

# Do Female Professors Survive the 19th-century Tenure System?: Evidence from the Economics Ph.D. Class of 2008\*

Jihui Chen

Myongjin Kim

Qihong Liu<sup>†</sup>

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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 9.6%) to have received tenure and promotion during the first eight years since graduation. The gender gap becomes more pronounced, or 12%, 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. In particular, female faculty, particularly international women working in the U.S., are more likely to quit than their male counterparts in their post-doctoral careers. Compared to the existing literature, our sample includes a wide range of 57 U.S. economics programs, rather than a handful of top programs. Furthermore, we examine 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

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<sup>†</sup>Chen: Department of Economics, Illinois State University, Normal, IL 61790 (jchen4@ilstu.edu); Kim and Liu: Department of Economics, University of Oklahoma, Norman, OK 73019 (mjkim@ou.edu and qliu@ou.edu).

“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 Mason<sup>1</sup>

## 1 Introduction

When the college tenure system was first implemented in the U.S. in the early 20<sup>th</sup> 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 2013, females accounted for 35% of all new economics Ph.D. recipients (Cawley, 2014). 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). 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% for 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, along with initial placement outcomes, on professional outcomes during the first eight years of these new Ph.D. economists. Our analysis shows that female economists are less likely to succeed in academia, particularly foreign nationals in the U.S. To improve retention of female faculty, we call for university policies promoting workplace diversity beyond the hiring process.

Our analysis contributes to the literature in several aspects. First, 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 top programs (Oyer, 2006; Athey et al., 2007; Grove and Wu, 2007). Second, with the increasing presence of female and international students in the economics doctoral programs,<sup>2</sup> we examine a new and growing dimension of the labor market for economics Ph.D.’s. Third, this paper contributes to the strand of literature that has examined gender difference in initial job placements and career outcomes (Hilmer and Hilmer, 2007; McDowell et al., 1999; Ginther and Hayes, 2003; Ginther and Kahn, 2004; Oyer, 2006; Chen et al., 2013) by considering two types of career outcomes: tenure status and career change (i.e., whether remain in academia).

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

<sup>2</sup>Source: <http://www.nsf.gov/statistics/showpub.cfm?TopID=2&SubID=25>.

## 2 Analysis

### 2.1 Data

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 the fall of 2016) of the same 587 individuals as in our earlier paper. In particular, through extensive online searches, we gathered information on each individual’s career path since 2008, which includes each position and its location, as well as the timing of T&P if applicable. The time span of eight years 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. In cases where online search failed, we directly contacted the individuals or sought help through our own networks of colleagues for a definitive answer. Our final sample has 561 confirmed professional outcomes.<sup>3</sup> For all individuals, we have information on their demographic characteristics, academic characteristics, initial job placement and current job outcome. Refer to the Appendix for detailed variable definition.

### 2.2 Discussions

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 by Fall 2016, and zero otherwise. The estimation results of probit models are reported in Table 1. Our key variable of interest is *female*; a negative coefficient would indicate an adverse situation that female economists face in academia.

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 9.6%. Adding current and initial job outcomes in column 2, the estimate for *female* remains negative and statistically significant, or  $-8.9\%$ . The same conclusion holds when we limit the sample to those who had initial TT appointments in 2008, with a greater gender effect in corresponding columns in Table 2. We focus on the full sample to allow a larger sample size and job mobility during the 8-year time span.

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

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<sup>3</sup>All unconfirmed cases are currently not employed in academia, and most are of foreign nationalities as recorded in 2008.

Table 1: Probit Analysis: Tenured or not

VARIABLES	(1) full sample	(2) full sample	(3) non-US jobs	(4) US jobs	(5) US jobs-noncitizens	(6) US jobs-citizens
lnjobdist		0.024** (0.011)	0.024 (0.054)	0.016 (0.012)	0.007 (0.014)	0.025 (0.019)
stayus		0.036 (0.050)				
lnjobrank		-0.024 (0.018)	-0.021 (0.033)	-0.030 (0.019)	-0.021 (0.022)	-0.037 (0.029)
female	-0.096*** (0.036)	-0.089** (0.036)	-0.041 (0.065)	-0.100** (0.049)	-0.123* (0.063)	-0.078 (0.077)
femaleratio	-0.008 (0.121)	0.023 (0.119)	0.125 (0.230)	-0.038 (0.144)	0.251 (0.185)	-0.327 (0.205)
US	0.030 (0.051)	0.038 (0.054)	-0.064 (0.142)	0.069 (0.060)		
China	0.040 (0.065)	0.041 (0.068)	0.019 (0.099)	0.081 (0.105)	0.081 (0.108)	
India	0.057 (0.087)	0.062 (0.091)	-0.030 (0.137)	0.136 (0.128)	0.158 (0.126)	
Korea	-0.128** (0.054)	-0.133*** (0.051)	-0.136 (0.091)			
Russia	0.105 (0.089)	0.140 (0.091)	0.163 (0.133)	0.124 (0.129)	0.083 (0.128)	
Turkey	-0.010 (0.104)	-0.014 (0.106)	-0.024 (0.194)	0.054 (0.143)	0.041 (0.132)	
Japan	0.401*** (0.133)	0.382*** (0.134)	0.338** (0.161)	0.467 (0.286)	0.414 (0.315)	
Italy	-0.018 (0.128)	-0.006 (0.128)	0.153 (0.237)			
TW	0.230 (0.150)	0.246 (0.152)	0.334 (0.292)	0.222 (0.197)	0.249 (0.192)	
Argentina	0.075 (0.120)	0.055 (0.114)		0.128 (0.144)	0.063 (0.160)	
additional master degree	0.092** (0.037)	0.085** (0.037)	0.113* (0.065)	0.074 (0.051)	0.086 (0.068)	0.063 (0.080)
Ph.D. tier 2	-0.008 (0.051)	-0.009 (0.048)	-0.034 (0.098)	-0.002 (0.062)	0.051 (0.085)	-0.029 (0.102)
Ph.D. tier 3	-0.029 (0.049)	-0.015 (0.047)	-0.076 (0.096)	0.011 (0.052)	0.022 (0.076)	-0.003 (0.096)
Ph.D. tier 4	-0.015 (0.056)	0.002 (0.057)	-0.112 (0.102)	0.071 (0.072)	0.027 (0.091)	0.119 (0.134)
size	-0.003 (0.003)	-0.004 (0.003)	-0.005 (0.005)	-0.002 (0.002)	-0.000 (0.003)	-0.002 (0.006)
teaching awards	0.018 (0.033)	0.019 (0.032)	-0.047 (0.057)	0.049 (0.038)	0.077 (0.060)	0.037 (0.047)
top50	0.282*** (0.086)	0.272*** (0.088)	0.263** (0.123)	0.315** (0.123)	0.615*** (0.147)	-0.041 (0.114)
top50rr	0.215* (0.114)	0.215* (0.119)	0.296 (0.272)	0.166 (0.122)	0.328* (0.173)	0.008 (0.141)
topadvisor	0.026 (0.124)	0.013 (0.121)	0.067 (0.250)	-0.015 (0.105)	0.039 (0.161)	0.000 (0.209)
female advisor/coadvisor	0.100 (0.074)	0.105 (0.075)	0.040 (0.127)	0.141 (0.092)	0.074 (0.129)	0.265** (0.135)
Observations	578	575	195	363	206	157
Pseudo R-squared	0.0893	0.102	0.115	0.103	0.167	0.122

Robust standard errors in parentheses, clustered by Ph.D. institution; \*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

economics) are burdened with excess service duties, which would further hinder their productivity and in turn advancement prospects. Furthermore, unlike their male colleagues, the same supporting and mentoring networks may not be as abundant to females in largely male-dominated fields such as economics. Another subtle 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. In fact, “intimidation, harassment and

Table 2: Tenured or not (initial academia placements only)

	(1)	(2)	(3)	(4)	(5)	(6)
female	-0.141**	-0.139**	-0.090	-0.163*	-0.261**	-0.121
	(0.067)	(0.067)	(0.094)	(0.093)	(0.111)	(0.125)
Observations	322	322	115	195	100	85

Note: All model specifications are the same as in Table 1.

discrimination” are the top reasons that female faculty have cited for TT departures.<sup>4</sup>

Column 3 uses a subsample of individuals currently working outside the U.S., and columns 4–6 of those in the U.S. Focusing on the estimates for *female*, while little gender difference exists in terms of T&P for non-US jobs, the differential is apparent for US jobs, where females are 10% less likely to receive tenure, compared to male faculty (column 4). When we further divide the sample by citizenship, female international faculty, as a whole, face the most adverse situation in T&P, by 12.3%, 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, particularly for female economists with foreign background (Perna, 2001), who not only share the aforementioned disadvantages faced by all females, but also may experience other adverse factors such as cultural gaps.

Turning to other estimates in Table 1, two other gender-related variables both have statistically insignificant estimates, except for column 6 where citizens would benefit from having a female advisor/coadvisor (*female advisor/coadvisor*). There is some evidence of country heterogeneity (i.e., Korea and Japan) in the T&P outcome. In addition, having a previous master’s degree and top journal publications/R&Rs during the doctoral program 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 after graduation.

To examine closely the international effects, Table 3 reports early career outcomes 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). Interestingly, compared to other regions, Asia has a more balanced gender ratio in the sample. To formally test early career outcomes by regions, Table 4 reports the estimation results using subsamples of individuals originally from Europe, Asia, and North America, respectively. We again find that international female faculty are less likely to receive T&P (column 1), with a more pronounced gender gap among Europeans (Booth et al., 2000). The relatively large number of Asian females in the discipline may have provided a more effective supporting network among themselves, *ceteris paribus*, compared to those from other

<sup>4</sup>Source: “For working mothers in academia, tenure track is often a tough balancing act,” by Daniel de Vise, *Washington Post*, July 11, 2010. <http://www.washingtonpost.com/wp-dyn/content/article/2010/07/10/AR2010071002610.html>.

Table 3: 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

regions.

Table 4: Tenured or not (by Home Continent)

	(1)	(2)	(3)
	Europe	Asia	North America
female	-0.140** (0.062)	-0.032 (0.065)	-0.106 (0.072)
Observations	110	193	177

Note: All model specifications are the same as in Table 1.

After examining the medium-term 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 5, 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 international women working in the U.S., are less likely to remain in academia during the first eight years of their post-doctoral careers.

### 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).<sup>5</sup> 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.

<sup>5</sup>Source: "The women who leave," Harvard Crimson News, May 23, 2016.

Table 5: Probit Analysis: Remain in academia or not

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	full sample	full sample	non-US jobs	US jobs	US jobs-noncitizens	US jobs-citizens
female	-0.125** (0.057)	-0.102* (0.058)	0.056 (0.109)	-0.167*** (0.064)	-0.237*** (0.085)	-0.106 (0.084)
Observations	561	561	191	366	213	153

Note: All model specifications are the same as in Table 1.

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 called *the Undergraduate Women in Economics Challenge*.<sup>6</sup> In addition, the profession has put forth several measures 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.<sup>7</sup> 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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<sup>6</sup>For more information, refer to <http://scholar.harvard.edu/goldin/UWE>.

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# Appendix

## Variable definitions

(1) Demographic characteristics.

- Gender: We define a dummy variable, *female*, as 1 if the individual is a female and 0 otherwise.
- Home Country/region: We define a set of country/region dummy variables as 1 if the individual comes from that country/region and 0 otherwise. These variables include *Argentina, China, India, Italy, Japan, Korea, Russia, Taiwan, Turkey, US*.
- Home Continent/area: We define a set of continent dummy variables as 1 if the individual comes from that continent/area and 0 otherwise. These variables include *Africa, Asia, Australia, Europe, Mideast, North America, South America*.

(2) Academic characteristics.

- Additional Master Degree: We define a dummy variable, *addmaster*, as 1 if the individual earned a master's degree prior to entering doctoral training and 0 otherwise.
- Female ratio: the ratio of females in the individual's program-cohort (*femaleratio*).
- Advisor: We define a dummy variable, *topadvisor*, as 1 if the advisor and/or the co-advisor is ranked top-50 economists worldwide and 0 otherwise.<sup>8</sup>
- Female Advisor/coadvisor: We define a dummy variable, *female advisor/coadvisor*, as 1 if the individual has a female advisor/coadvisor and 0 otherwise.
- Top 50 Publications: dummy variable, *top50*, is defined as 1 if the individual had at least one publication in a top 50 economics journal and 0 otherwise.<sup>9</sup>
- Top 50 Revise and Resubmit (R&R): dummy variable *top50rr*, is defined as 1 if the individual had at least one R&R in a top 50 journal when in the doctoral program and 0 otherwise.<sup>10</sup>
- Teaching Awards (*teaching award*): This variable measures the number of teaching awards that the individual receives while in the Ph.D. program.

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<sup>8</sup>We use Tom Coupe's index of top economists to define this variable. The list of top 1000 economists is available at: <http://student.ulb.ac.be/~tcoupe/update/top1000p.html>. Accessed February, 2009.

<sup>9</sup>We use the Kalaitzidakis, Mamuneas, and Stengos (2003) ranking to define this variable. The full list of the journal ranking is available upon request.

<sup>10</sup>We use the Kalaitzidakis, Mamuneas, and Stengos (2003) ranking to define this variable.

- Program Ranking: Following Buchmueller et al. (1999), we define four dummy variables for graduate program tiers. Tier 1 (*tier1*), Tier 2 (*tier2*), Tier 3 (*tier3*) and Tier 4 (*tier4*) refer to programs ranked 1 to 6, 7 to 15, 16 to 30, and beyond 30, respectively.<sup>11</sup> The variable *tier4* is omitted as the reference category in the analysis.
- Program Size (*size*): the total number of individuals in the program on the same job market.

### (3) Initial Job Placement Outcomes

- Job Location: We define a dummy variable, *stayus*, as 1 if the individual's initial job placement was in the U.S. and 0 otherwise.
- Job Type: We define a dummy variable, *academicjob* as 1 if an individual's initial job placement was in academia and 0 if s/he was placed into the government or the private sector or a temporary position (e.g., visiting positions or post-docs).

### (4) Current Job Outcomes

- Tenure and Promotion: We define a dummy variable, *tenured*, as 1 if the individual has received tenure and promotion since 2008 and 0 otherwise.
- Remain in Academia: We define a dummy variable, *stayacad*, as 1 if the individual has remained in academia since the initial job placement in 2008 and 0 otherwise.
- Current Job Location: We define a dummy variable, *usjobs*, as 1 if the individual is currently working in the U.S. and 0 otherwise.
- Distance: We define a variable *lnjobdist* as the log of the distance (in miles) between the individual's current job location and their Ph.D. program location.

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<sup>11</sup>Some institutions offer economics programs both in the business school and the college of arts and sciences. We treat them as different programs but give them the same rank. The list of all programs included in our sample is available upon request.