NBER WORKING PAPER SERIES

WOMEN IN ACADEMIC ECONOMICS: HAVE WE MADE PROGRESS?

Donna K. Ginther
Shulamit Kahn

Working Paper 28743
http://www.nber.org/papers/w28743

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
April 2021

Ginther acknowledges funding from NSF grant SES-1538797. We thank Anthony Olejniczak from Academic Analytics for providing information about the data and Sarah Jacobson for providing comments on the paper. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

Women in Academic Economics: Have We Made Progress?
Donna K. Ginther and Shulamit Kahn
NBER Working Paper No. 28743
April 2021
JEL No. A11,J16,J40

ABSTRACT

This study uses data from Academic Analytics to examine gender differences in promotion to associate professor in economics. We found that women in economics were 15% less likely to be promoted to associate professor after controlling for cumulative publications, citations, grants and grant dollars. In contrast, we found no significant gender differences in promotion in other fields including biomedical science, physical science, political science, mathematics and statistics, and engineering. We separated the sample by the research intensity of institutions and found suggestive evidence that these results were being driven by less research-intensive institutions.

Donna K. Ginther
Department of Economics
University of Kansas
333 Snow Hall
1460 Jayhawk Boulevard
Lawrence, KS 66045
and NBER
dginther@ku.edu

Shulamit Kahn
Boston University
School of Management
595 Commonwealth Ave.
Boston, MA 02215
skahn@bu.edu

Women in Academic Economics: Have We Made Progress?

The paucity of women in tenured ranks of economics in the US has led to concern that there may be inequities in the tenure process. The AEA's Committee on the Status of Women in the Economics Profession (CSWEP) annually compares the percent female of synthetic cohorts as their careers progress. In 2019 they concluded, "The female share of associate professors is consistently about 5% lower than the share who were assistant professors seven years earlier." (CSWEP 2020). In other words, women are less likely than men to be tenured. We ourselves have contributed to the literature on tenure in economics at several points in the last decades (Kahn 1993, Ginther and Kahn 2004, Ginther and Kahn 2014), primarily using the National Science Foundation's longitudinal Survey of Doctorate Recipients (SDR) that follows STEM PhDs post-PhD. Although the SDR sample of economists was small, we found significant gender differences in promotion to tenure, first among PhD recipients 1971-–1980 and continuing through PhD recipients 1981–2003. This work was limited in its ability to control for productivity measures since the SDR had only self-reported numbers of publications and only in some survey waves (the last being 2008).

The current study turns to a different source of information about academic careers – the research firm Academic Analytics – to study recent gender differences in promotion in economics. We find that women in economics have almost achieved parity in promotion to associate professor in research-intensive institutions, but that significant gaps remain at institutions that are less research focused.

Other researchers have also examined gender differences in promotion in economics. Heather Sarsons (2017) collected data on economists who went up for tenure between 1985 and 2014 at the 30 top economics departments, including productivity variables. In her sample,

women were 69% as likely as men to have received tenure (6–8 years post-PhD, p=0.001) and those who did took half of a year longer to receive it (p=0.012). A major reason for these differences were that women who coauthored with men received practically no credit for those papers, and less than half as much credit for papers coauthored jointly with men and women. Antecol *et al.* (2018) measured the gender gap in receiving tenure in a top 50 economics department (for hires 1980–2005) focusing the effect of a stop-the-tenure-clock policies. Their data show the tenure gender gap was approximately 7 percentage points at its narrowest in 1995 (out of an average 25% tenure rate), but grew substantially since then, partially due to gender-neutral stop-the-clock policies.

So why measure the gender difference in promotion in economics once again? First, because the articles on promotion are about earlier PhD cohorts, and there might have been substantial change since then. Second, the more recent studies described above are limited to economists at top schools, yet only 8.5% of tenure-track assistant economists with PhDs 2014–2013 were at universities rated by Carnegie as "very high research" (calculated from the SDR). Third, recent research has shown that increased mentoring has increased women's productivity and likelihood of being promoted (Ginther *et al.* 2020).

I. Data and Methods

We use data collected by Academic Analytics, a company that provides data and analysis to higher education institutions including publications, grants, citations and awards to benchmark their faculty's productivity. Our sample includes annual data of all faculty provided by 323 higher education institutions in the US, including 131 institutions listed by the Carnegie Classification of Higher Education Institutions as "Research Very High" and 114 institutions

classified as "Research High." We identified faculty who received PhDs from 2005-2011, were observed as tenure-track assistant professors during that period and appeared in three or more separate years of Academic Analytics data. We follow individuals across universities that were part of the Academic Analytics universe.

There were 798 assistant professor faculty members in economics departments (including agricultural economics but excluding economists in business schools not part of an economics department). We followed faculty who entered the sample starting in 2009 and ending in 2018, or whenever they left the Academic Analytics sample. The data set included information on each faculty member's journal publications each year from 2004–2018 and total citations to each article accrued by 2018. We allocated each publication's citations to the years through 2018 based on the typical citation pattern over time since publication in the field (using this data set). We also observed federal research grants and the dollar amounts of those grants 2004–2018 (or whenever the person permanently exited the Academic Analytics sample.[1])

We estimated a Cox proportional hazard model of the time between PhD and either promotion to associate professor[2] or being right censored, as a function of gender, PhD degree year; whether the university was public or private; whether the university was categorized by Carnegie as "Very High Research" (669 people), or as "High Research" (122 people) or other Carnegie categories (7 people); dummy variables for department (general economics: 655 people; agricultural economics: 117 people; or applied economics: 26 people) and time-varying variables for the cumulative number of publications, of citations, of grants received, and the

[1] Exiting the Academic Analytics sample does not mean that an individual leaves academic employment since Academic Analytics focuses on a subset of research-intensive higher education institutions.
[2] Ideally, we would observe when a person receives tenure. However, Academic Analytics only has verified tenure status for a subsample of individuals. As a result, we use promotion to associate professor as a proxy for promotion to tenure.

cumulative amount of grant dollars received from 2004 until that date. We use an inverse hyperbolic sine (IHS) transformation of productivity numbers (given the presence of many zero values).

II. Results

Hazard ratios are shown in Table 1. Column 1 includes a female dummy only and shows women were 18.5% ($p<0.03$) less likely to be promoted to associate professor. Controlling for institution type (public/private, Carnegie) in column 2 does not narrow the gender difference.

To compare, we estimated a similar regression for approximately the same period (survey years 2006–2017, PhD years 2004–2013) using the NSF's SDR, including anyone observed as a tenure-track assistant professor and calculating the time from PhD to when last observed. The sample included only 399 economists, some seen only once. This is a smaller, less longitudinal sample than we had used in previous studies because of a 2015 major restructuring of the SDR. Results controlling for the same institutional variables as column 2 are in column 3, with a larger although somewhat less significant gender difference in promotion to tenure (hazard ratio 0.617, $p=0.071$). Ginther and Kahn (2014) for 1981–2003 PhD cohorts with basic covariates found a larger hazard ratio on female of 0.788.

The Academic Analytics data allow us to control for productivity. Adding productivity measures to the model (column 4) somewhat narrows the female's disadvantage in tenure receipt to 15% and lowers its significance (p-value= 0.08.) Figure 1 illustrates the predicted survival function for men and women controlling for all covariates.[3] The gap between genders is obvious by 5 years from PhD and continues to be substantial at least through 12 years from PhD.

[3] Figure was estimated as a log-logistic model for a smoothed survival curve and graphed at the covariates' means.

The productivity measures that were important in this equation were numbers of publications and number of grants. Very high and high-research universities were much more likely than lesser ones to award tenure, but that is relative to a very small sample in other types of universities.

Some of the previous studies were limited to the best research universities. We therefore separately estimated the hazard analysis for two samples: those who entered academia into "Research Very High" institutions and those that did not. The results are in the last two columns of Table 1. The majority of the observations were in the Very High Research universities (which is primarily informative about the clients interested in Academic Analytics services). We were stunned by the results. The gender tenure gap was small and insignificant in very high research institutions. However, in less research-intensive universities it was huge, with women's rate of receiving tenure (with all controls) 46% lower than men's ($p=0.055$). Although the difference between the universities does not attain significance at standard levels, the huge point estimate of the tenure penalty at these less research-based universities and colleges is remarkable.

Previous studies of gender differences in tenure and promotion compared economics to other science and social science fields (Ginther and Kahn 2004, 2014; Ceci et al. 2014; Sarsons 2017; Lundberg and Stearns 2019). In these, economics fared quite poorly. Table 2 compares the economics results including productivity and institutional variables (Column 4 in Table 1) to other fields, including fields used in our 2004 study. In the top panel of Table 2, economics has the largest gender promotion gap after controlling for institution and productivity characteristics and is the only field whose difference was even marginally significant ($p=0.08$). In results not shown, both political science and biomedical science had statistically significant gender promotion gaps, but these differences are fully explained by controls for publications, citations, and grants that each significantly increase the likelihood of promotion to associate professor.

The next two panels of Table 2 divide the sample into Research Very High and Research Less-Intensive. The middle panel of Table 2 indicates no significant gender differences in any field in promotion at Research Very High institutions. The bottom panel shows that economics is the *only* field with a significant promotion gap at Research Less-Intensive Institutions.

III. Conclusions

We can only guess at why less research-intensive colleges and universities are so different. Could it be that in less-research-oriented institutions, the criteria for tenure are less clear, since research is less important? Yet the coefficient on cumulative publications in the economics models was practically identical in Research Very High (1.58, $p<0.001$) and Research Less-Intensive (1.51, $p<0.04$), which belies that conjecture. Our results parallel those found in the CeMENT mentoring experiment (Ginther *et al.* 2020). There, women who received the mentoring treatment were significantly more likely to be promoted to tenure at top 50 economics departments but significantly less likely to receive tenure at unranked economics departments. Our results for Research Very High institutions may differ from previous studies because other researchers measure promotion at a particular university, and we measure promotion to associate even if people move universities within the universe of Academic Analytics.

In an atmosphere where success is difficult to assess, bias may be more likely to prevail. In contrast, the academic hiring literature has found that for positions where the criteria and qualifications are clear – as in an assistant professor hiring experiment by Williams and Ceci (2015) – there is actually a preference for hiring women relative to men. Nevertheless, the lack of clear criteria in lower-research universities cannot explain why the stark difference between very high research institutions and others appears only in the field of economics. Sarsons (2017) argues that the alphabetical ordering of author's names – which makes it impossible to know

each individuals' contributions – distinguish the tenure process in economics from most other science and social science fields. She studied only highly-rated research institutions. Is this imperfect information about people's individual contributions even more important in less-research-intensive institutions, and if so, why? Teaching may be a more important criteria in less-research oriented universities, and there is some evidence of gender bias in student evaluations (Buser, Hayter, and Marshall 2019). Also, women may be more likely to engage in low-promotable tasks (Babcock, Recalde and Vesterlund 2017). Yet once again, it is unexplained why this pattern does not extend to other fields.

We have no answers. We hope these findings open new avenues for research and new conversations about how to make promotion decisions more equitable in economics in all academic institutions.

REFERENCES

Antecol, Heather, Kelly Bedard, and Jenna Stearns (2018). "Equal but Inequitable: Who Benefits from Gender-Neutral Tenure Clock Stopping Policies?" *American Economic Review* 108 (9), 2420-41. *https://pubs.aeaweb.org/doi/pdfplus/10.1257/aer.20160613.*

Babcock, Linda, Maria P. Recalde, and Lise Vesterlund. 2017. "Gender Differences in the Allocation of Low-Promotability Tasks: The Role of Backlash." *American Economic Review* 107 (5): 131-35.

Buser, Whitney, Jill Hayter, and Emily C. Marshall. 2019. "Gender Bias and Temporal Effects in Standard Evaluations of Teaching." *AEA Papers and Proceedings* 109: 261-65.

Ceci, Stephen J., Donna K. Ginther, Shulamit Kahn, and Wendy M. Williams. (2014). Women in Academic Science: A Changing Landscape. *Psychological Science in the Public Interest 15(3), 75-141*. https://doi.org/10.1177/1529100614541236.

Committee on the Status of Women in the Economics Profession. Report 2020. *AEA Papers and Proceedings* 110, 726-736.

Ginther, Donna, K., and Shulamit Kahn. (2004). Women in Economics: Moving Up or Falling Off the Academic Career Ladder? *Journal of Economic Perspectives* 18(3), 193-214. https://pubs.aeaweb.org/doi/pdfplus/10.1257/0895330042162386.

Ginther, Donna K., and Shulamit Kahn (2014). "Academic Women's Careers in the Social Sciences: Progress, Pitfalls and Plateaus." In *The Economics of Economists: Institutional Setting, Individual Incentives, and Future Prospects*, edited by Alessandro Lanteri and Jack Vromen, 285-315. Cambridge: Cambridge University Press.

Ginther, Donna K., Janet M. Currie, Francine D. Blau, and Rachel T.A. Croson. (2020). "Can Mentoring Help Female Assistant Professors in Economics? An Evaluation by Randomized Trial." *AEA Papers and Proceedings* 110: 205-209.

Kahn, Shulamit (1993). "Gender Differences in Academic Career Paths of Economists." *American Economic Review* 83(2), 52-56. https://www.jstor.org/stable/2117639.

Lundberg, Shelly, and Jenna Stearns (2019). "Women in Economics: Stalled Progress. *Journal of Economic Perspectives*, 33 (1), 3-22. https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.33.1.3.

Sarsons, Heather (2017). Recognition for Group Work: Gender Differences in Academia. *AEA Papers and Proceedings*, 107, 141-145. https://www.aeaweb.org/articles?id=10.1257/aer.p20171126.

Williams, Wendy M. and Stephen J. Ceci. (2015). "National Hiring Experiments Reveal 2:1 Faculty Preference for Women on STEM Tenure Track." *Proceedings of the National Academy of Sciences* 112(17): 5360–5365.

Table 1: Proportional Hazard Estimates of Gender Differences in Promotion to Associate Professor, 2009-2018.

VARIABLES	(1) No Controls	(2) Institution Controls	(3) SDR	(4) Productivity Controls	(5) Research Very High	(6) Research Less-Intensive
Female	0.815**	0.810**	0.617*	0.851*	0.897	0.545*
	(0.078)	(0.077)	(0.165)	(0.079)	(0.089)	(0.173)
Public University		1.081	1.183	1.130	1.264**	1.455
		(0.104)	(0.499)	(0.110)	(0.134)	(0.367)
Carnegie: Research		12.908***	2.681**	12.408***		
Very High		(12.430)	(1.151)	(12.033)		
Carnegie: Research		10.545**	2.114	10.951**		1.295
High		(10.214)	(1.206)	(10.681)		(0.571)
Degree Year		1.004	0.950	0.990	1.000	0.983
		(0.024)	(0.069)	(0.024)	(0.027)	(0.056)
IHS Cumulative				1.009	1.042	0.974
Citations				(0.035)	(0.038)	(0.102)
IHS Cumulative				1.611***	1.577***	1.507**
Publications				(0.115)	(0.122)	(0.304)
IHS Cumulative				2.057***	1.933**	5.314
Grants				(0.528)	(0.506)	(6.351)
IHS Cumulative				0.966	0.983	0.813*
Grant Dollars				(0.023)	(0.024)	(0.096)
Observations	4,571	4,571	399	4,571	3,912	659
Individuals	798	798	399	798	669	129

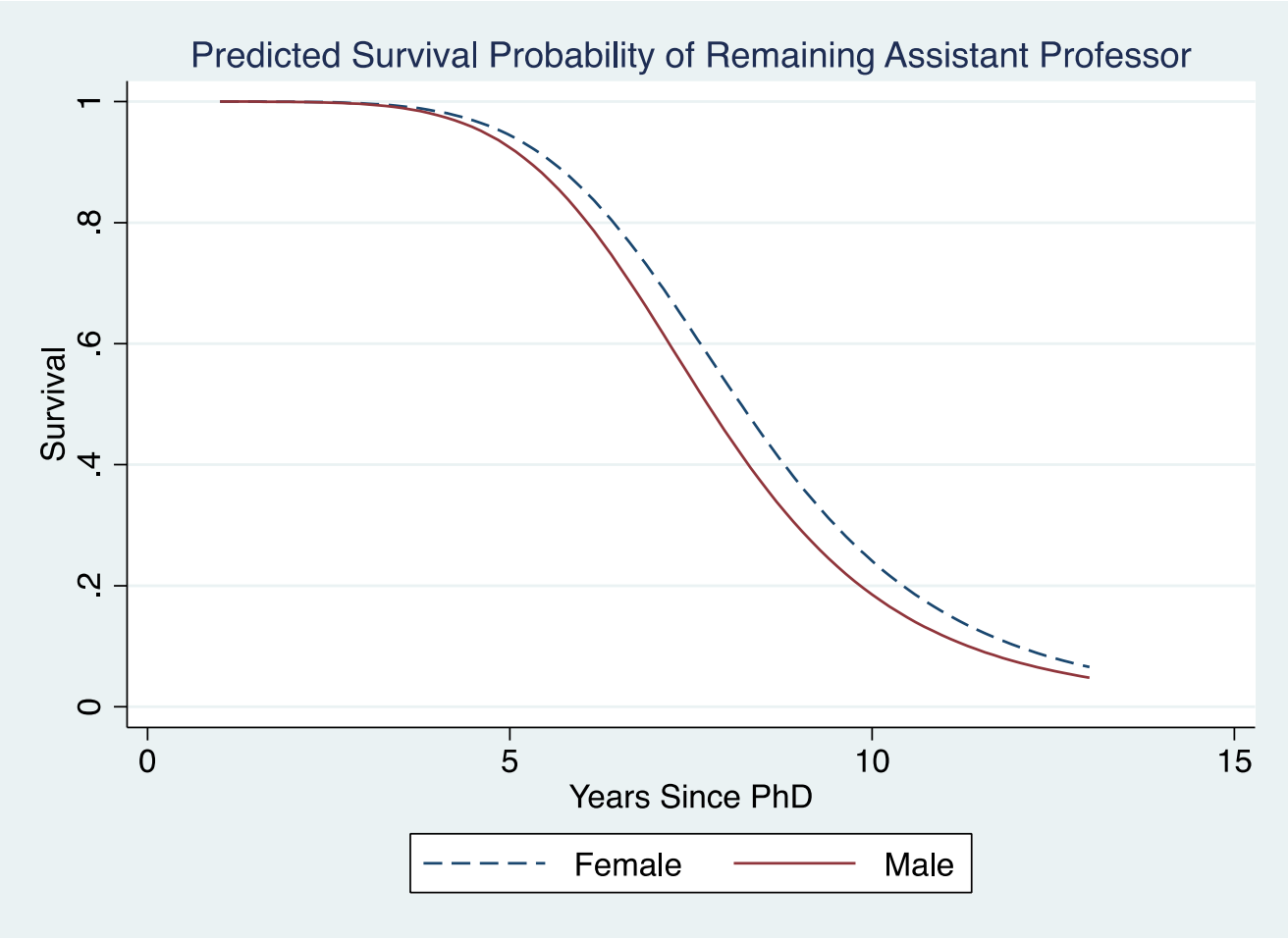
Notes: Hazard Ratios and robust standard errors in parentheses from Cox Proportional Hazard model estimates of promotion to associate professor. Models in Columns 2 and 4–6 also include controls for economics department (agricultural, general, applied). SDR model is not time-varying. *** p<0.01, **p<0.05, *p<0.10.

Table 2: Proportional Hazard Estimates of Gender Differences in Promotion to Associate Professor by Field and Institution Type, 2009-2018.

VARIABLES	Economics	Political Science	Biomedical Science	Physical Science	Engineering	Math & Statistics
Full Sample						
Female	0.851*	0.928	0.924	0.915	0.976	0.979
	(0.079)	(0.071)	(0.061)	(0.077)	(0.049)	(0.071)
Observations	4,571	4,281	18,201	8,341	19,768	7,571
Individuals	798	765	3,664	1,594	3,650	1,449
Research Very High						
Female	0.897	0.879	0.899	0.961	0.980	1.023
	(0.089)	(0.077)	(0.072)	(0.086)	(0.054)	(0.081)
Observations	3,912	3,390	13,027	6,899	16,132	6,157
Individuals	669	602	2,604	1,295	2,944	1,166
Research Less-Intensive						
Female	0.545*	1.248	1.083	0.694	1.017	0.906
	(0.173)	(0.222)	(0.125)	(0.159)	(0.128)	(0.165)
Observations	659	891	5,174	1,442	3,636	1,414
Individuals	129	163	1060	299	706	283

Notes: Hazard Ratios and robust standard errors in parentheses from Cox Proportional Hazard model estimates of promotion to associate professor. Full Sample uses Table 1 Column 4 specification; Research Very High and Research Less-Intensive use specification in columns 5 and 6 of Table 1 respectively. Models include controls for department. *p<0.10.

Figure 1: Predicted Survival Probability of Remaining Assistant Professors in Economics, 2009-2018



See paper for notes.