

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, Phil Hanlon, 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 2011. 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 that female faculty had 1.6% lower salary than male faculty when all control variables were accounted for and 3.8% when rank and years in rank were omitted as control variables. These estimates for 2011 faculty salary were compared with estimates from a similar study using 2005 faculty salaries. When all controls were used the gender differences decreased from 2.5% in 2005, to 1.6% in 2011. This decrease between 2005 and 2011 was not statistically significant. When rank and years in rank were not accounted for, the salary difference remained the same in 2005 and 2011 at 3.8%. 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), and in 2005. The University is committed to a periodic re-examination of faculty salaries. This report provides the findings from the third such study, closely replicating the previous two.

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 Provost and Executive Vice President of Academic Affairs Phil Hanlon, the University undertook the third study. The study was carried out by Professor Robert Schoeni, Patricia Andreski, Research Associate at the Institute of Social Research, and Patricia J. Wolff, Senior Research Associate in the Office of Budget and Planning.

Procedure

The most recent study examines the salaries of tenure and tenure track faculty based on academic year 2011 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, and the number of appointments. Detailed information about the variables is provided in Appendix Table A1.²

It is important to point out that this type of analysis considers only some of the factors 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

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 was undertaken in 2009, and finalized in 2012.

²In the 1999 and 2005 studies a variable representing market wages was included in the analysis. These data are not available for 2011 and therefore were not included in the current analyses. The 2005 regression models were estimated with and without the market wage variable and it was found that the estimated gender differences were nearly identical, indicating that exclusion of this variable does not bias the estimated gender differential.

publications. We would expect significant 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 specific academic contributions.

Results

Table 1 presents mean salaries of faculty at the University of Michigan by gender and rank. A total of 1955 faculty (635 women and 1320 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 female faculty member had a 9-month salary of \$110,578; the average for male faculty was \$127,847. 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 11 years and earned their highest degree 18 years ago, compared with male faculty members, who had been at the University an average of 14 years and earned their highest degree 21 years ago. In 2011, 41% of women are full professors, while 57% of men are full professors. In 2005, comparable figures are 36% of women and 57% 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 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, and multiple appointments. 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 Model (1) shows an average 3.8% pay disadvantage for women; this gender-based differential is statistically significant at conventional levels. The 3.8% differential estimated for 2011 is identical to the differential estimated in the previous report examining data for 2005.

When we add controls for rank and time in rank, the wage disadvantage of women faculty drops to 1.6%. While this is a decrease from the 2.5% difference found for 2005, 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 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 possible 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: 1% higher if two appointments (not significant) and 5.5% 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: 4% 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.

Table 1. Summary Statistics for Faculty by Gender, 2011

	Women	Men	All
Number of faculty	635	1320	1955
Years since highest degree	17.8	21.0	19.9
Mean years at UM	11.0	14.1	13.1
Mean Salary	\$110,578	\$127,847	\$122,238
Proportion in each rank:			
Assistant professor	.26	.20	0.22
Associate professor	.33	.23	0.27
Full professor	.41	.57	0.51
Mean salary by rank:			
Assistant professor	\$84,743	\$91,821	\$89,043
Associate professor	\$95,488	\$101,464	\$99,053
Full professor	\$139,371	\$151,320	\$148,250

Table 2. Effects of Gender on Faculty Salaries, 2011

Independent variables	Model 1 Coefficient (absolute value of t- statistic)	Model 2 Coefficient (absolute value of t- statistic)
Female	-0.0380** (3.83)	-0.0156* (2.03)
Race/ethnicity		
Asian, Pacific Islander	0.0148 (1.09)	-0.0001 (0.08)
Black, American Indian, Alaskan Native, Hispanic White (reference group)	0.0091 (0.54)	0.0060 (0.46)
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	1955	1955

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

** Indicates statistical significance at the .001 level

* 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, 2011
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	2011-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 reference category.
Number of appointments	Two appointments=1 Three or more appointments=1 One appointment is the excluded reference category.
Medical school 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.

Appendix Table 2A. Department/Unit Affiliation Categories

Category	Number	Percent of Sample	Programs/ Units Included
1	34	1.8%	Anthropology
2	35	1.8%	Chemistry
3	62.5	3.2%	Economics Organizational Studies G. Ford School of Public Policy
4	98.3	5.0%	English Language & Literature Comparative Literature Program American Culture Program Women Studies Program
5	26.5	1.4%	Geological Sciences
6	100	5.1%	Classical Studies History Philosophy
7	102.3	5.2%	Mathematics Statistics Biostatistics
8	89	4.6%	Astronomy Physics Atmospheric, Oceanic and Space Science
9	38.5	2.0%	Political Science
10	74	3.8%	Psychology
11	121.5	6.2%	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	23	1.2%	Sociology
13	66.7	3.4%	UG: Environment Molec./Cell./Develop. Bio Ecology and Evolutionary Biology Herbarium
14	168	8.6%	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	97	5.0%	Elect. Engineering & Computer Sci
16	59.25	3.0%	Mech Eng & Applied Mech
17	49.5	2.5%	A. Alfred Taubman College of Architecture and Urban Planning
18	51.8	2.7%	History of Art School of Art and Design
19	104	5.3%	School of Business Administration
20	54.5	2.8%	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	65.5	3.4%	School of Education Division of Kinesiology
22	47.3	2.4%	Law School
23	50.5	2.6%	School of Information Communication Studies Technical Communication Program in Film and Video
24	109.5	5.6%	School of Music Department of Dance Theatre and Drama
25	36	1.8%	School of Natural Resources & Environment
26	49.5	2.5%	Dental Hygiene - Dentistry School of Nursing Health Behavior & Health Ed
27	30.5	1.6%	College of Pharmacy
28	66	3.4%	Health Management and Policy School of Public Health Epidemiology Department Environmental-Industrial Health Epidemiology
29	44.5	2.3%	School of Social Work

Total	1955	100.0%	
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