

Bias in Grant Review: The Fault in Our Metrics?

Linda F. Bisson
Associate Director
UC Davis ADVANCE



Awards by Sponsor Category, FY 2005-06 to 2013-14

(\$ millions, inflation adjusted)

<i>SPONSOR</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>
<i>Federal</i>	3,173	3,135	3,229	3,224	3,977	3,719	3,378	2,927	3,285
<i>State</i>	447	372	472	486	465	455	445	531	439
<i>Other Gov't*</i>	118	181	141	156	169	110	131	149	183
<i>Business</i>	290	388	512	392	380	403	506	470	612
<i>Non-Profit</i>	477	533	674	608	565	561	541	666	644
<i>Academia**</i>	408	442	468	464	498	516	543	538	546
<i>TOTAL</i>	<i>4,912</i>	<i>5,050</i>	<i>5,495</i>	<i>5,331</i>	<i>6,054</i>	<i>5,765</i>	<i>5,542</i>	<i>5,280</i>	<i>5,708</i>

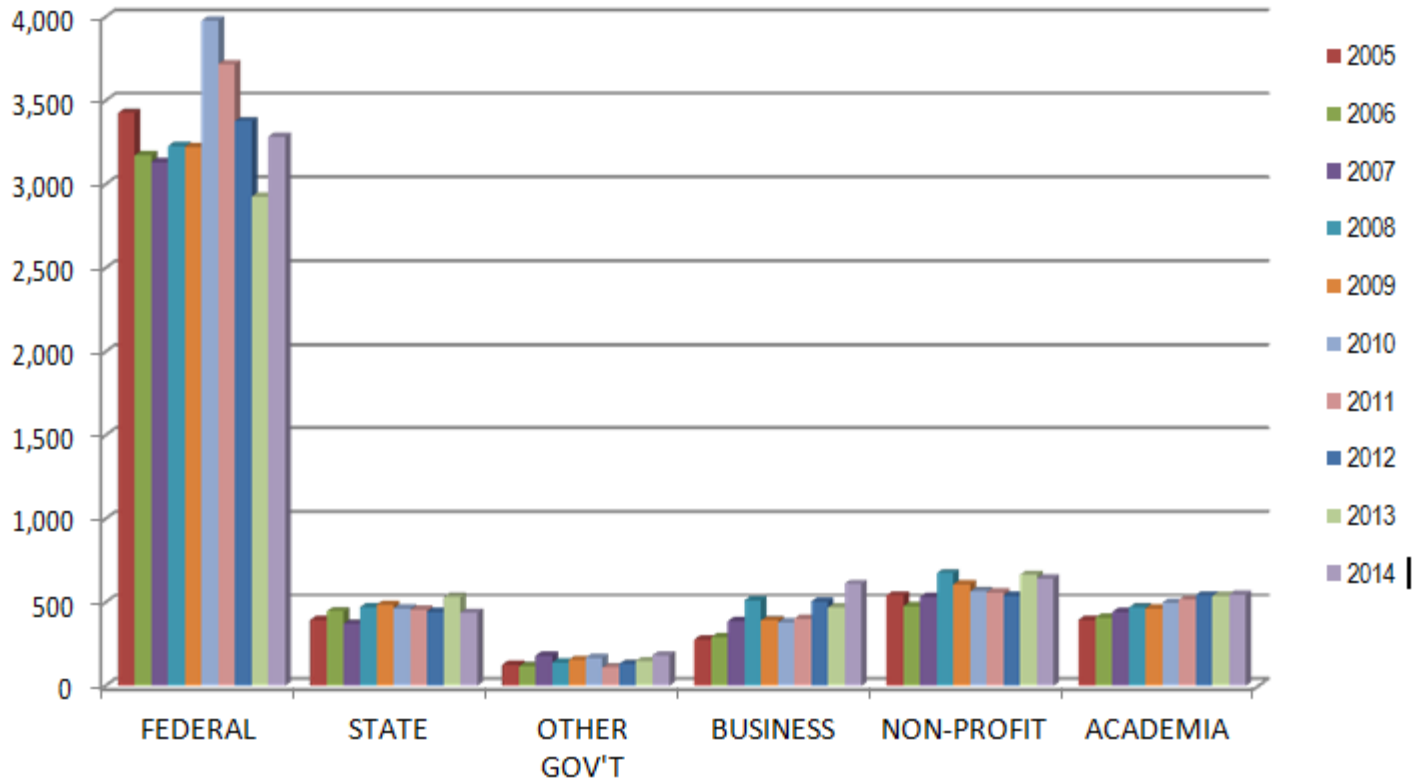
* *Other Gov't includes Agricultural Market Order Boards.*

***Academia includes the categories of Higher Education, DOE Labs, Campuses and UCOP.*

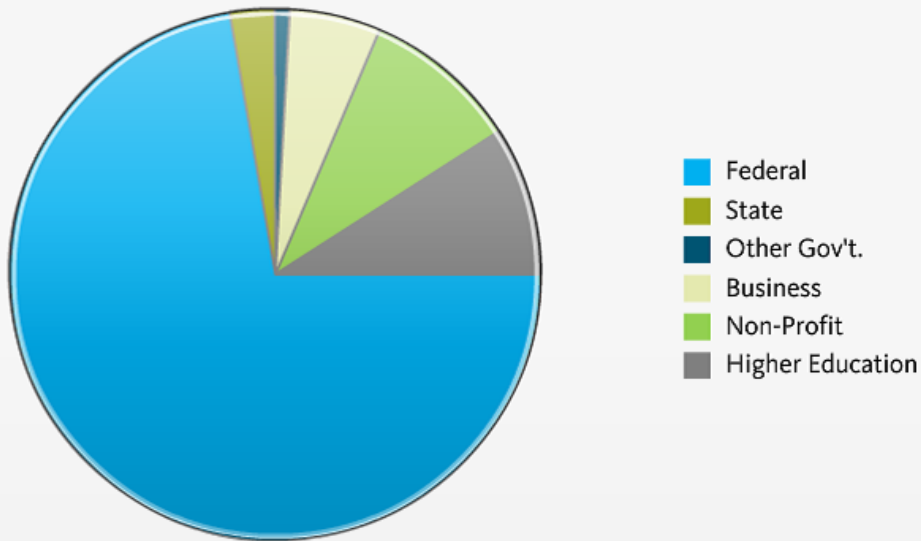


Awards by Sponsor Category, FY 2004-05 to 2013-14

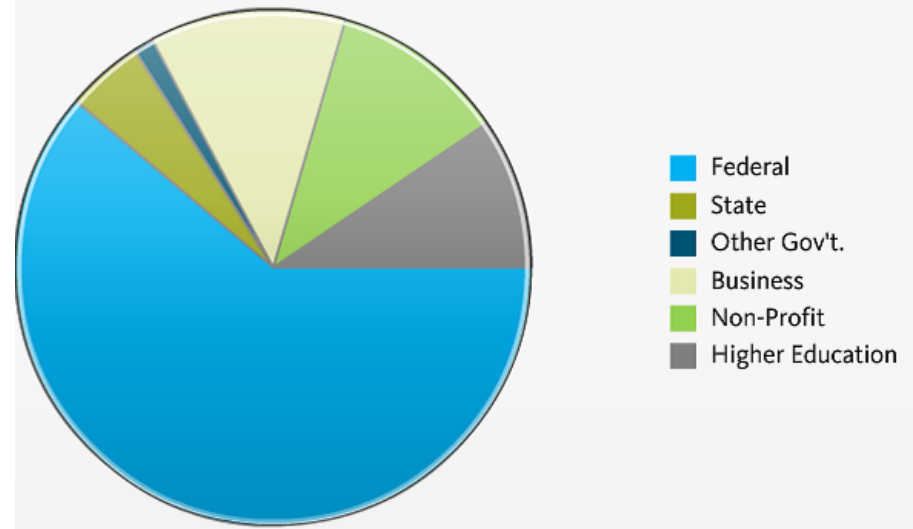
\$ millions, inflation adjusted



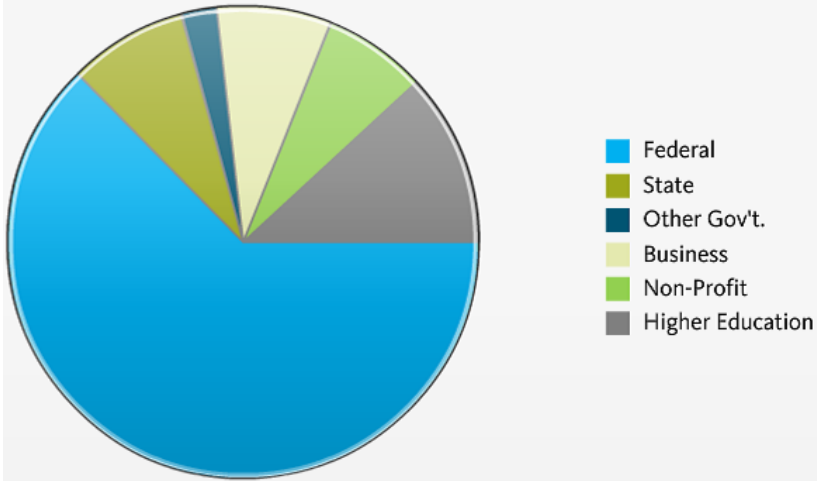
Universitywide - 2003



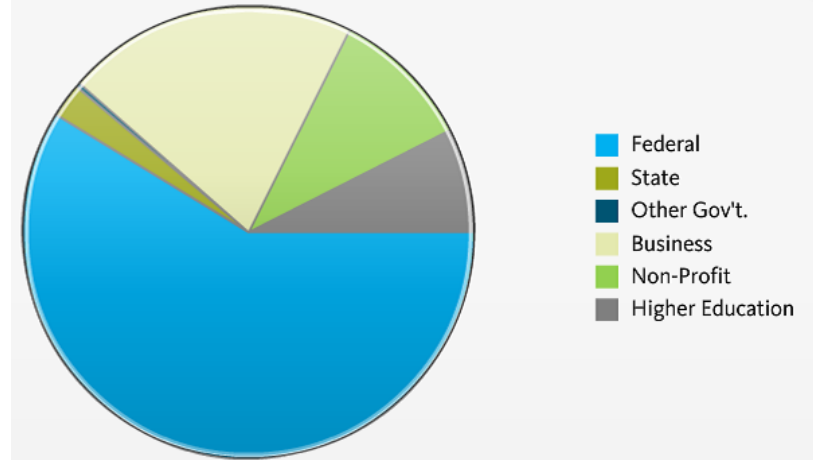
Universitywide - 2014



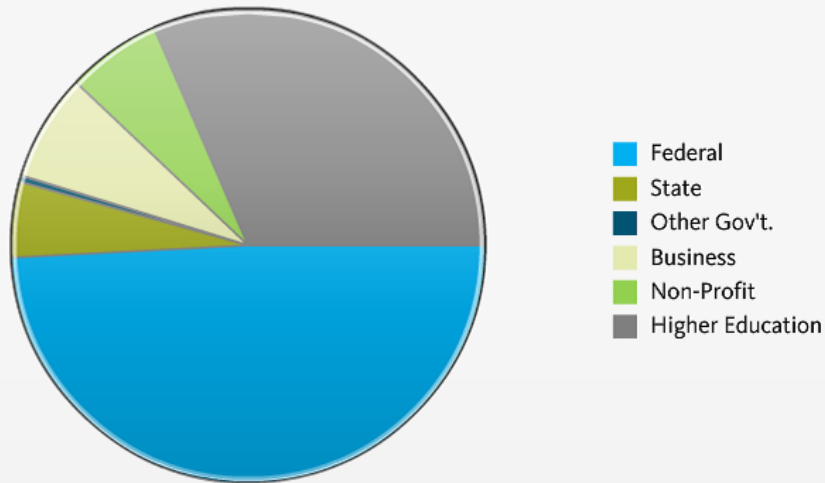
Davis - 2014



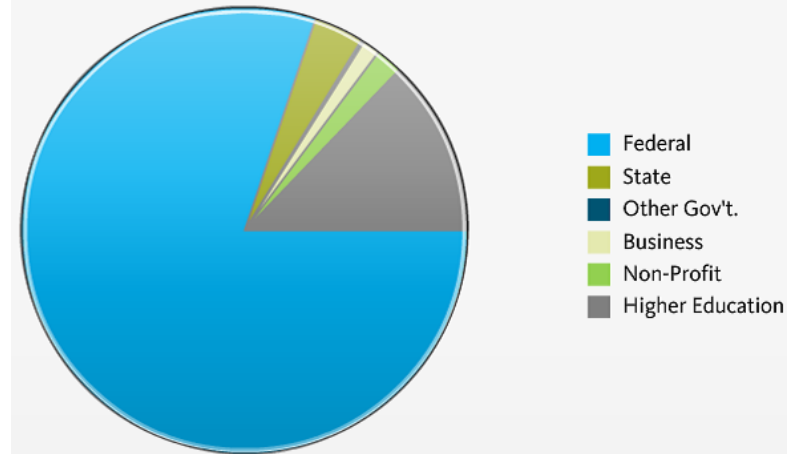
San Diego - 2014



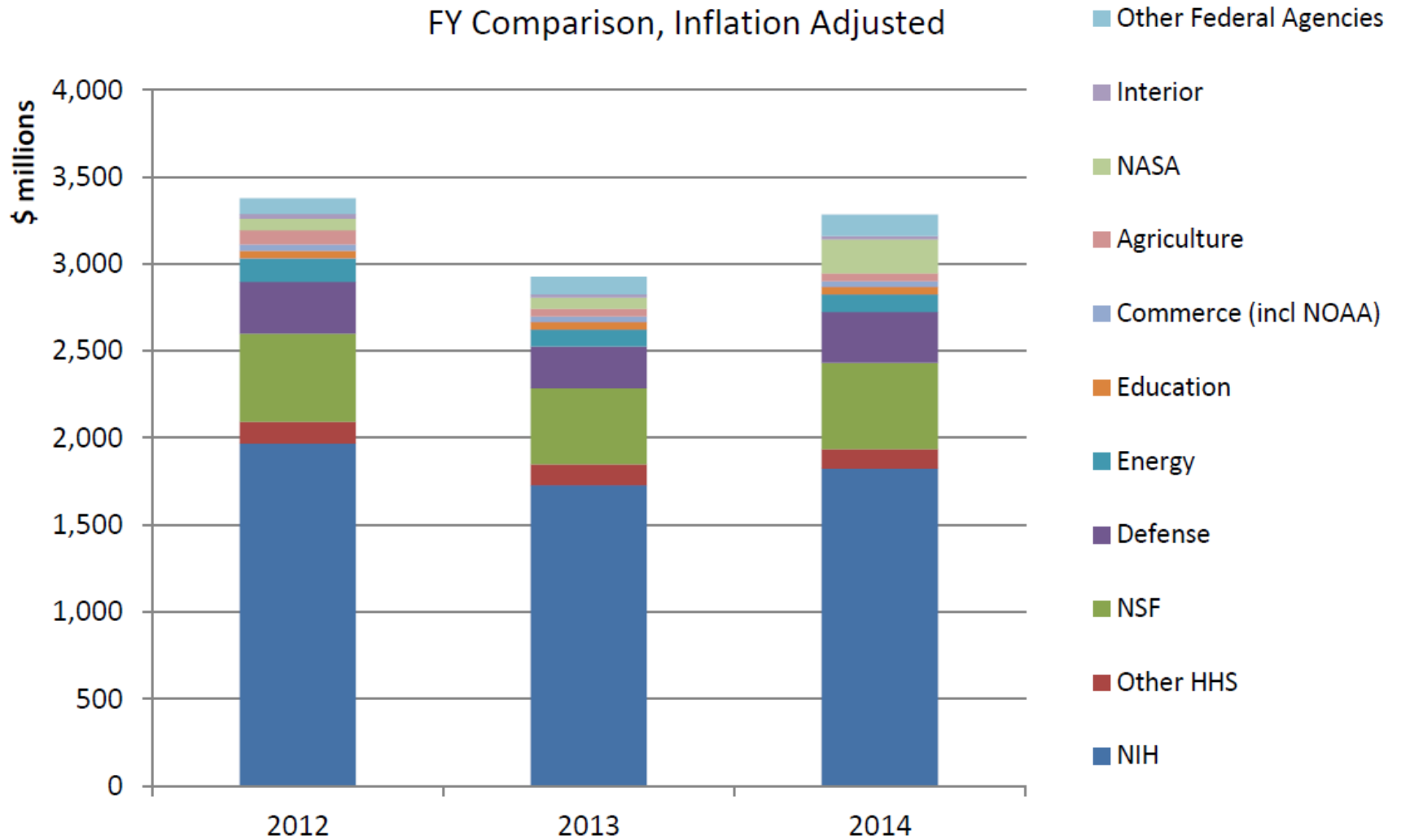
Santa Cruz - 2014



Merced - 2014



Federal Agency Funding FY Comparison, Inflation Adjusted



Rescuing US biomedical research from its systemic flaws

Bruce Alberts^a, Marc W. Kirschner^b, Shirley Tilghman^{c,1}, and Harold Varmus^d

^aDepartment of Biophysics and Biochemistry, University of California, San Francisco, CA 94158; ^bDepartment of Systems Biology, Harvard Medical School, Boston, MA 02115; ^cDepartment of Molecular Biology, Princeton University, Princeton, NJ 08540; and ^dNational Cancer Institute, Bethesda, MD 20892

A generation at risk: Young investigators and the future of the biomedical workforce

Ronald J. Daniels¹

President, Johns Hopkins University, Baltimore, MD 21287

The Aging of NIH Investigators

Congressman's Provocative Op-Ed Bemoans Lack of Young Investigator Funding

Information, Bias, and Efficiency in Expert Evaluation:
Evidence from the NIH *

Danielle Li

Northwestern University[†]

by ERIC BERGER

*Special Contributor to
Annals News & Perspective*

The Economics of Science
Funding for Research
Paula E. Stephan

Georgia State University, NBER, and ICER, Turin, Italy

June 2010



RACE, ETHNICITY, AND NIH RESEARCH AWARDS

Donna K. Ginther^{1,*}, Walter T. Schaffer², Joshua Schnell³, Beth Masimore³, Faye Liu³,
Laurel L. Haak³, and Raynard Kington⁴

- “Although proposals with strong priority scores were equally likely to be funded regardless of race, we find that Asians are 4 percentage points and black or African-American applicants are 13 percentage points less likely to receive NIH investigator-initiated research funding compared with whites.”
- “Together, these data indicate that black and Asian investigators are less likely to be awarded an R01 on the first or second attempt, blacks and Hispanics are less likely to resubmit a revised application, and black investigators that do resubmit have to do so more often to receive an award.”

RACE, ETHNICITY, AND NIH RESEARCH AWARDS

Donna K. Ginther^{1,*}, Walter T. Schaffer², Joshua Schnell³, Beth Masimore³, Faye Liu³,
Laurel L. Haak³, and Raynard Kington⁴

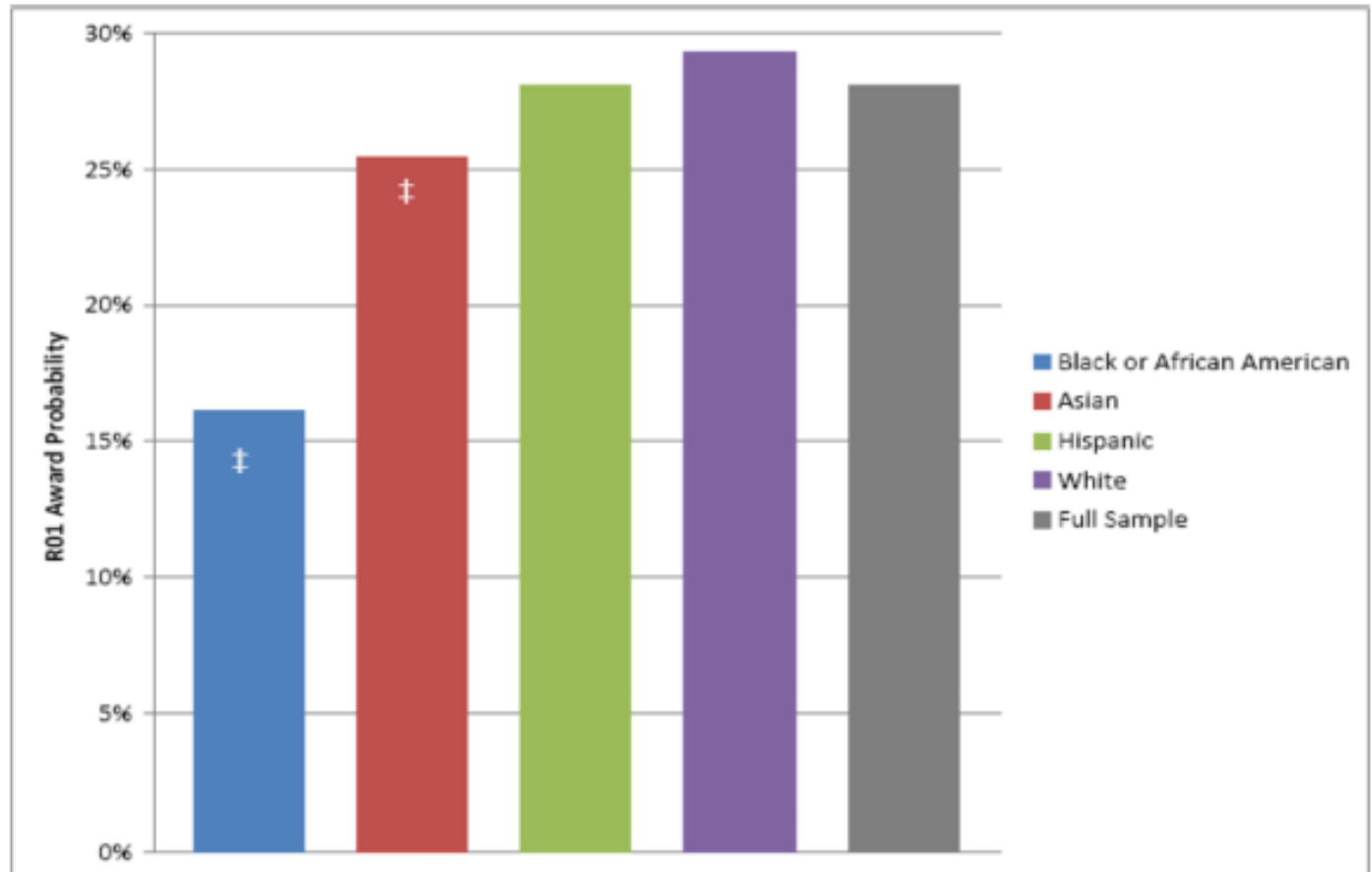


Fig. 1. Probability of NIH R01 award by race and ethnicity, FY 2000 to 2006 ($N=83,188$). Based on data from NIH IMPAC II, DRF, and AAMC Faculty Roster. †, $P < .001$; **, $P < .01$; *, $P < .05$.

The Economics of Science Funding for Research

Paula E. Stephan

Georgia State University, NBER, and ICER, Turin, Italy

June 2010

- “The conventional wisdom is that the market, if left to its own devices, would under- invest in research in terms of social benefits relative to social costs”
- Results from the previous grant (if there was one) play an important role in evaluation.
- The presence of demonstrated expertise and strong preliminary data play an especially key role in the review process. A major reason that universities provide start up funds is to permit the newly hired faculty member time to continue the process of collecting preliminary data for an NIH proposal.
- The “lineage” of the scientist is often noted, in terms of where the scientist trained and in whose lab the scientist did his or her postdoc work.
- Researchers must also demonstrate that they have adequate space at their university in which to conduct the research.
- Grants are often scored on their “doability.”

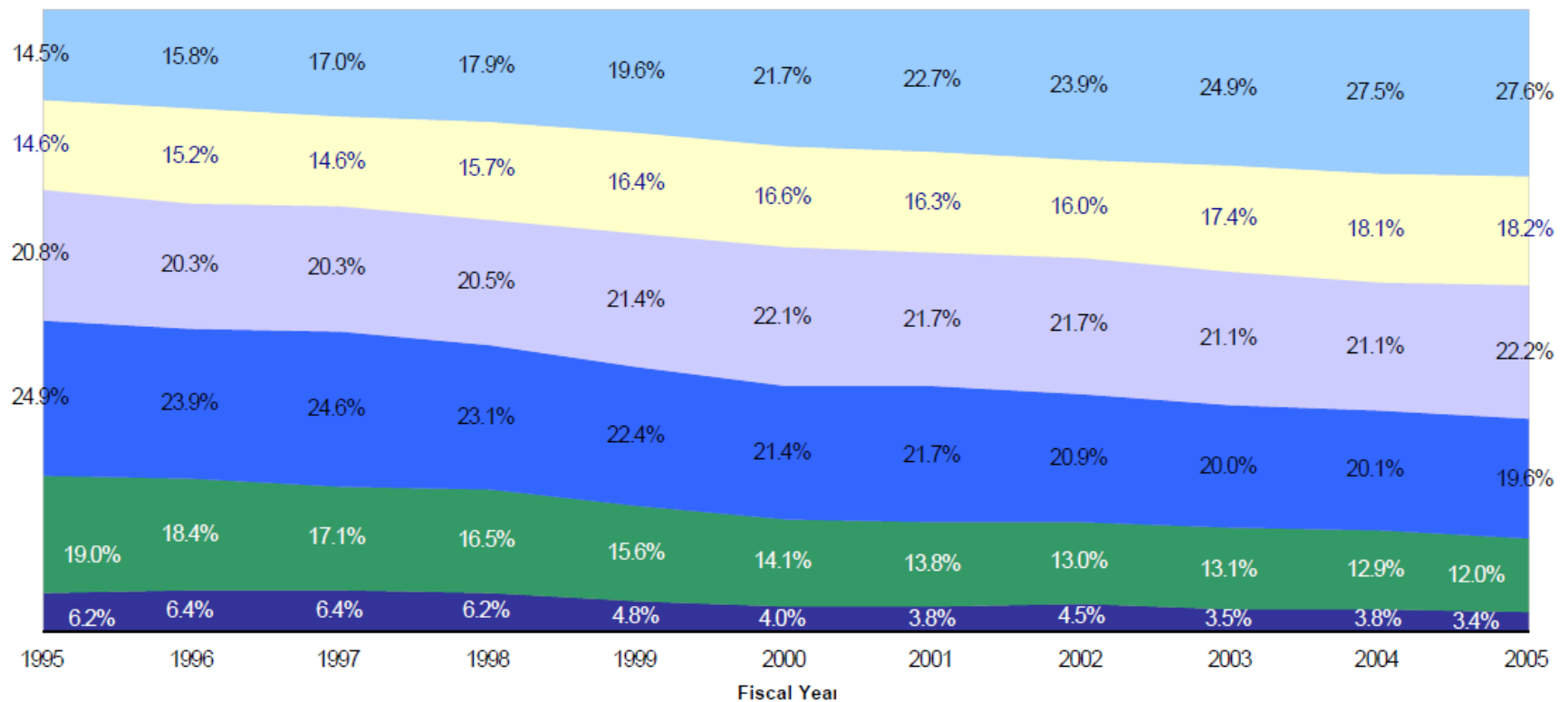
The Economics of Science Funding for Research

Paula E. Stephan

Georgia State University, NBER, and ICER, Turin, Italy

June 2010

NIH Competing R01 Equivalent Award



The Economics of Science Funding for Research

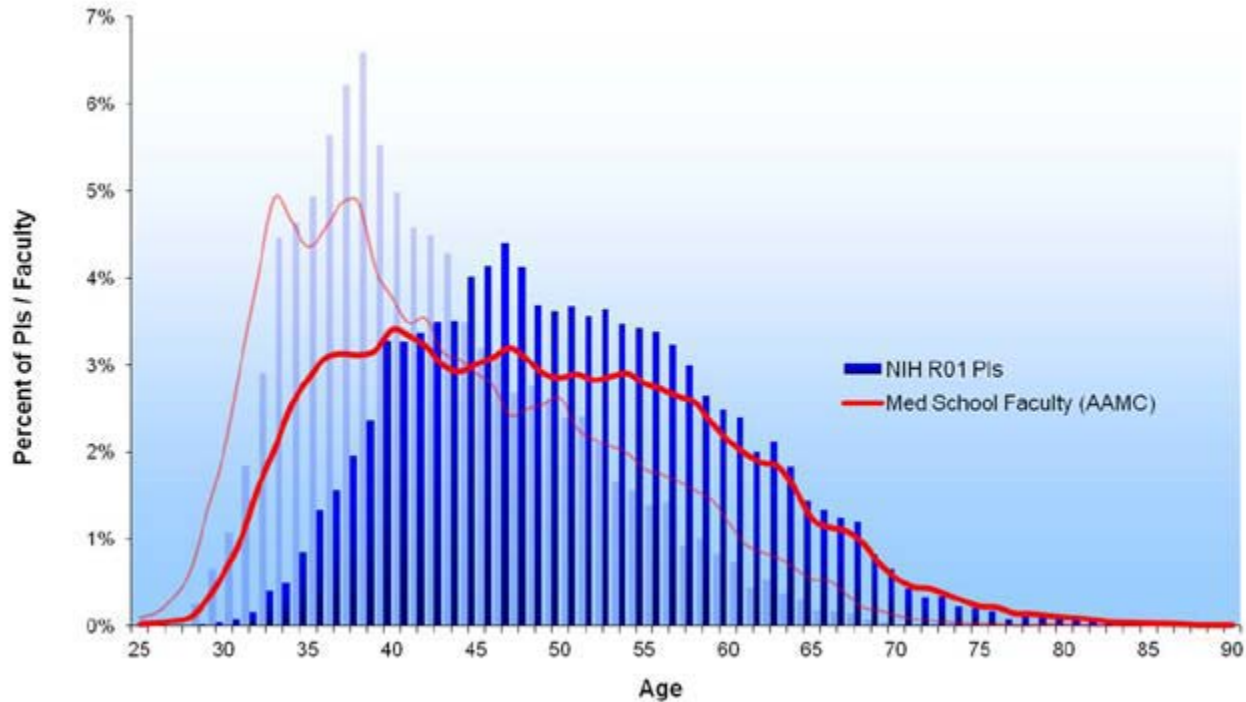
Paula E. Stephan

Georgia State University, NBER, and ICER, Turin, Italy

June 2010

- First, the need for preliminary results biases funding decisions towards more established researchers and delays the submission of grants by investigators just starting out.
- Second, more than 70% of new investigators must resubmit their proposals before receiving funding; thirty years ago over 85% of all new investigators received funding on their first submission. Resubmission can easily add an additional year to the process.
- Third, people increasingly are older at the time that they get a tenure-track position.
- Decisions at the margin become increasingly random when reviewers must choose among a limited number of top-quality proposals

Age Distribution in 1980 (background) and 2010 (foreground)



Rescuing US biomedical research from its systemic flaws (2014)

Bruce Alberts, Marc W. Kirschner, Shirley Tilghman and Harold Varmus
PNAS

- Hypercompetitive funding system highly discouraging to potential outstanding students and faculty
- Crippling demands on faculty time
- Policies/practices/attitudes of academia based on the assumption of continued rapid growth of federal funding sources to match growth in costs and in people = perverse incentives for institutional funding
- Cost structure encourages oversupply of trained individuals for the positions available
- “. . . the system favors those who can guarantee results rather than those with potentially path-breaking ideas.”

Information, Bias, and Efficiency in Expert Evaluation: Evidence from the NIH *

Danielle Li
Northwestern University†

- While reviewers are biased in favor of applications from their own subfield, they are also more informed about their quality
- First holding quality constant, every additional permanent member an applicant is related to increases her chances of being funded by 2.9 percent
- Second reviewers shape committee decisions by both increasing bias and improving information
- Finally the gains associated with review by potentially biased experts dominate the losses

Information, Bias, and Efficiency in Expert Evaluation:
Evidence from the NIH *

Danielle Li
Northwestern University†

“Treating related applicants as if they were unrelated thereby eliminating both bias and information would reduce the quality of the NIH-supported research portfolio by two to three percent, as measured by future citations and publications.”

Information, Bias, and Efficiency in Expert Evaluation: Evidence from the NIH *

Danielle Li

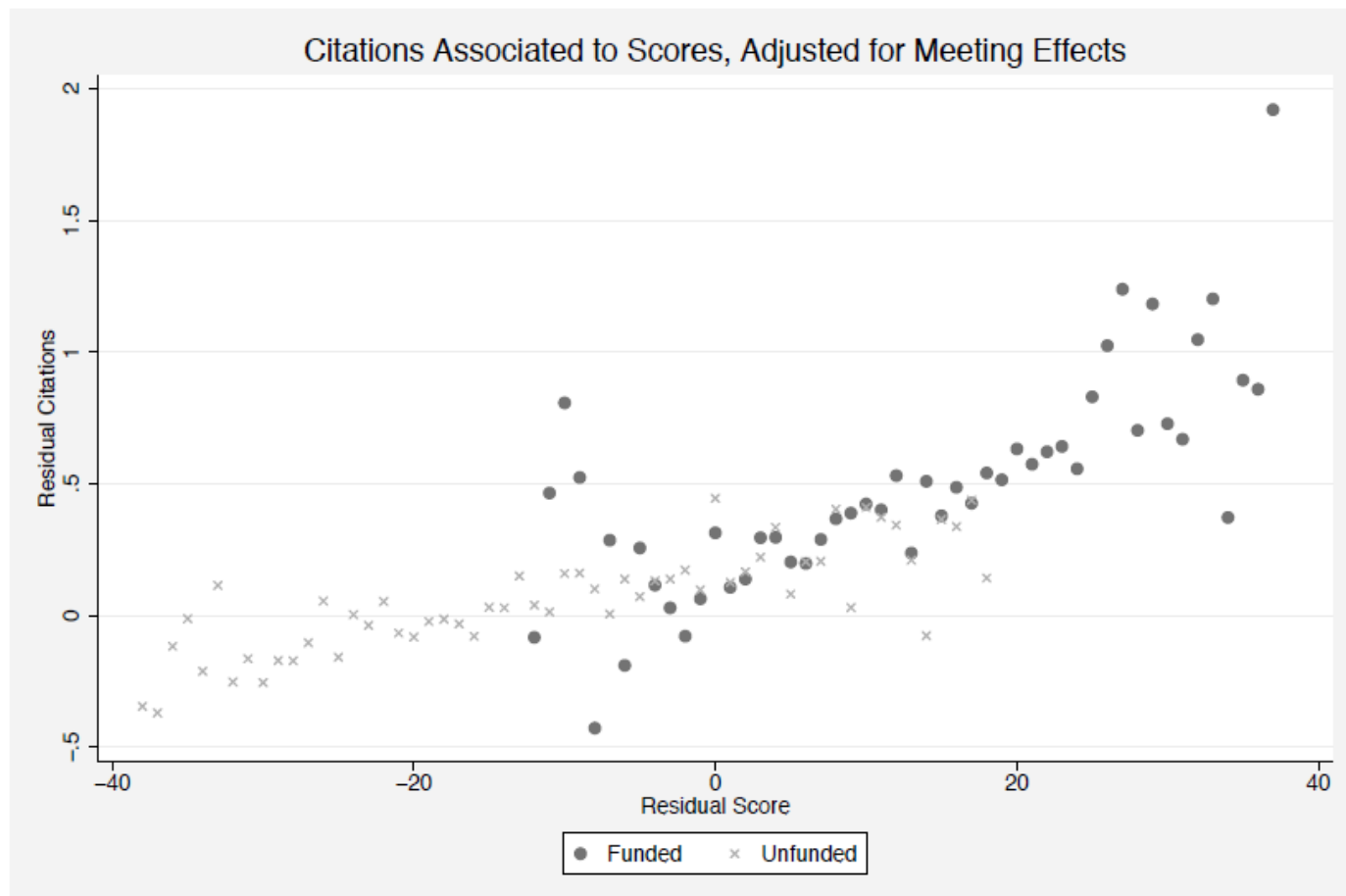


FIGURE 3: MEAN APPLICATION QUALITY BY SCORE: FUNDED AND UNFUNDED GRANTS

Conclusions

- Age and other bias in federal grant awards are documentable
- Basis for bias in part due to implicit bias (direct or indirect)
- Basis for bias in part due to metrics of quality that display implicit bias
- Reliance on grants as a proxy metric of excellence may compound implicit bias effects
- Potential junior faculty, and particularly URM faculty, are discouraged by the hyper-competitiveness of federal funding and the “crippling” demands on time