

Gender Gap in Tenure & Promotion: Evidence from the Economics Ph.D. Class of 2008*

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Abstract

This study examines early career outcomes (i.e., tenure and promotion) of the Economics Ph.D. class of 2008. We find that relative to males in the same cohort, female economists are less likely (by about 14%) to have received tenure and promotion eight years post-graduation. The gender gap becomes more pronounced (of 26%) among individuals of foreign origins working in the U.S. In addition, we find a similar gender bias regarding whether an individual remains in academia since the initial job placement in 2008. Our paper contributes to the literature by examining a new and growing dimension of the labor market for economics Ph.D.'s, i.e., women and internationals.

Keywords: Economics of gender, Labor market outcomes, Tenure and promotion

JEL Classification Codes: J16, J44, A23, I23

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“The fear of failure influences many female academics to delay starting a family until after they have earned tenure. That same fear influences other women to avoid the tenure track entirely and decide that they must choose family over career.”

– Mary Ann Mason¹

1 Introduction

When the college tenure system was first implemented in the U.S. in the early 20th century, the academic profession was virtually monopolized by men, who had never foreseen as an issue its incompatibility with women’s reproductive cycle (Park et al., 2011). However, social and economic progress has since inspired generations of women to pursue doctorate degrees, especially during recent decades. In 2015, females accounted for 35% of all new economics Ph.D. recipients (NSF, 2016). Yet, compared to their male counterparts, female economists are 7.6% less likely to choose academia, after controlling for doctoral program and demographic characteristics (Chen et al., 2013). For those who have chosen this career path, disproportionately more women would later voluntarily give up tenure-track (TT) positions, not mentioning those who ultimately fail to reach the “holy grail” of tenure and promotion (T&P).² The latest statistics from the American Economic Association (AEA) have painted a similar picture: while women represent 31% of assistant professors in economics, the ratio is only 15% among full professors (Bayer and Rouse, 2016).

Focusing on gender difference, we investigate early career achievements of the Economics Ph.D. class of 2008. In particular, we examine possible effects of demographic and doctoral program characteristics on T&P outcomes for those who held initial TT appointments upon graduation. Our analysis shows that female economists are less likely to succeed in academia, particularly foreign nationals working in the U.S. To improve retention of female faculty, we call for university policies promoting workplace diversity beyond the hiring process.

Our paper contributes to the literature in several aspects. First, to the best of our knowledge, this is the first paper tracks career outcomes for all new Ph.D. economists, including those relocating outside the U.S. upon graduation. Second, our sample consists of individuals graduating from 57 top U.S. economics programs, allowing an analysis more immune to selection bias, compared to existing studies that often focus on a handful of elite programs or surveys (Oyer, 2006; Athey et al., 2007; Grove and Wu, 2007). Third, this paper adds to the strand of literature that has examined gender difference in initial job placements and subsequent career outcomes (Hilmer and Hilmer, 2007; McDowell et al., 1999; Ginther and Hayes, 2003; Ginther and Kahn, 2004; Oyer, 2006; Chen et al.,

¹Source: “Is Tenure a Trap for Women?” *The Chronicle of Higher Education*, April 22, 2009 (<http://chronicle.com/jobs/news/2009/04/2009042201c.htm>).

²For example, family reasons (childbearing/rearing and dual-career couples) often hinder female faculty from advancing along career pathways.

2013). In particular, we considering two types of career outcomes: tenure status and career change (i.e., whether an individual remains in academia).

2 Analysis

Our sample draws upon the data from Chen et al. (2013), where we study initial job placements of the Economics Ph.D. class of 2008. This new round of data collection tracks early career outcomes (as of Fall 2016) of the same 578 individuals as in our earlier paper. In particular, through extensive online searches (e.g., personal websites and *LinkedIn*), we gathered information on each individual’s career path since 2008, including each position and its location, as well as the timing of T&P and of job change if applicable.³ The time span of eight years since graduation is to ensure that information on early professional achievements (e.g., T&P) is publicly available, since the tenure-track probationary period is typically six years from the time of initial TT appointment for most institutions. Eventually, we have tracked down a total of 561 individuals.⁴

To focus on those who held an initial TT appointment in 2008, the final sample includes 322 observations. For all individuals, we have information on their demographic characteristics, academic characteristics, initial job placement and current job outcome. Refer to the Online Appendix for detailed variable definition.

To investigate whether gender differential exists in terms of T&P, we define the dependent variable, *tenured*, as one if an individual has been granted T&P (i.e., appointed as Associate Professor or as Senior Lecturer in the British system) by Fall 2016, and zero otherwise.⁵ The estimation results of probit models are reported in Table 1. Our key variable of interest is *female*; a negative coefficient would indicate gender bias against females in tenure.

Using the full sample, column 1 only controls for demographic and relevant doctoral program characteristics. We find that females in the Class of 2008 are less likely to receive tenure, relative to their male peers, by 14.1%. Adding current and initial job outcomes in column 2, the estimate for *female* remains negative and statistically significant.

These findings suggest that female economists in the sample are less likely to survive the tenure system as a whole. This gender bias may be attributable to a number of obstacles unique to women. Compared to their male colleagues, women assistant professors would bear a greater share of responsibilities for starting and raising young families during a fast-closing window parallel for both

³In cases where online search failed, we directly contacted the individuals or sought help through our own networks of colleagues for a definitive answer.

⁴All unconfirmed cases are currently not employed in academia, and most are of foreign nationalities as recorded in 2008.

⁵Some Asian universities, e.g., in Korea, do not grant tenure at the associate level. For simplicity, we treat all associate professors as tenured in the main analysis, since such country-specific heterogeneity is absorbed by the country fixed effects. As a robustness check, we remove all Asian placements and obtain qualitatively the same results.

Table 1: Tenured or not (initial academia placements only)

VARIABLES	(1) full sample	(2) full sample	(3) non-US jobs	(4) US jobs	(5) US jobs- noncitizens	(6) US jobs-citizens
lnjobdist		0.016 (0.020)	0.074 (0.091)	0.010 (0.022)	0.001 (0.025)	0.020 (0.045)
stayus		0.066 (0.084)				
lnjobrank		0.008 (0.022)	0.029 (0.048)	-0.007 (0.025)	-0.012 (0.039)	-0.016 (0.040)
female	-0.141** (0.067)	-0.139** (0.067)	-0.090 (0.094)	-0.163* (0.093)	-0.261** (0.111)	-0.121 (0.125)
femalratio	0.028 (0.177)	0.054 (0.180)	0.235 (0.356)	0.023 (0.223)	0.660*** (0.246)	-0.391 (0.318)
additional master degree	0.072 (0.061)	0.073 (0.060)	0.097 (0.098)	0.068 (0.087)	0.097 (0.132)	0.035 (0.135)
Ph.D. tier 2	0.026 (0.096)	0.021 (0.096)	0.188 (0.139)	-0.044 (0.115)	0.053 (0.151)	-0.103 (0.203)
Ph.D. tier 3	-0.028 (0.080)	-0.041 (0.078)	-0.043 (0.129)	0.004 (0.080)	0.077 (0.135)	0.097 (0.206)
Ph.D. tier 4	0.070 (0.088)	0.052 (0.089)	-0.005 (0.165)	0.157 (0.109)	0.018 (0.167)	0.342* (0.206)
size	-0.000 (0.004)	0.000 (0.004)	0.004 (0.008)	0.001 (0.004)	-0.002 (0.006)	0.008 (0.012)
teaching awards	0.024 (0.046)	0.025 (0.046)	-0.025 (0.081)	0.045 (0.060)	0.079 (0.113)	0.029 (0.074)
top50	0.300*** (0.091)	0.304*** (0.092)	0.146 (0.120)	0.421*** (0.135)		-0.110 (0.192)
top50r	0.258* (0.138)	0.258* (0.138)	0.469** (0.218)	0.244* (0.140)	0.139 (0.242)	0.298 (0.260)
topadvisor	0.009 (0.173)	0.011 (0.169)	0.331 (0.227)	-0.088 (0.162)	-0.103 (0.222)	0.058 (0.371)
female advisor/coadvisor	0.056 (0.098)	0.060 (0.099)	-0.088 (0.150)	0.126 (0.120)	-0.009 (0.203)	0.385*** (0.130)
Observations	322	322	115	195	100	85
Pseudo R-squared	0.0805	0.0835	0.123	0.0953	0.0998	0.123

Note: Country dummies are not reported for brevity.

tenure and biological clocks. In addition, university administrators often seek diversity in committee composition (Porter, 2007). As a result, females from disciplines where women are scarce (such as economics) are burdened with excess service duties, which would further hinder their productivity and in turn advancement prospects. Furthermore, the economics profession is still short of a “critical mass” of women to form the same level of supporting and mentoring networks as men enjoy, putting female faculty at a disadvantage. Another subtle yet important factor is that work and professional climate may be generally less friendly to female faculty. For example, students often display gender bias when addressing male faculty as Dr. or professor but not their female counterparts.⁶

Columns 3&4 use subsamples of individuals currently working outside and in the U.S., respectively. Focusing on the estimates for *female*, while little gender difference exists in terms of T&P for non-US jobs (column 3), the differential is apparent for US jobs where females are 16.3% less likely to receive T&P (column 4). When we further divide the sample by citizenship in the last two columns,

⁶“Intimidation, harassment and discrimination” are the top reasons that female faculty have cited for TT departures (Source: “For working mothers in academia, tenure track is often a tough balancing act,” by By Daniel de Vise, *Washington Post*, July 11, 2010. <http://www.washingtonpost.com/wp-dyn/content/article/2010/07/10/AR2010071002610.html>.)

female international faculty, as a whole, face the most adverse situation regarding T&P, by 26.1%, than their male counterparts (column 5); such gender difference disappears among citizens (column 6). This finding indicates that academia in the U.S. poses a challenging career path for women, particularly those with foreign background (Perna, 2001), who not only share the aforementioned disadvantages faced by females in general, but also may experience other adverse factors such as cultural gaps at work.

Turning to other estimates in Table 1, two other gender-related variables have statistically insignificant estimates, except for columns 5&6. Specifically, a higher female ratio in the same Ph.D. cohort has a positive effect on one’s T&P outcome (column 5), and U.S. citizens benefit from having a female advisor/coadvisor (column 6). There is some evidence of country heterogeneity (i.e., Korea and Japan) in the T&P outcome. In addition, having top journal publications/R&Rs during doctoral studies improve the propensity of receiving T&P. It is expected, however, that most doctoral program characteristics would have diminishing impact on T&P several years post-graduation.

Table 2: Summary stats by continent and gender

Continent	Female			Male			Total
	Tenure	Non-Tenure	% Tenure	Tenure	Non-Tenure	% Tenure	
Africa	1	1	50%	0	5	0%	7
Asia	18	76	19%	28	72	28%	194
Australia	0	2	0%	2	4	33%	8
Europe	4	23	15%	22	62	26%	111
Mideast	1	7	13%	7	21	25%	36
North America	7	49	13%	34	87	28%	177
South America	3	7	30%	10	25	29%	45
Total	34	165	17%	103	276	27%	578

To examine closely the international effects, Table 2 reports tenure ratios for each region, breaking down by gender. For the Class of 2008, we observe a gender gap of 10% in T&P (17% vs. 27%), comparable to 12% for social sciences overall (Bayer and Rouse, 2016). Note that Asia has a more balanced gender ratio (94 females vs. 100 males) relative to other regions. To formally test early career outcomes by regions, Table 3 reports the estimation results using subsamples of individuals originally from Europe, Asia, and North America, respectively. We find that female faculty who originally from Europe are less likely to receive T&P (column 1), or a gender gap of 14% (Booth et al., 2000), but not for Asians (column 2). The relatively large number of Asian females in the discipline may have provided an effective supporting network among themselves.

After examining the career outcome (i.e., T&P), we now turn to the pathways the class of 2008 have taken since graduation. In particular, we are interested in factors contributing to whether or not an individual remains in academia. In Table 4, the dependent variable, *stayacad*, is defined as one if an individual has held a TT/tenured position since the initial job placement in 2008 and zero

otherwise. Again focusing on the estimates for *female*, the results paint a very similar picture as in Table 1; female faculty, particularly those working in the U.S., are less likely to remain in academia during the first eight years of their post-doctoral careers.

Additional considerations

Next, we discuss potential caveats about our analysis. First, there may be endogeneity concerns due to unobservable heterogeneity in geographical difference, cultural barrier, and personal ability, for example, which could potentially affect T&P and placement outcomes including *stayus* and *lnjobdist*. For country-specific unobservables, the inclusion of country fixed effects would mitigate the concern. We also re-estimate all regression models excluding placement outcome variables, and obtain qualitatively similar results. Note that the estimates for these variables are largely insignificant in Table 1.⁷ Taken together, we claim that the estimates of the key variables of interest are reliable.

Second, we cannot control for time fixed effects in our cross-sectional data, which may limit our results to be specific to the sample year. Absent additional data, our sample does observe considerable variation in age across individuals, ranging from 25 to 49 with a mean of 29.3 (as of 2008). Individuals joined the Ph.D. programs at different ages, offering some variation along the time series dimension. To take advantage of this feature, we split the sample by age 30, and find the gender gap only among the younger cohort, suggesting a diminishing disadvantage in T&P for older women in our sample.⁸

3 Conclusion

Anecdotal evidence and previous research have supported the observation that female economists are more likely to opt out of academia (Chen et al., 2013; Parker and Schroeder, 2016).⁹ This paper further suggests that they are less likely to succeed in academia, due, at least partly, to the unique challenges that women face while balancing between career and family. Even more sobering, Ceci et al. (2014) find that economics leads “the largest (or only) gender gaps” in terms of tenure rates, salaries, and job satisfaction among all math-intensive disciplines.

The dismal prospect of female faculty in economics may be related to the lack of diversity at the undergraduate level. As an effort to encourage more undergraduate women to major in economics, a team of economists at Harvard University recently launched a nation-wide project, *the Undergraduate Women in Economics Challenge*.¹⁰ In addition, the profession has put forth several measures

⁷A series of Durbin-Wu-Hausman tests do not reject the null hypothesis of consistent estimates at the 10% significance level.

⁸These results are available from the authors upon request.

⁹Source: “The women who leave,” Harvard Crimson News, May 23, 2016.

¹⁰For more information, refer to <http://scholar.harvard.edu/goldin/UWE>.

to promote a female-friendly environment in academia. For example, AEA provides child-care services and nursing rooms for female faculty; organizations such as the Committee on the Status of Women in the Economics Profession (CSWEP) facilitate mentorship and networking specifically for female economists at the national level. Still, more efforts are needed at the local/university level to implement policies that enhance work-life balance, including teaching-relief, stop-the-clock, or even part-time TT positions for parents with young families. Furthermore, more women are needed in university leadership positions to serve as role models for female faculty and students alike.

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Table 3: Tenured or not (by Home Continent)

	(1)	(2)	(3)
	Europe	Asia	North America
lnjobdist	-0.000 (0.049)	-0.019 (0.028)	0.016 (0.038)
stayus	0.097 (0.198)	0.029 (0.139)	0.178 (0.166)
lnjobrank	0.010 (0.070)	0.062 (0.042)	-0.007 (0.041)
female	-0.191* (0.114)	0.025 (0.126)	-0.168 (0.114)
femaleratio	0.138 (0.362)	-0.187 (0.402)	-0.414 (0.260)
additional master degree	0.125 (0.142)	0.183 (0.145)	0.067 (0.120)
Ph.D. tier 2	0.134 (0.203)	-0.033 (0.212)	0.005 (0.159)
Ph.D. tier 3	0.036 (0.137)	-0.069 (0.192)	0.106 (0.123)
Ph.D. tier 4	0.131 (0.236)	-0.299* (0.160)	0.312** (0.153)
size	0.001 (0.011)	-0.006 (0.007)	0.009 (0.008)
teaching awards	0.058 (0.118)	-0.305** (0.145)	0.034 (0.065)
top50	0.364* (0.190)	0.528*** (0.097)	-0.020 (0.211)
top50r	0.064 (0.251)	-0.047 (0.257)	0.421** (0.203)
topadvisor	0.461 (0.286)	0.252 (0.286)	0.093 (0.267)
female advisor/coadvisor	0.025 (0.192)	0.066 (0.209)	0.245* (0.143)
Observations	71	103	99
Pseudo R-squared	0.131	0.181	0.114

Note: All model specifications are the same as in Table 1. Country dummies are not reported for brevity.

Table 4: Probit Analysis: Remain in academia or not

	(1)	(2)	(3)	(4)	(5)	(6)
	full sample	full sample	non-US jobs	US jobs	US jobs- noncitizens	US jobs- citizens
lnjobdist		0.008 (0.009)	-0.069 (0.117)	0.012 (0.009)	0.007 (0.008)	0.022 (0.018)
stayus		0.025 (0.040)				
lnjobrank		-0.036*** (0.014)	-0.086** (0.039)	-0.034** (0.013)	-0.051 (0.035)	0.013 (0.016)
female	-0.088* (0.051)	-0.078 (0.048)	-0.000 (0.076)	-0.150** (0.072)	-0.077 (0.067)	-0.097 (0.081)
femaleratio	0.069 (0.089)	0.059 (0.087)	0.015 (0.260)	0.122 (0.119)	0.008 (0.066)	0.195 (0.145)
additional master degree	0.047 (0.034)	0.050 (0.035)	0.164 (0.125)	0.029 (0.047)	0.010 (0.026)	0.061 (0.051)
Ph.D. tier 2	-0.016 (0.053)	-0.006 (0.051)	-0.201 (0.156)	0.019 (0.059)	0.005 (0.029)	-0.164 (0.217)
Ph.D. tier 3	-0.027 (0.043)	-0.009 (0.043)	-0.117 (0.152)	0.021 (0.052)	-0.002 (0.024)	-0.037 (0.114)
Ph.D. tier 4	-0.013 (0.072)	0.030 (0.059)	-0.047 (0.137)	0.053 (0.059)	-0.005 (0.034)	0.051 (0.104)
size	-0.003 (0.003)	-0.002 (0.003)	-0.006 (0.006)	-0.000 (0.004)	-0.003 (0.003)	-0.002 (0.007)
teaching awards	0.053* (0.031)	0.054* (0.031)	0.174* (0.089)	0.036 (0.031)	0.018 (0.030)	0.006 (0.035)
top50	-0.004 (0.044)	-0.007 (0.041)	-0.411** (0.174)	0.046 (0.038)	0.023 (0.023)	
top50r	0.039 (0.068)	0.037 (0.060)		-0.019 (0.094)		-0.199 (0.228)
topadvisor	0.005 (0.070)	0.008 (0.062)	-0.264 (0.285)	0.007 (0.091)	-0.015 (0.063)	
female advisor/coadvisor	0.014 (0.055)	0.014 (0.051)	0.013 (0.111)	0.044 (0.050)	0.004 (0.027)	0.050 (0.050)
Observations	310	309	81	189	99	76
Pseudo R-squared	0.0883	0.119	0.202	0.158	0.354	0.178

Note: All model specifications are the same as in Table 1. Country dummies are not reported for brevity.