A GENDER COMPARISON OF ECONOMISTS' PUBLICATIONS

E. Bruce Hutchinson, Marc A. Loizeaux, Leila J. Pratt, and Stephanie Smullen[1]

Abstract

An ordered probit model is used to examine the impact of gender and the quality of the PhD granting institution on the publication record of male and female economists who received their doctorate in 1985. This analysis indicates that men and women have different publication patterns regardless of where they received their PhD and that the quality of the PhD granting institution has no measurable effect on an individual's publication record.

Key Words: Gender, ordered probit model, journal publications

JEL Classification: J16

Introduction

Numerous studies (Davis, Huston and Patterson [2001], Goodwin and Sauer [1995], Hutchinson and Zivney [1995], and Laband and Piette [1994]) examine the journal-publication behavior of individuals with a doctorate in economics. A sub-category of this literature is a continuing professional interest in the comparative journal-publication records of male and female economists. Based on a 1966 National Science Foundation survey, Hansen, Weisbrod and Strauss report that women economists have "higher average job quality" yet "lower research productivity (1978, p.737)." Fish and Gibbons whose research focused on journal publication between 1969 and 1986 conclude "…that men significantly out-publish women …whether the samples [are] regarded as matched pairs or as two independent samples (p. 97)." McDowell and Smith, using data from 1968 to 1975 for an equal number of male and female economists from top 20 institutions, conclude that on average, women produced fewer publications even after adjusting for the number of coauthors (1992, p. 75). Ginther and Kahn, relying upon National Science Foundation data for doctorates earned from 1974 through 2000, write that "notably, men publish more than women, particularly in non-top-10 journals (2004, p. 199)."

In a 2006 article, McDowell, Singell and Stater, using data from the American Economics Association (AEA) Directories for the years 1964, 1974, 1985, 1989, 1993, and 1997, conclude that by 1993 the conclusion of earlier studies that male economists

[1] E. Bruce Hutchinson is Professor of Economics, Department of Economics, University of Tennessee at Chattanooga, Chattanooga, TN 37403; Marc A. Loizeaux is Manager, Provider Performance Assessment Analytics, BlueCross BlueShield of Tennessee, Chattanooga, TN 37402; Leila J. Pratt is Hart Professor of Economics, University of Tennessee at Chattanooga; and, Stephanie Smullen, is Professor of Computer Science, Computer Science, University of Tennessee at Chattanooga.

were more likely to publish more than their female counterparts (p. 166-67) was no longer applicable. Their analysis of post-1993 data indicates that males and females had substantively equal publication records.

The present study uses statistical analysis to compare male and female publication records adjusted by the quality of the PhD granting institution. Quality here is determined by school tier as established by the National Research Council. We, as other authors excepting McDowell, Singell and Stater, find a continuing statistical difference in journal publication records when we simultaneously consider gender and the quality of the PhD granting institution.

Data and Results

Our data are drawn from the 1985 and 1986 listing of "Doctoral Dissertations in Political Economy in American Universities and Colleges" published in the December 1985 and 1986 editions of the *American Economic Review*. These lists identify individuals and the year in which the PhD is conferred. Our data set includes all listed individuals who received a PhD in 1985.[2] The *Economic Literature Database* (Heck, 2001), which contains 250-plus journals, was used to identify economics and related journal articles (hereafter "journal article") published by these individuals between 1985 and 1999. Counted were articles and notes; omitted were comments, replies, discussions, and book reviews, which is the general treatment followed in the literature. If articles were co-authored, even if both authors were from the 1985 PhD class, each was given credit for one publication. The gender of an individual was determined based on name and where necessary and possible by contacting the individual.[3]

The original data set contained 720 individuals; however, we were unable to determine the gender of 50 individuals. Thus our working data set contains 670 individuals. Of these 115 or 17.2% were females and 555 were males. Three-hundred and twenty-seven (48.8%) of these individuals published at least one journal article.

A larger percentage (see Table 1) of women (58%) failed to publish at least one article between 1985 and 1999 than did men (50%). However a slightly larger percentage of women (13%) than men (12%) published exactly one article. Likewise the percentage of women (8%) who published three articles during this period was also somewhat larger than the percentage of men (5%). However a substantially larger percentage of men (7%) than women (3%) published exactly two articles and an even higher percentage of men (26%) than women (18%) published four or more articles during this period.

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[2] The lists include individuals who earn the PhD from Canadian Universities. These individuals are omitted from our sample because their PhD is from a non-U.S. university and the tier rankings used include only U.S. universities.

[3] Many faculty and students with knowledge of foreign languages and cultures assisted in this determination. E-mails were also sent in an effort to determine the gender of individual economists.

Table 1 Number of Publications by Gender					
Publications	0	1	2	3	4 +
Female	67 58%	15 13%	3 3%	9 8%	21 18%
Males	276 50%	66 12%	40 7%	29 5%	144 26%
Total	343 51%	81 12%	43 6%	38 6%	165 25%

Universities were placed into school tiers according to the 1982 ranking of economics departments as reported in the appendices of the 1995 National Research Council update to the 1982 assessment of research-doctorate programs. Essentially, we used Hansen's first (highest or best) to fifth (lowest) tier designations to group the schools.[4] Table 2 shows this stratification.

As can be seen, 40% of our sample received their PhD from a tier 1 or tier 2 institutions while 32% received their degree from a tier 5 school. 14 % of the males received their degrees from a tier 1 school compared to only 8% of the females. In addition, a higher percentage of women than men graduated from tier 4 or tier 5 institutions.

[4] Schools in the various Tiers are:
Tier 1: Chicago, Harvard, MIT, Princeton, Stanford, Yale
Tier 2: Columbia, Michigan, Minnesota, Northwestern, Pennsylvania, Rochester, UC-Berkeley, UCLA, UW-Madison
Tier 3: Brown, Cal-Tech, Carnegie-Mellon, Cornell, Duke, Illinois, Johns Hopkins, Maryland, Michigan State, New York University, North Carolina, UC-San Diego, Virginia, Virginia Polytechnic Institute, Washington-Seattle
Tier 4: Boston University, Claremont, Florida, Iowa, Iowa State, Massachusetts, Ohio State, Pennsylvania State, Pittsburgh, Purdue, SUNY-Stony Brook, Texas A &M, Texas-Austin, UC-Davis, UC -Santa Barbara, USC, Vanderbilt, Washington-St. Louis
Tier 5: All other Colleges and Universities.

Table 2 Gender by School Tier					
	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Publications	1	2	3	4	5
Females	9 8%	28 24%	16 14%	21 18%	41 36%
Males	76 14%	156 28%	90 16%	62 11%	171 31%
Total	85 13%	184 27%	106 16%	83 12%	212 32%

Table 3 shows publishing records stratified by gender and school tier. Giving consideration to the sensitivity of percentages based on small numbers, no pattern differences are readily observed. An ordered probit model is used to determine the impact of these variables on the probability that an individual will publish 1, 2, 3 or 4 or more articles between 1985 and 1999. In general, this model takes the form:

$$y^* = \boldsymbol{\beta}'\mathbf{x} + \varepsilon.$$

y^* is not observed but we do observe

$y = 0$ if $y^* \leq 0$
$y = 1$ if $0 \leq y^* \leq \mu_1$
$y = 2$ if $\mu_1 \leq y^* \leq \mu_2$
.
.
.
$y = j$ if $\mu_{j-1} \leq y^*$

The μ's are unknown parameters and are estimated with the $\boldsymbol{\beta}$'s. The values of both these parameters depend on the set of measurable factors, $\mathbf{x}$, and the unobservable factors ε. The error term, ε, is assumed to be normally distributed across observations. It is standardized to a mean of zero and a variance of one. The resulting normal distribution gives us the following probabilities:

$\text{Prob}(y = 0) = \Phi(-\boldsymbol{\beta}'\mathbf{x})$,
$\text{Prob}(y = 1) = \Phi(\mu_1 - \boldsymbol{\beta}'\mathbf{x}) - \Phi(-\boldsymbol{\beta}'\mathbf{x})$,
$\text{Prob}(y = 2) = \Phi(\mu_2 - \boldsymbol{\beta}'\mathbf{x}) - \Phi(\mu_1 - \boldsymbol{\beta}'\mathbf{x})$,
$\text{Prob}(y = 3) = \Phi(\mu_3 - \boldsymbol{\beta}'\mathbf{x}) - \Phi(\mu_2 - \boldsymbol{\beta}'\mathbf{x})$,
$\text{Prob}(y = 4) = 1 - \Phi(\mu_3 - \boldsymbol{\beta}'\mathbf{x})$.

For all the probabilities to be positive:

$$0 < \mu_1 < \mu_2 < \mu_3.$$

Table 3
Number of Publications by School Tier and Gender

Publications	0	1	2	3	4 +
Tier 1					
Females	4	2	1	1	1
	44%	22%	11%	11%	11%
Males	34	10	10	3	19
	45%	13%	13%	4%	25%
Tier 2					
Females	18	3	0	1	6
	64%	11%	0%	4%	21%
Males	85	13	13	10	35
	54%	8%	8%	6%	22%
Tier 3					
Females	6	2	1	1	6
	38%	13%	6%	6%	38%
Males	47	11	6	5	21
	52%	12%	7%	6%	23%
Tier 4					
Females	12	0	0	4	5
	57%	0%	0%	19%	24%
Males	31	8	3	5	6
	58%	15%	6%	9%	11%
Tier 5					
Females	27	8	1	2	3
	66%	20%	2%	5%	7%
Males	79	24	8	6	54
	46%	14%	5%	4%	32%

The explanatory variables or the regressors, **x**, are GENDER which equals 1 if the individual is male, and a set of dummy variables that designate the tier of the PHD granting institution. Table 4 reports the results of the ordered probit. None of the school tier dummies are significant indicating that the quality of the PhD granting institution is unimportant in explaining an individual's probability of publishing. However, gender is positive and significant indicating that males have a significantly higher probability of publishing than females.

Table 4
Ordered Probit Regression Results

Variable	Coefficient	Std. Error	t-Statistic	
Constant	-0.1858	0.1277	-1.455	
Gender	0.2313	0.1211	1.910	*
Tier 1	0.0310	0.1465	0.212	
Tier 2	-0.1349	0.1175	-1.149	
Tier 3	-0.0106	0.1371	-0.077	
Tier 4	-0.1367	0.1498	-0.913	
μ_1	0.3112	0.0326	9.546	**
μ_2	0.4882	0.0402	12.144	**
μ_3	0.6592	0.0464	14.195	**
*	Significant at the 5% level			
**	Significant at the 10% level			

As usual in models with discrete dependent variables the marginal impacts of the **x** values on the probabilities are not equal to the coefficients. To measure the marginal impact of a binary explanatory variable, one must compare the probabilities that result when the variable takes on its two values (0 or 1) with all other variables held constant at their means. Table 5 shows the marginal impact of each of the binary regressors (school tiers or gender) on the five publishing probabilities given all the other variables are held constant at their sample means. For example, according to the estimated marginal impacts presented in Table 5, males are 9.20% more likely to not publish than females given the school tiers are held constant at their mean values. Likewise a graduate of a Tier 2 institution is 5.40% less likely to not publish than other individuals given gender and the other three tier dummy variables are held constant at their mean values.

The small differences in male and female publication probabilities in the five school tiers reinforce the non-significance of the tier dummy variables. The gender dummy variables however provide some surprising results. Men are about 9% more likely than women to not publish at all. Women, on the other hand, are about 8% more likely than men to publish 4 or more articles or to be "super publishers". In addition, women and men are almost equally likely to publish 1, 2, or 3 articles between 1985 and 1999.

Table 5
Marginal Impact of Gender & School Tier on Publishing Probabilities

	Prob. y =0	Prob. y =1	Prob. y =2	Prob. y =3	Prob. y =4
Gender =0	0.412	0.123	0.069	0.064	0.331
Gender =1	0.504	0.122	0.065	0.058	0.252
Difference	0.092	-0.001	-0.004	-0.006	-0.079
Tier 1 = 0	0.486	0.122	0.066	0.060	0.266
Tier 1 = 1	0.499	0.122	0.065	0.058	0.256
Difference	0.013	0.000	-0.001	-0.002	-0.010
Tier 2 = 0	0.503	0.122	0.065	0.058	0.253
Tier 2 = 1	0.449	0.124	0.068	0.062	0.298
Difference	-0.054	0.002	0.003	0.004	0.045
Tier 3 = 0	0.488	0.123	0.066	0.059	0.264
Tier 3 = 1	0.484	0.123	0.066	0.059	0.264
Difference	-0.004	0.000	0.000	0.000	0.000
Tier 4 = 0	0.488	0.123	0.066	0.059	0.264
Tier 4 = 1	0.483	0.123	0.066	0.059	0.269
Difference	-0.005	0.000	0.000	0.000	0.005

Conclusion

This study used research records based on a search of the *Economic Literature Database* citations to 250-plus economics and related journals to examine the impact of gender and school tier on the probability that an individual who received the PhD in 1985 would publish zero, one, two, three or four or more articles between 1985 and 1999. We find that for this group, the tier (general quality) of the graduate institution from which they graduated does not impact their publishing probability. We also find that men have a significantly different publication pattern than women though the difference is narrow. In particularly we find that men in this cohort are more likely to not publish at all. On the other hand, we find that women are more likely to be "super publishers" publishing four or more articles between 1985 and 1999.

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