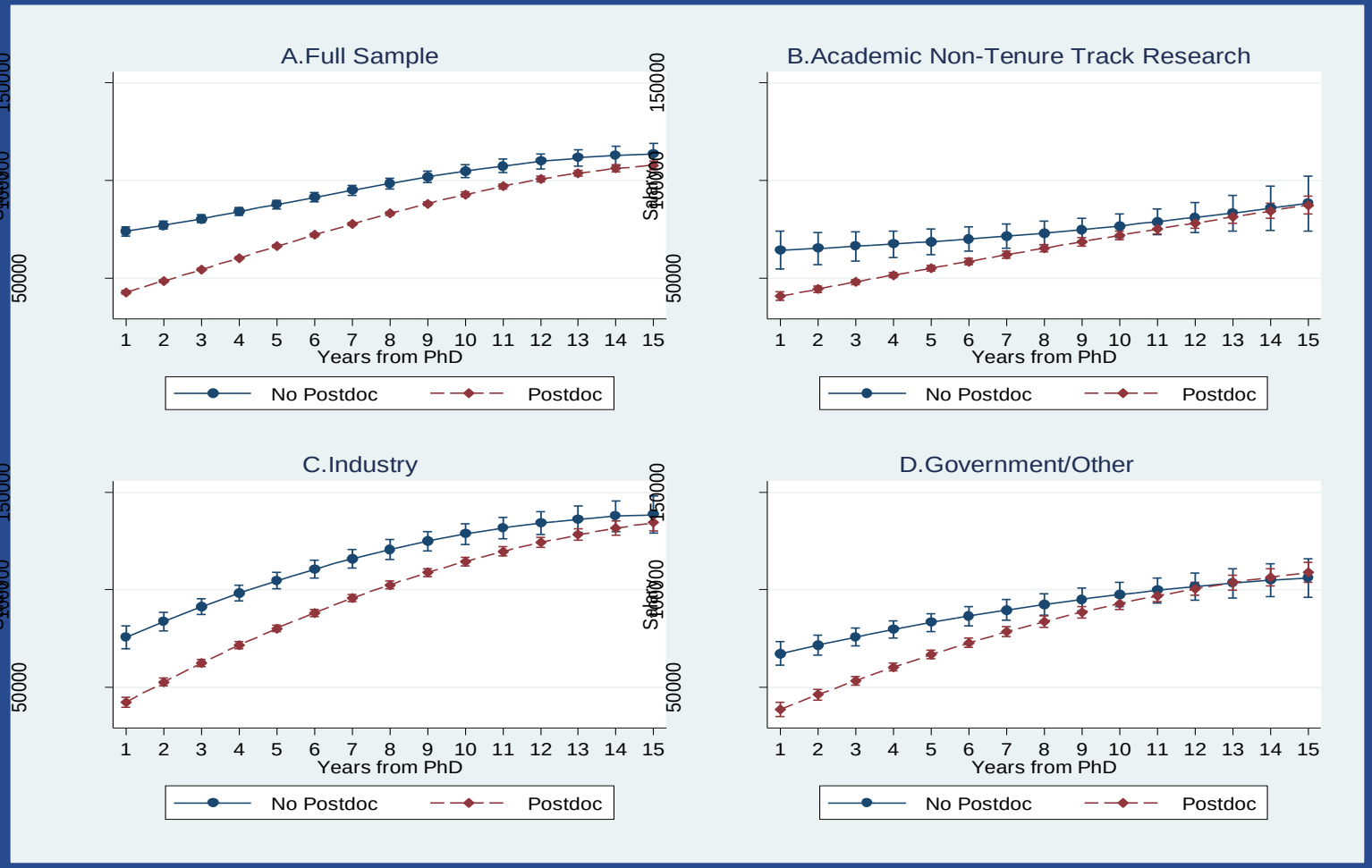
Training Argument

- Investment: Low pay to postdoctoral scholars due to large training component of position
- Training received portable to another position
- Low wages are down payment on a research career

Validity of Training Argument

- Definitely strong training component in many postdoctoral positions
  - But in some labs training component is minimal and postdoctoral scholars are relied on for routine procedures
  - Over postdoc period, training component diminishes
- High cost of training—opportunity costs are $20,000 plus without including fringes
- Training investment does not pay off in long time
  - Many skills learned may not be transferable to non-research position—likely outcome for many
  - Even for those who go into research return may be minimal or not existent
  - See work by Ginther and Kahn—14 years before one catches up

Effect of Postdoc on Earnings



Postdocs earn less on average than non-postdocs in all sectors. They only catch up to non-postdocs in non-tenure track academia and government..

Training for Unlikely Position

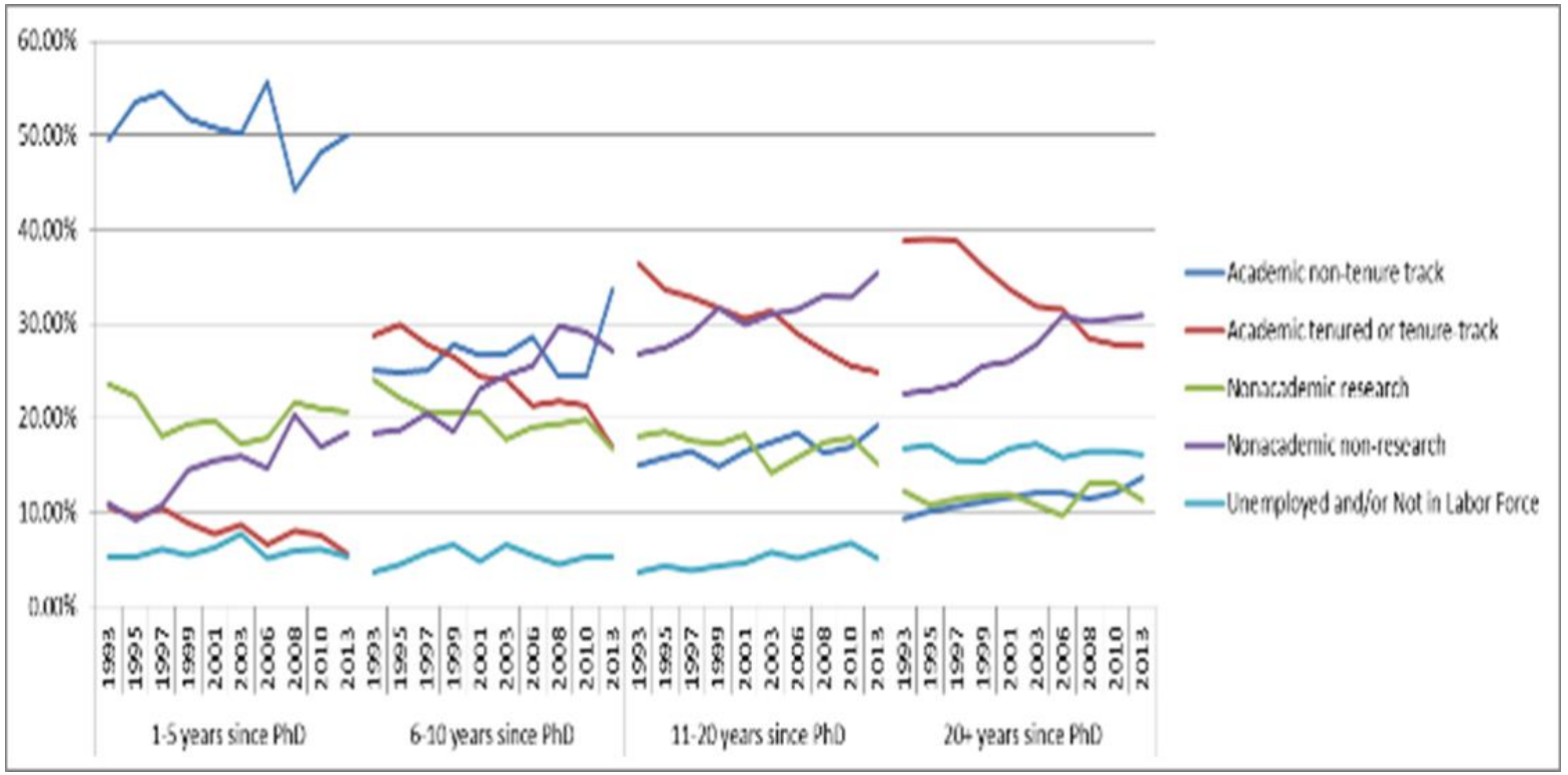
- Few will end up getting tenure-track position in academe
- Many more will go to industry; some to non-research jobs

Tenure and Tenure-track Positions 3-5 Years Since PhD

- 10.6% biological, agricultural and environmental sciences; (17.3%)
- 14.3% physical sciences; (18.8%)
- 14.6% engineering; (22.7%)
- 13.8% computer and information sciences; (55.7%)
- 29.6% math and statistics; (54.9%)

Red is 2013; Blue is 1993; Table 3-16 Indicators.

Increase in Non-research, Non-academic Positions; Decline in Tenure-Track Positions

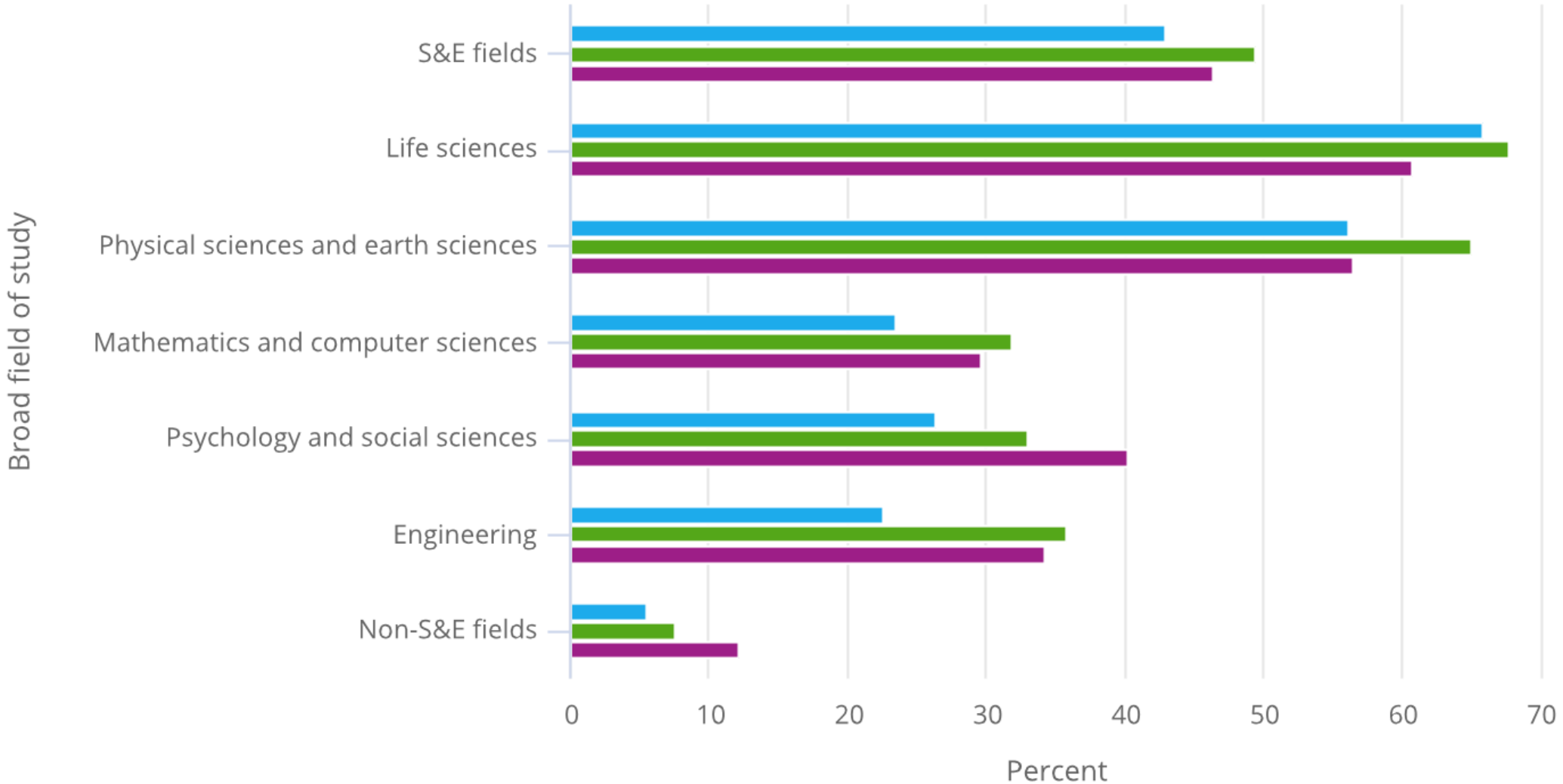


Alternative Explanation
Low Wages

- An unusual market
- Ample supply of domestically produced PhDs and large supply of PhDs educated abroad keep salaries low
- Postdoc is the “default” position

FIGURE 22

U.S. postdoctorate rate for doctorate recipients, by broad field of study: Selected years, 1999–2018



Why Do Postdoctoral Scholars Take Position?

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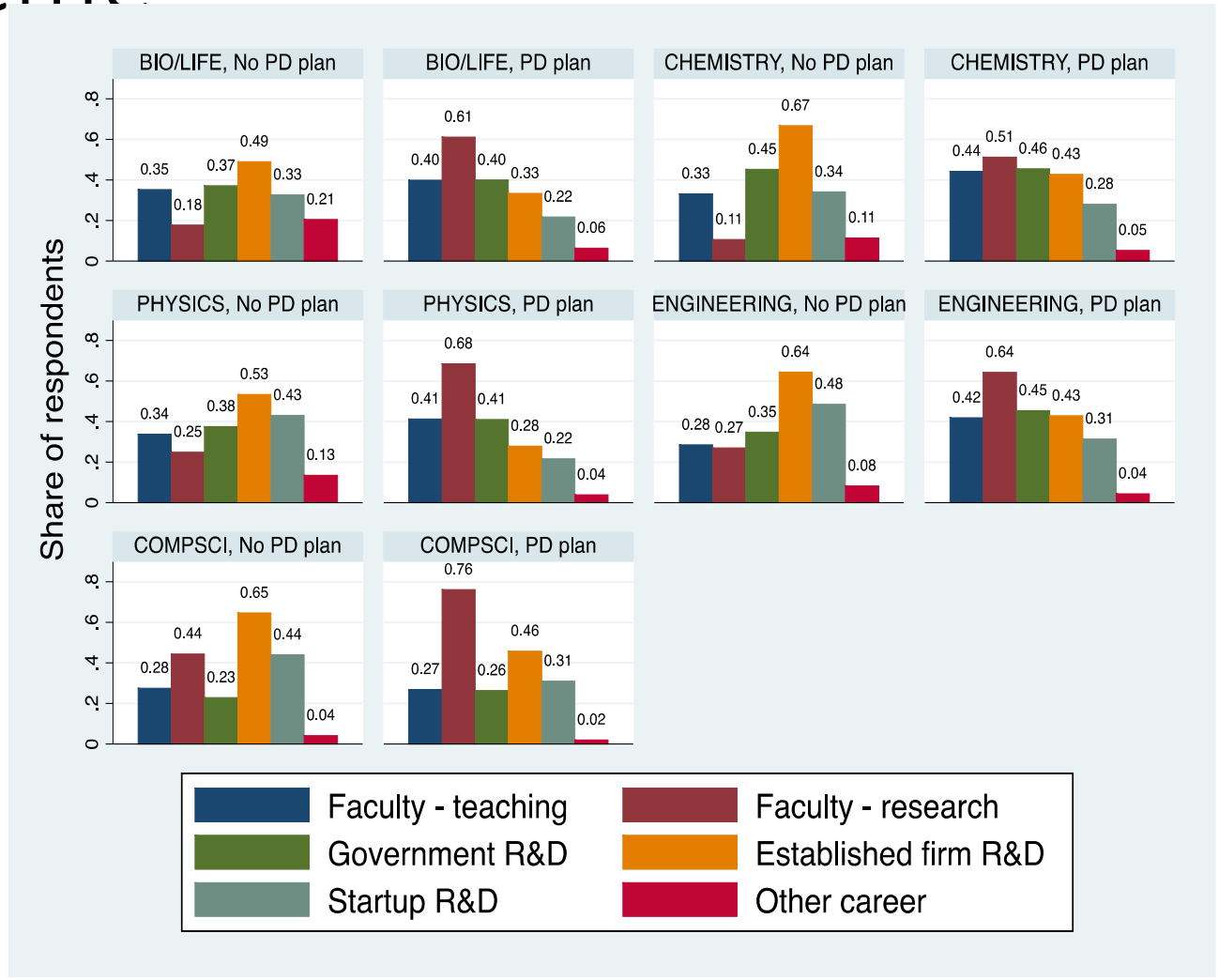
Incentives from Postdoc Point of View

- Interest in science
- Aspirations/optimism bias
- Career building/ “arms race component”
- Information (lack of)
- Lack of alternatives
- Hard to know when to leave

Interest/Aspirations

- Postdoctoral scholars get satisfaction from engaging in research
- Most perceive their chances/ability as being better than that of others in their field; “optimism bias”
  - (Sauermann and Roach find majority of students rate themselves as being more able than peers in the program)
- Postdoctoral position is logical step for those who want to get a research position—acquire skills and build resumé

Majority of Postdocs Have Preference for Job in Academe



Sauermann & Roach: “Why Pursue a Postdoc?”

Getting an Academic Job Resembles an Arms Race

- Publications
  - Academic market place highly competitive; need publications to be considered for an academic appointment
  - Essential to have more publications in pipeline before starting an academic career first evaluation towards tenure comes after three years
  - Mike Lauer, Deputy Director NIH Extramural Research, refers to this as the “arms race” component
- Funding
  - Must have preliminary data before beginning to apply for grants
  - Postdoctoral position used to set the stage for future research

Get Out of Jail, Free, Card

Publications—especially first authored articles in high impact journals--are seen as a necessary

condition for getting out of postdoc jail

into an academe position

Information

- Information in short supply
- Many students receive minimal information about career options when they decide to go to graduate school or start their graduate training; PhDs are stressed over MA degrees
- Many doctoral programs offer few seminars or workshops that provide students with information on careers other than those in academia
- Postdoctoral position often first time information concerning jobs becomes available and is talked about; many postdoctoral fellows even then are isolated and only get information from their PI
- PhD programs rarely post job outcomes on their Web pages
- Many faculty resist students seeking information regarding alternative careers; faculty are misinformed
- Postdocs know odds of getting faculty position are low (Sauermann and Roach), but know little about career outcome data. Often told postdoc is good training for other positions.

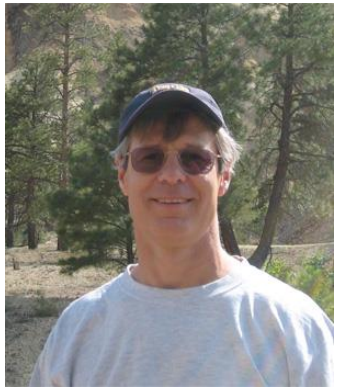
Alternative Jobs in Short Supply

- Number of PhDs has increased
- Demand has slowed
  - Funding for research flat
  - State support declining
  - Restructuring of research in industry—example of pharma and large chemical research labs
- Probability of finding research position has declined
- And this before Covid-19

Hard to Know When to Leave

"You invested so much you can't stop, just like the War in Viet Nam."

Loren Williams, Professor of Chemistry and Biochemistry, Georgia Institute of Technology



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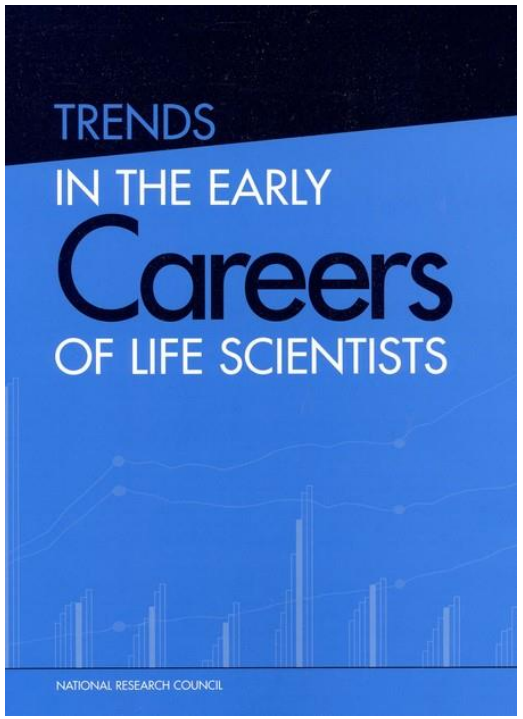

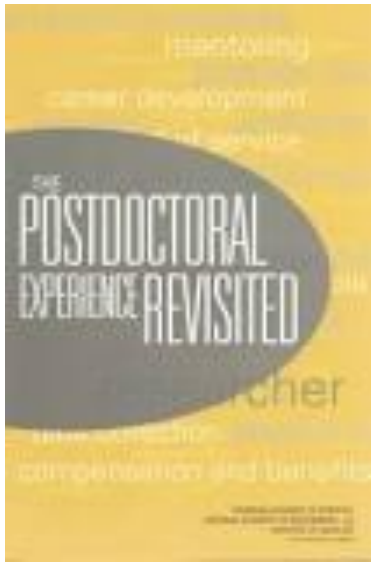

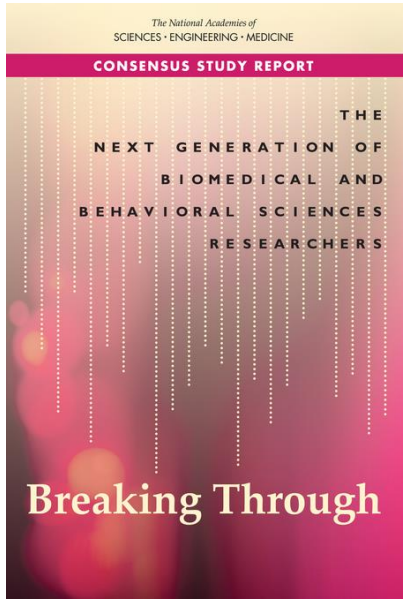

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Recommendations routinely include

- Increase in compensation
- Improved job information flows
- Create more staff scientists' positions
- More independent funding for postdoctoral researchers
- Almost all recommendations have been ignored to date by academe and most by funders
- Biggest change that has occurred has been due to threat of FLSA coverage; not because of recommendations

Important Areas for Research

- What are 85% who do not get academic jobs doing? Are they using research skills?
- What do those going to industry do?
- Is academic postdoc best way to train people for work in industry?
- Are staff scientists a reasonable and stabilizing alternative?

Thank you!

- Questions/comments
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