Where the Postdocs Are?
Paper Prospectus and Outline

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Abstract

Understanding the causes of the growth in the number of Postdoctoral researchers is central to an accurate evaluation and assessment of their role in and contributions to the nation's research enterprise. More and longer postdoctoral training may be a consequence of the burden of knowledge (Jones 2009), in which increased knowledge makes additional training necessary to reach the frontier of scholarship. Alternatively, postdocs may reflect a (temporary) disequilibrium in the market for scientific talent caused by growth in graduate training (increased supply) and a decline in faculty positions (reduced demand), which cause aspiring researchers to wait in temporary positions while hoping to secure more stable academic appointments.

This paper will set the current situation in its longer historical context by tracing the evolving role of postdocs within the U.S scientific enterprise since the early 1960s in conjunction with an exploration of changing perceptions of the benefits and costs of postdoc positions. A central theme of this historical context is the role that increased federal funding has played in supporting the growing reliance on postdocs.

Building on this historical background, I will exploit a newly developed panel data set for the years 2009-2018 covering 7 academic fields spanning biomedicine, science, engineering and social science, at about 150 leading research universities. Combining data on faculty numbers, faculty productivity, and research funding drawn from Academic Analytics with data on the numbers of postdoctoral researchers, graduate students from the NSF Graduate Student Survey and federal research expenditures from the NSF Higher Education R&D survey, I will analyze variations in the distribution of postdocs across universities, making comparisons across the different disciplines and considering factors that are correlated with the presence of postdocs.

Preliminary analysis of these data reveals that postdoctoral researchers and research funding are much more concentrated than are faculty or graduate students (see Table 1). I also find that in most, but not all of the, disciplines examined there is a strong positive relationship between federal R&D expenditures and postdoc numbers (see Table 2). While it is not possible to interpret these relationships as causal, this finding does suggest that federal R&D support has been an important factor in the growing reliance on postdocs in a number of different disciplines.

Timetable for Completion

Assembling and verifying the panel data has recently been completed and I am currently in the process of analyzing a variety of inter-relationships. I expect to spend February and early March on this analysis and will write up results by early April 2022.

References

Jones, Benjamin F. (2009). "The Burden of Knowledge and the Death of the Renaissance Man: Is Innovation Getting Harder." *Review of Economic Studies* 76, no. 1.

Table 1: Shares of Students, Postdocs, Faculty and Federal R&D Expenditures in the **top 10% of institutions**

	2009-10	2011-12	2013-14	2015-16	2017-18
Biomedical					
Graduate Students	25.18	24.42	23.86	23.42	24.69
Postdocs	36.79	38.31	37.98	37.07	37.95
Faculty	19.67	20.49	21.14	21.81	20.62
Fed R&D	32.99	34.00	35.17	36.63	36.05
Chemical Eng					
Graduate Students	22.39	23.73	22.75	20.86	19.57
Postdocs	36.22	37.63	37.16	36.18	33.73
Faculty	16.45	19.35	19.49	18.48	17.16
Fed R&D	23.12	29.13	31.51	29.99	29.31
Chemistry					
Graduate Students	20.44	20.34	20.43	20.31	20.83
Postdocs	33.26	35.68	37.40	35.97	35.61
Faculty	15.59	17.47	18.32	17.37	17.04
Fed R&D	27.97	29.74	29.74	27.96	25.48
Computer Science					
Graduate Students	27.57	28.97	32.60	37.42	34.39
Postdocs	43.54	46.77	47.07	45.88	60.89
Faculty	24.38	24.48	24.07	24.06	23.35
Fed R&D	54.92	57.09	54.56	55.94	55.95
Economics					
Graduate Students	17.97	17.02	17.01	17.83	18.47
Postdocs	33.33	41.99	39.92	36.43	36.64
Faculty	19.83	20.79	21.05	21.29	20.70
Fed R&D	45.40	51.04	55.33	55.95	51.23
Electrical Engineering					
Graduate Students	31.50	31.76	31.79	30.30	31.53
Postdocs	36.58	42.32	45.87	42.08	38.74
Faculty	24.78	25.23	24.89	25.04	23.52
Fed R&D	51.61	51.92	60.02	60.50	61.90
Psychology					
Graduate Students	23.73	24.00	23.94	24.55	25.76
Postdocs	39.04	35.85	37.02	34.81	33.07
Faculty	20.11	20.73	21.89	20.49	20.21
Fed R&D	27.85	29.21	32.21	31.49	29.54

Table 2: Panel Regression Results: Number of postdoctoral researchers

	Biomedical	Chemical Eng	Chemistry	CompSci	Econ	Elec Eng	Psyc
Number of Regular faculty	**0.0969****	**0.122***	0.0436	0.00993	0.00280	0.0483	**0.0420***
	(3.29)	**(2.10)**	(0.90)	(0.72)	(0.33)	(1.42)	**(2.12)**
federal R&D expenditure in million	**0.287*****	**0.268****	**0.901*****	0.000740	0.0286	-0.00204	**0.379*****
	(4.36)	**(2.79)**	**(7.33)**	(0.03)	(0.59)	(-0.13)	**(5.26)**
Department total number of all graduate students	0.0203	0.0104	**0.0680*****	-0.000525	**0.00519****	**0.00870****	0.00774
	(1.44)	(0.98)	**(3.88)**	(-0.73)	**(2.98)**	**(2.71)**	(1.88)
Mean sri across faculties within same department	0.689	0.141	-1.904	1.403	-0.375	-0.178	**3.292***
	(0.07)	(0.10)	(-0.81)	(1.25)	(-1.13)	(-0.11)	**(2.39)**
Year Effects							
2010	7.296	-0.603	-0.687	**1.187***	0.00636	0.587	-0.365
	(1.78)	(-0.71)	(-0.64)	**(2.20)**	(0.03)	(0.69)	(-0.56)
2011	7.385	-0.122	-2.012	**1.115***	-0.135	0.0599	-0.457
	(1.80)	(-0.14)	(-1.86)	**(2.05)**	(-0.72)	(0.07)	(-0.70)
2012	1.597	-0.529	-1.600	**1.141***	0.0164	0.789	-0.264
	(0.39)	(-0.62)	(-1.47)	**(2.08)**	(0.09)	(0.92)	(-0.41)
2013	-2.096	0.503	**-2.305***	**1.206***	0.178	1.101	-1.024

	(-0.50)	(0.58)	**(-2.12)**	**(2.20)**	(0.95)	(1.28)	(-1.57)
2014	-4.582	0.561	**-2.808****	**1.868*****	0.366	1.146	-0.507
	(-1.10)	(0.64)	**(-2.58)**	**(3.40)**	(1.96)	(1.32)	(-0.77)
2015	-6.772	0.660	**-3.320****	**2.211*****	0.347	0.841	-0.0433
	(-1.62)	(0.75)	**(-3.06)**	**(3.99)**	(1.84)	(0.97)	(-0.07)
2016	-5.115	0.301	**-3.855*****	**2.279*****	**0.441***	0.802	0.247
	(-1.22)	(0.34)	**(-3.55)**	**(4.07)**	**(2.32)**	(0.92)	(0.38)
2017	-5.443	-0.470	**-5.966*****	-0.0338	**0.487***	1.136	-0.487
	(-1.27)	(-0.52)	**(-5.46)**	(-0.05)	**(2.53)**	(1.30)	(-0.74)
2018	-8.421	-0.696	-6.834***	-0.387	0.515**	1.306	-0.0275
	(-1.94)	(-0.78)	(-6.23)	(-0.60)	(2.71)	(1.49)	(-0.04)
Constant	**93.63*****	**7.297*****	**12.41*****	**4.180*****	0.216	**4.305****	**2.886***
	(12.51)	**(5.66)**	**(5.07)**	**(5.12)**	(0.66)	**(2.80)**	**(2.51)**
Observations	1446	932	1286	1112	1121	1141	1240
R-squared	0.0430	0.0277	0.1278	0.0466	0.0379	0.0190	0.0433

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001