University of Michigan Gender Salary Study: An Update

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Executive Summary

Consistent with widespread national attention to the issue of gender equity in faculty salaries, Edward M. Gramlich, former Interim Provost and Executive Vice President for Academic Affairs, commissioned a group of faculty and academic administrators to conduct an econometric analysis of salaries of tenured and tenure-track faculty at the University of Michigan, Ann Arbor as of November 2005. Multiple regression models were used to predict salaries based on several factors known to affect pay, and included gender as a variable. The analysis found a small but statistically significant gender effect when all controls were used (about 2.5%), and a somewhat larger effect (about 3.8%) when rank and years in rank were omitted as control variables. These estimates for 2005 faculty salary were compared with estimates from a similar study using 1999 faculty salaries. When all controls were used the gender differences increased from 1.1% in 1999 to 2.5% in 2005. When rank and years in rank were not accounted for, the salary difference increased from 3.3% to 3.8 %. These increases between 1999 and 2005 were not statistically significant. The analyses were not able to account for variations in individual performance such as scholarly publications and teaching evaluations.

Introduction

Gender equity in faculty salaries is a national concern. Reports from the American Association of University Professors (AAUP) and others suggest that the salaries of women faculty members lag behind those of their male counterparts. The University of Michigan conducted an analysis of faculty salaries, including looking at gender differences, in 1999 (finalized and released in 2001). At that time, the University committed to a periodic re-examination of faculty salaries. This report provides the findings from the second such study, closely replicating the first.

Each of the UM studies examined the salaries of tenure and tenure track faculty on the Ann Arbor campus, for all schools and colleges except the Medical School.[1], At the request of Interim Provost and Executive Vice President of Academic Affairs Edward M. Gramlich, the University undertook the second study. It was led by Lori J. Pierce, Associate Provost for Faculty and Academic Affairs. The study was carried out by Associate Professor Robert Schoeni, with the assistance of Patricia Andreski, Research Associate at the Institute of Social Research, Patricia J. Wolff, Senior Research Associate in the Office of Budget and Planning, and Mary Corcoran, Professor of Public Policy and Social Work. An advisory committee of faculty served as consultants for the study.

Procedure

The most recent study examines the salaries of tenure and tenure track faculty based on academic year 2005 appointment data. The statistical analysis of salary data used the technique of multiple regression, in which the following factors were used to predict nine-month salary equivalents: highest degree, years since degree, years at Michigan, rank, years in rank, unit affiliation, gender, race and ethnicity, whether an administrative appointment was held, whether a medical school appointment was held, number of appointments, and "market ratio" (the purpose of which was to capture outside market forces by measuring the average relative pay by field in a set of peer institutions). Detailed information about the variables is provided in Appendix Table A1.

At the outset, it is important to point out that this type of analysis considers only some of the variables that are known to affect salary. It omits some of the most important factors that account for individual salary differentials, notably measures of teaching performance, scholarly reputation and impact, quality and quantity of an individual's contributions to the institution and their academic profession. Collecting this information would be very costly, and even if with such data were available it is very difficult to make comparisons between faculty in diverse departments and units on measures like quality of publications. We would expect a good deal of individual variation around the salary predicted by the regression model used here because individuals who are identical in terms of field, rank, and the other variables are likely to be different in terms of their

[1] The complexity of the salary structure at the Medical School requires a separate analysis. In 2005 an initial study of Medical School salaries was completed. A second such study will be undertaken in the next two to three years.

specific academic contributions.

Results

Table 1 presents mean salaries of faculty at the University of Michigan by gender and rank. A total of 1813 faculty (565 women and 1248 men) were analyzed in this study. The table shows that average salary for all women faculty is less than that of men, both overall, and at every rank. The average woman faculty member had a 9-month salary of $90,274; the average for male faculty was $108,476. Table 1 shows that part of this difference is clearly due to time since degree and rank. Women faculty, on average, have been at the University for ten years and earned their highest degree 16 years ago, compared with male faculty members, who had been at the University an average of 14 years and earned their highest degree 20 years ago. In 2005, 36% of women are full professors, while 57% of men are full professors. In 1999, comparable figures are 29% of women and 59% of men. When comparing salaries within ranks, salary differences between men and women are much smaller than the differences for all faculty regardless of rank. But even within rank men's average salaries are consistently higher than those of women. Part of the remaining differences in the average of men's and women's salaries is due to factors such as field of study.

Table 2 reports results of regression models that predict the natural logarithm of a nine-month salary. Model (1) reports results of a regression equation that uses gender, race, ethnicity, highest degree, years since degree, years at the University of Michigan, departmental unit affiliation, administrative appointments, medical school affiliations, multiple appointments, and market ratios. Model (2) reports results when rank, years in rank, and the interaction of these two factors are also added as explanatory variables.

In reviewing Table 2, we see that the Model (1) shows an average 3.8% pay disadvantage for women; this gender-based differential is statistically significant at conventional levels. When we add controls for rank and time in rank, the wage disadvantage of women faculty drops to 2.5%. While this is an increase over the 1.1% difference found for 1999, the change is not statistically significant.

The literature on pay differentials by gender and race contains extended discussions of how to appropriately control for rank and years in rank. On one hand, rank is clearly an important indicator of professional accomplishment, and it is plainly the case that rank is and should be a powerful predictor of salary level. On the other hand, if the processes that determine salary levels treat women and men differently, it is highly plausible that there is differential treatment in the processes that determine rank. Therefore results are presented using both models.

In addition to the differential in salary related to gender, the coefficients of the control variables in the regressions indicate that: (1) Individuals with multiple appointments have higher salaries: 2% higher if two appointments and 7% higher for three or more appointments. This finding is consistent with the claim that interdisciplinarity is valued

and rewarded at Michigan. (2) Individuals with administrative appointments also earn more: 5% on average.

Next Steps

The next step in the analysis of gender differentials in salary rates for tenured and tenure-track faculty at the University of Michigan is to combine the information generated by this multiple regression analysis with an assessment of individual faculty performance based on the indicators outlined above as well as other measures such as scholarly productivity and teaching evaluations. This second-stage of the analysis will provide a clearer picture of salary differentials.

There is national evidence to suggest that women faculty members have lower starting salaries than their male counterparts. The Office of the Provost has begun collecting this data for instructional faculty and will analyze it to see is starting salary differences are a factor that is behind gender differentials at UM.

Table 1. Summary Statistics for Faculty by Gender

	Women	Men	All
Number of faculty	565	1248	1813
Years since highest degree	15.6	20.1	18.7
Mean years at UM	9.8	13.9	12.6
Mean Salary	$90,274	$108,476	$102,803
Rank			
Assistant professor	.33	.21	0.25
Associate professor	.31	.22	0.25
Full professor	.36	.57	0.50
Mean salary by rank			
Assistant professor	$70,771	$77,599	$74,781
Associate professor	$79,802	$88,041	$84,804
Full professor	$117,453	$127,845	$125,550

Table 2. Effects of Gender on Faculty Salaries

Independent variables	Model 1 Coefficient (absolute value of t-statistic)	Model 2 Coefficient (absolute value of t-statistic)
Female	-0.0377*	-0.0250*
	(3.46)	(2.94)
Race/ethnicity		
Asian, Pacific Islander	-0.0063	-0.0077
	(0.42)	(0.67)
Black, American Indian,	-0.0034	0.0043
Alaskan Native, Hispanic	(0.22)	(0.36)
White (reference group)		
Additional control variables		
Time since degree, years at UM, highest degree, department/unit, market ratio, number of appointments, medical appointment, administrative appointment	X	X
Rank, years in rank, interaction of rank and years in rank		X
Number of observations	1813	1813

All salaries have been adjusted to a nine-month equivalent.

* Indicates statistical significance at the 0.05 level.

Appendix Table A1. Definitions of Variables Used in the Regressions

Ln salary	The natural logarithm of salary averaged across appointments. Salary was adjusted to nine months, and it refers to the salary as of November 1, 2005
Gender	Female=1
Race	Asian, Pacific Islander=1 Under-represented minority (Black, American Indian, Alaskan Native, Hispanic)=1 White is the excluded reference category.]
Degree date	Date of highest degree.
Years at UM	2005-instructional entry date
Highest degree	Holds doctorate or other appropriate terminal degree=1
Department units	Summary variables for 29 departmental unit affiliation categories. Appendix Table 2A shows affiliation categories. Faculty members with more than one appointment were assigned fractional dummies. Member of that department=1 Psychology is the excluded category
Market ratio	The natural logarithm of the average market ratio across appointments. The market ratio was calculated as the average salary at peer institutions for a given field and a given rank divided by the average peer salary of all fields for a given rank.
Number of appointments	Two appointments=1 Three or more appointments=1 One appointment is the excluded reference category.
Medical appointment=1	
Administrative appointment=1	
Rank	For a faculty member with more than one rank, the highest rank is used Professor=1 Associate professor 1-6 years=1 Associate Professor 7 or more years=1 Assistant professor is the excluded reference category.

Years in rank — For faculty member with more than one rank, this variable is based on highest rank.

Rank by years in rank interactions
Professor by years in rank
Associate professor 1-6 years by years in rank
Assistant professor by year sin rank is the excluded reference category.

School/college — Faculty members with more than one appointment were assigned fractional dummies
A. Alfred Taubman College of Architecture and Urban Panning
School or Art and Design
Stephen M Ross School of Business Administration
School of Dentistry
School of Education
School of Engineering
School of Information
Division of Kinesiology
Law School
School of Music, Theatre, and Dance
School of Natural Resources and Environment
School of Nursing
College of Pharmacy
School of Public Health
Gerald R. Ford School of Public policy
School of Social Work
College of Literature, Science, and the Arts is the excluded reference category.

Appendix Table 2A. Department/Unit Affiliation Categories

Category	Number	Percent of Sample	Programs/ Units Included
1	32	1.8%	Anthropology
2	36	2.0%	Chemistry
3	58	3.2%	Economics Organizational Studies G. Ford School of Public Policy
4	93.5	5.2%	English Language & Literature Comparative Literature Program American Culture Program Women Studies Program
5	24	1.3%	Geological Sciences
6	92.8	5.1%	Classical Studies History Philosophy
7	94.5	5.2%	Mathematics Statistics Biostatistics
8	80.5	4.4%	Astronomy Physics Atmospheric, Oceanic and Space Science
9	31	1.7%	Political Science
10	69.25	3.8%	Psychology
11	115.17	6.3%	Asian Languages and Culture Germanic Languages & Lit Judaic Studies Program in Linguistics Near Eastern Studies Residential College Romance Languages & Literature Slavic Languages & Literature Ctr. Afro-Amer & African Studies
12	21.5	1.2%	Sociology
13	54.7	3.0%	UG: Environment
			Molec./Cell./Develop. Bio
			Ecology and Evolutionary Biology
			Herbarium
14	138	7.6%	Biomedical Engineering CoE Macromolecular Sci & Engr Aerospace Engineering Chemical Engineering

			Civil & Environmental Engineering Industrial/Operations Engineering Materials Science and Engineering Naval Arch & Marine Engineering Nuclear Eng & Radiological Sci
15	79	4.4%	Elect. Engineering & Computer Sci
16	47	2.6%	Mech Eng & Applied Mech
17	36.5	2.0%	A. Alfred Taubman College of Architecture and Urban Planning
18	52.7	2.9%	History of Art School of Art and Design
19	110	6.1%	School of Business Administration
20	59.5	3.3%	Biologic and Materials Sciences Oral/Maxillofacial Surgery Prosthodontics Cariology, Restor Sci and Endo Community Dentistry Periodontics/Prevent & Geriatrics Oral Diagnosis Oral Pathology Oral Surgery Orthodontics Pediatric Dentistry Periodontics
21	65	3.6%	School of Education Division of Kinesiology
22	52.8	2.9%	Law School
23	45	2.5%	School of Information Communication Studies Technical Communication Program in Film and Video
24	104.5	5.8%	School of Music Department of Dance Theatre and Drama
25	34.8	1.9%	School of Natural Resources & Environment
26	55	3.0%	Dental Hygiene - Dentistry School of Nursing Health Behavior & Health Ed
27	28.5	1.6%	College of Pharmacy
28	58.5	3.2%	Health Management and Policy School of Public Health Epidemiology Department Environmental-Industrial Health Epidemiology
29	43.25	2.4%	School of Social Work

Total	1813	100.0%	