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Gender Differences in Academic Career Paths of Economists

By SHULAMIT KAHN*

Many people in corporate and government circles believe that there is a glass ceiling limiting females' advance to the highest levels of management and professional jobs. Because of the difficulty in defining promotion and the paucity of data sets on professionals and managers, this glass ceiling has not been widely documented in empirical research. (For recent evidence based on several corporations, see U.S. Department of Labor [1991]). Within labor economics, there is no empirical consensus in the returns-to-seniority literature that women's career progression in the labor market is significantly worse than men's. However, much of this literature does not isolate the occupations where the glass ceiling is considered most binding: management and certain professional jobs.

This paper considers women's progress among Ph.D. academics in the field of economics and management. This kind of analysis can be extremely useful to gauge the progress or lack of progress within our own field. If differences are found between men and women of similar backgrounds, this is not necessarily evidence that employer discrimination exists. Gender differences might arise because women and men, faced with the same options and opportunities, have made different choices or investments in their careers; or gender differences might

arise because of discrimination at some other level, for instance among journal editors and funding sources or during the educational process. Thus, a finding of gender differences in the hiring and promotion of females in a particular academic field is a necessary but clearly not sufficient condition of discrimination, flagging areas of potential concern.

The academic market has an importance beyond its numbers. College students' perceptions of the gender representation in positions of authority and status may color their expectations about future jobs; at the same time, the absence of female role models or mentors among academics, particularly at senior levels, may affect students' motivation and aspirations.

An additional factor makes this labor market of particular interest: female Ph.D. recipients who have entered the academic labor market, particularly in a field as heavily dominated by males as economics, have already signaled a high degree of attachment to the labor market by investing in their education. Many of the arguments to explain general gender wage differentials point to employers' difficulties in distinguishing between women who are committed to the labor market and those who are not. This argument should not hold—or should not hold nearly as strongly—for Ph.D. economists.

I. Data

This study uses longitudinal panel data collected by the National Science Foundation in its biannual Survey of Doctorate Recipients (SDR). The SDR provides a uniquely valuable resource for this study. The SDR project has surveyed a stratified random sample of doctoral scientists and engineers every two years since 1973. In the

*Boston University and the National Bureau of Economic Research. This paper has developed in response to the interest of The Committee on the Status of Women in the Economics Profession and its past chairs Nancy Gordon and Isabel Sawhill. Key thanks go to the National Science Foundation for releasing these data, and particularly to Carolyn Shettle at the Science Resource Studies Division of the NSF. Sue Berryman was instrumental in obtaining these data and has given invaluable input; the early stages of this research were funded by the Russell Sage Foundation.

original 1973 survey, the target population included people who received their doctorates from 1930 through 1972. With each survey, new doctorate recipients are added; at the same time, some previous respondents are dropped. People are dropped from the survey either when the number of years since Ph.D. receipt exceeds 42 (or 44 in some years), or for sampling reasons. The sample was stratified by sex, as well as by cohort, field, and size of doctoral institution. Women and minorities were oversampled. To give an example of the sample sizes in this survey in economics, in 1989 625 males Ph.D. economists were surveyed, of whom 361 were in academia in 1989, while 331 females Ph.D. economists were surveyed, of whom 184 were in academia. However, even with the oversampling, the numbers are sufficiently small to warrant caution in generalizing to all economists. This study can thus be only suggestive.

Although there are data on very early cohorts (as early as 1930), the first observations on these cohorts are from 1973. Consequently, the data on early cohorts cannot be used to study the tenure process. People from earlier cohorts who are still in academia are much more likely to have been successful in academia (e.g., received tenure) than those who began in academia but left pre-1973. Since the academics observed from earlier cohorts are not a random sample, all statistical analysis presented here includes only those who received their Ph.D.'s after 1970.

The questionnaire is quite short and has limited control variables. Moreover, at this point, access to the entire set of independent variables has not yet been obtained, particularly on the present employer (or the prestige of the present employer). However, even without this variable, the longitudinal nature of the questionnaire allows us to answer a myriad of questions about careers of academics as they unfold.

Because of factors such as equal-opportunity legislation, affirmative action, and changing norms and behaviors, newer cohorts of women might have better tenure prospects than older cohorts. The year of Ph.D. receipt is included to control at least

partially for these trends. The age at Ph.D. was included as well, although its sign could not be predicted. The age at Ph.D. varies from 24 to 63 and averages 31.6. Two race variables are included, which divide the population into blacks (and Native Americans), Asians, and others.¹

Ideally, one would have good control variables for the inherent quality of the person. The best available control is the graduate school where the person received his/her Ph.D. Accordingly, the Ph.D.-granting institutions were divided into six tiers as defined by the American Economic Association's Commission on Graduate Education in Economics (W. Lee Hanson, 1991), and dummy variables for each tier were included in the analysis.

The questionnaire does not ask for measures of publications. Therefore, these data cannot be used to examine whether academics with similar publication records six years post-Ph.D. were treated differentially by gender. This analysis is thus a *reduced form*: it models the likelihood of being promoted for a male or female with similar background and demographic characteristics. This likelihood includes the likelihood that the individual will publish enough to receive tenure.

Some academics use the strategy of changing institution or even field in order to obtain a tenured job when tenure is not obtained in the present institution or field (see e.g., P. Allison and J. S. Long, 1987). I include a dummy variable for whether the individual moved to a field slightly outside of economics or management (such as public policy).²

II. Gender Differences in First Jobs

The survey indicates that, during the past two decades, female Ph.D. economists are somewhat less likely than men to begin their

¹Coefficients on the race variables were not significantly changed when Hispanics were grouped with blacks.

²Since, at this stage, I have not obtained data on employers, I am unable to determine whether the individual changed institutions.

TABLE 1—MEDIAN NUMBER OF YEARS TO PROMOTION

Sample	Ph.D. until tenure		Tenure until full professor	
	Male	Female	Male	Female
Total	7	10	9	9
1989 academics	7	10	9	9
Received Ph.D.				
1971–1975	7	11	10	9
Received Ph.D.				
1976–1980	8	8	11	10

Note: The table entries are unconditional median numbers of years for economists who received the Ph.D. after 1970. The results are based on Kaplan-Meier estimates, which accounts for right-censoring.

careers in academia (including only four-year colleges and universities) and instead tend to be more likely to enter all other sectors. The difference in the proportion going into academia is not statistically significant at conventional levels. Controlling for cohort, differences still seem to remain.

Of those who do enter academia directly after receiving the Ph.D., women are less likely to enter tenure-track jobs. Only 58.1 of females who start in academia enter tenure track jobs, while 73.3 percent of men do.³ This difference is statistically significant. However, the strength of the effect and significance falls dramatically when the quality of Ph.D. institution, cohort, and other available variables are controlled for. The remainder of this paper considers promotion for those who do have a tenure-track job. The non-tenure-track academic population, however, warrants considerable further study.

III. Tenure Differences by Gender

Sex differences in tenure receipt can be seen in Tables 1 and 2 and in Figure 1. Table 1 gives the unconditional median time to tenure based on the nonparametric Kaplan-Meier survival curves. The median rather than the mean is given, so that no

³I classify individuals with unknown tenure-track status as non-tenure-track. Note that the data also indicate that the proportion of women in non-tenure-track first jobs is considerably higher than the overall proportion for female academic economists.

TABLE 2—HAZARD ESTIMATION OF RECEIVING TENURE

Variable	Coefficient	SE
Male	0.445	0.159
Ph.D. tier 1	-0.627	0.293
Ph.D. tier 2	-0.509	0.275
Ph.D. tier 3	-0.242	0.263
Ph.D. tier 4	-0.309	0.263
Ph.D. tier 5	-0.413	0.247
Black	0.004	0.287
Asian	-0.264	0.244
Age at Ph.D.	0.0094	0.0147
Year of Ph.D.	-0.0416	0.0177
Changed field	0.467	0.218
N:	608	
Log likelihood:	-1,307.7	

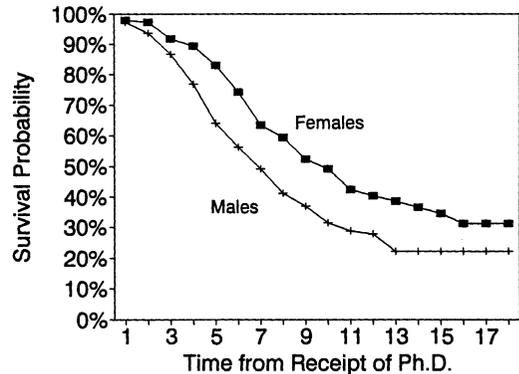


FIGURE 1. KAPLAN-MEIER SURVIVAL CURVES: PROBABILITY OF REMAINING UNTENURED

structure for the tenure probabilities would be imposed past the maximum length of the observed period, 18 years. These tables indicate that females have a harder time receiving tenure and take longer achieving it. Of people who were academics in 1989, the median time until tenure was seven years for males but ten years for females. Table 2 gives a multivariate hazard analysis of the same population. Here, the sign on the coefficient of "male" is positive and statistically significant, indicating that men have higher probabilities of receiving tenure each period. The hazard ratio calculated from this coefficient implies that being male in-

creases the instantaneous "risk" of tenure by a multiplicative factor of 1.56. Another way to evaluate this result is by considering the estimated median time until tenure for men and women with otherwise identical values of the independent variables. When the independent variables are set at their mean level, the median predicted time until tenure for a man is nine years, while for a woman it is 16 years (after nine years, only 36 percent of women with "average" characteristics can expect to have tenure).

Gender differences are reflected in the survival curves of Figure 1, which graphs the likelihood of remaining untenured as a function of time since Ph.D., based on non-parametric (univariate) Kaplan-Meier estimates. These curves indicate that males are much more likely than women to receive tenure within seven years following Ph.D. receipt, but that the gender difference eventually narrows somewhat. Analysis of the multivariate results indicates that gender differences in independent variables (other than sex) account for only a very small part of the difference in tenure probabilities;⁴ the bulk of the difference is directly due to gender.

In the nonacademic general labor market, one source of gender differences in careers lies in the higher tendency of women to move in and out of the labor market. Is this true in academia as well? The data indicate that there is only a minuscule difference in women's tendency to leave the labor market. Of the more than 600 Ph.D. recipients analyzed (i.e., those who received the Ph.D. after 1970 and were ever academics) who did not retire by 1989, hardly any were observed as being out of the labor market in *any* questionnaire year: two out of 179 fe-

males and two out of 429 males. These tiny numbers could not account for any observed differences in tenure probabilities.⁵

There is some evidence in this survey that the gender differences are disappearing over time. If we construct Kaplan-Meier medians for the cohort who received Ph.D.'s in the early 1970's and compare them to those who received Ph.D.'s in the late 1970's,⁶ there is a large difference in the earlier period but no difference at all in the later period. Multivariate hazard analysis on these same cohort groups finds that for the earlier cohorts, men have a significantly higher hazard rate of receiving tenure during this period (coefficient = 0.528, SE = 0.218). In the later period, however, the coefficient on "male" drops to zero (coefficient = -0.053, SE = 0.367). This may merely be due to the fewer observations in the later period. Additional years of surveys are needed to confirm this result.

Finally, the results in Table 2 also speak to the progress of minority economists within academia. The instantaneous likelihood of blacks and Native Americans receiving tenure is essentially identical to that of Caucasians.

IV. Promotion to Full Professor

The "glass ceiling" argument applies most strongly to jobs further up on job ladders. In academia, this might translate into a reduced opportunity to advance beyond the tenure decision to full professorships. Looking at cross-sectional data, there appear to be large sex differences. In 1989 those who had obtained full professorship on average

⁴For instance, predicting survival rates based on the multivariate analysis in Table 2, when independent variables are set at their overall means nine years after Ph.D. receipt, 39.4 percent of academic males had not yet received tenure, while 55.0 percent of academic females were still untenured. However, setting the independent variables at their gender-specific means nine years from Ph.D. receipt, 38.9 percent of academic males had not yet received tenure, while 56.2 percent of academic females were still untenured.

⁵Although female academics are not entirely dropping out of the labor market, they might be choosing to progress more slowly, opting out for the slow track in order to devote more time to having and raising children. However, the SDR questionnaire only began including questions on children in 1981. Because of this, the data set is not well suited to studying the analysis between tenure and child-raising until additional years of data become available.

⁶Those receiving Ph.D.'s in the 1980's cannot be analyzed accurately, since too few of them had gone through the tenure process by 1989.

took 6.6 years between tenure receipt and promotion to full professorship for men, and 8.0 years for women. On the other hand, looking at the median length until receipt of full professorship and accounting for right-censoring using Kaplan-Meier estimates, a different story emerges (see Table 1). The median length of time from tenure until full professorship is if anything *lower* for females. Multivariate hazard-rate estimation confirms the results of the Kaplan-Meier estimates for promotion to full professorship. If one models the length of time between tenure receipt and being promoted to full professorship, the coefficient on "male" is actually negative (i.e., men are less likely to be promoted to full professors), but clearly not significantly different from zero. There seems to be no gender difference in the promotion to full professor. However, again, the caveat applies about sample size. Since the sample includes 276 tenured academics of whom only 69 are women, this "nonfinding" may be due entirely to lack of power.

V. Conclusion

This study has found gender differences in some but not all aspects of the career progression of Ph.D. economists who received their Ph.D.'s in the past two decades. The tenure hurdle seems to be particularly difficult for academic women to overcome. All of the analyses here show large gender differences between men and women in terms of tenure progress. There is some evidence, however, that for more recent co-

horts, tenure differences between men and women have narrowed. As additional years of data become available, it will be possible to evaluate this more conclusively. If tenure rates have substantially equalized in the past decade, this should not suggest to universities that they can relax their affirmative-action efforts. Equalization achieved through active affirmative-action policies is very likely to be reversed if these policies are abandoned. Finally, from the limited observations that we have, both sexes seem to fare equally well in the process of promotion to full professorship.

Many interesting questions remain. The "glass ceiling" might manifest itself in limited employment and promotion opportunities at the more prestigious academic institutions. In addition, men and women might use interuniversity mobility as a strategy to obtain tenure to a different extent or may benefit from it to different degrees. Both of these issues will be addressed when data on employers are obtained.

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