

The Misguided Power of Generalizations in Gender Pay Studies

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Abstract

The notion of wage disparities remains a prevailing issue today. In our study, we investigated the wage disparities of faculty members at a regional university, taking into consideration the faculty rank, years of total experience as well as years employed at the university, including their teaching disciplines. Overall results show that female faculty members earn 20% less than their male counterparts. However, the results showed when discipline and rank are accounted for the wage gap diminished.

Key Words: Gender Pay Gap; Higher Education

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Introduction

According to the U.S. Census Bureau, the pay gap between males and females overall is at 17% as of 2020 (Shrider, Kollar, Chen, & Semega, 2021). Statistics typically differentiate between controlled and uncontrolled gender pay gaps, where a controlled pay gap study measures the median salary of males and females in similar positions with similar education and experience, whereas the uncontrolled study does not consider any variables and reviews overall data (Bolotnyy & Emanuel, 2022).

A study of wage gaps between tenure-track faculty at the Ohio State University revealed an 11% pay gap in favor of male faculty within a fiscal year, even after considering clinical appointments, departments, ethnicity, and years of experience (Chen & Crown, 2019). A 2019 study examining the wage gap of US congressional staff members found that a gender wage gap exists even when using a control for human capital, office characteristics, and demographics. Female staff members earn approximately 24% less than male staff members, which translates into women earning 71 cents to the dollar when compared to men (Calcagno & Montgomery, 2021).

A National Institutes of Health study examined the gap between grades of employees at this public health institution where wages are determined based on a General Schedule (GS) and related (GSR) system ranging from 1 to 15, where GSR-13 to 15 positions are considered top-level positions. In 2002 the average grade for women was 10.8 whereas for men it was 12.5. Although both are considered midlevel positions, salaries can differ substantially. The GSR grade level difference somewhat narrowed with increasing years of experience but the gap never closed. A notable fact also appears that only 5.6% of women achieved a GSR15 or higher position whereas 13.9% of men did the same (Chen, Roy, & Crawford, 2010).

A gender wage gap also exists within the medical profession. When reviewing a study comparing the nursing and teaching professions, male Registered Nurses earned 27.9% higher

wages than females and male teachers earned 19.6% more than female teachers (Wilson, Butler, Butler, & Johnson, 2018). Surveying 1,213 pediatricians revealed that before any adjustments, female pediatricians earned 76% of a male pediatrician's annual income. When adjusted for demographics, work hours, and specialty, female pediatricians earned 13% less than males, and when further adjusting for specific job characteristics and work-family, women earned 6% less than male pediatricians. Therefore, although the gap narrowed, it still exists solely based on gender (Frintner, et al., 2019).

Data and Results

The current paper analyzes faculty salary data for a regional university located in the South. The purpose is to make comparisons between the 9-month salaries of male and female faculty. The data is comprised of 323 faculty of which 124 are Female and 199 are Male. In addition to faculty salaries, the data includes the area of teaching, rank, total years of experience, and years of experience at the current university.

Table One presents the average male and female salaries at the university. No consideration of rank or area of teaching is made. The average 9-month salary for females is \$64,931 and for males \$77,762. This is nearly a 20% pay gap favoring males. This coincides with results often reported in the media that women earn appropriately 80% of men.

Additionally, when looking at all females and all males, the average years of experience, both total and at the current university, are similar with only low, single-digit percentage differences. Therefore, at first glance, experience does not appear to explain the difference in the aggregate.

The university is divided into five areas or colleges. These five areas are Applied and Natural Science, Business, Education, Engineering and Computer Science, and Liberal Arts. A precursor thought was to separate Engineering and Computer Science from the whole since these areas are predominately male. When we consider the Engineering and Computer Science areas separately, we find the percentage salary difference between males and females goes down to 16% from 19% when we considered all areas of teaching. However, the years of experience difference becomes very substantial. Males have 64% more total years of experience and 47% more experience at their current university than females.

Table One

	9-month Salary			Total Yrs of Experience			Yrs of Experience at Univ		
	F	M	% diff	F	M	% diff	F	M	% diff
All	\$64,921	\$77,762	19.78%	20.81	20.01	4.01%	11.31	11.61	2.67%
All except Engineering and Computer Science	\$64,325	\$76,922	19.58%	22.54	20.45	10.21%	11.82	10.88	8.58%
Engineering and Computer Science only	\$68,015	\$79,087	16.28%	11.8	19.33	63.81%	8.65	12.71	46.92%

In Table Two, five general discipline areas are analyzed to allow for market differences within these areas of teaching. The five areas include 1) Applied and Natural Science, 2) Business, 3) Education, 4) Engineering and Computer Science, and 5) Liberal Arts. In one of the five areas, the data shows women are paid more than men. That is, in the area of Business, women earn nearly 9% more than men on average. In the four remaining areas (Applied and Natural Science, Education, Engineering and Science, and Liberal Arts), men’s salaries are higher than women’s salaries. However, the percent of the difference is less than the 20% difference reported in Table One when we looked at all areas together. Table Two, therefore, demonstrates that some of the perceived gender pay gaps can be explained by the general areas of teaching chosen by the faculty. Specifically, the difference between Applied and Natural Science is 10%. The difference for Education is 6.8%. The difference between Engineering and Science is 16.28% (also reported in Table One for that area). The difference for Liberal Arts is 12.40%. Table Two begins to show that career choice between men and women plays a role in salaries.

Table Two also allows us to make some observations about years of work experience. In the case of Business, female faculty earn on average nearly 9% more than their male counterparts; however, female faculty have lower total years of experience average and lower total years of experience at the current university average. Although women earn on average 9% more than men in the area of Business, men have 33% more years of total experience on average and 26% more years of experience at the current university on average. In terms of the area of Business in Table Two, there is indeed an unexplained gender gap; however, it is against men not women.

For Applied and Natural Science Table Two can provide some explanation for the 10% gender gap favoring men. On average the men employed in Applied and Natural Science have 16% more years of experience at the current university on average than women. However, at the same time, women have 3% more total years of experience on average than men.

For Education and Liberal Arts, Table Two highlights some concerns in that women earn on average less than men (6.8% and 12.4%, respectively) while showing that women on average have more experience. With the higher experience average for women, we would anticipate a smaller gap or even a gap in the favor of women.

Engineering and Science, as already noted in Table One, shows that men on average earn more than women; however, the years of experience difference is substantial. Males have 64% more total experience and 47% more experience at the current university than women. The additional experience could be a major contributor to the gender pay gap observed.

Table Two

Discipline		Gender	Salary	Total Yrs Experience	Yrs Experience at Univ
Applied and Natural Science		F	\$61,401	23.53	11.10
		M	\$67,540	22.84	12.89
	% diff		10%	3%*	16.2%
Business		F	\$139,460	18.33	10.00
		M	\$128,113	24.41	12.62
	% diff		8.86%*	33.17%	26.21%
Education		F	\$61,578	25.72	13.83
		M	\$65,743	17.79	10.21
	% diff		6.76%	44.63%*	35.43%*
Engineering and Comp Sci		F	\$68,015	11.80	8.65
		M	\$79,087	19.33	12.71
	% diff		16.28%	63.81%	46.92%
Liberal Arts		F	\$50,547	20.95	12.05
		M	\$56,815	19.13	10.06
	% diff		12.40%	9.50%*	10.06%*

“*”Represents a % difference that favors women

Tables Three, Four, Five, Six, and Seven summarize average salaries by area discipline as well as rank. In those five tables, we can consider twenty-three comparisons among the ranks within

the 5 discipline areas. Seven of the twenty-three comparisons have women earning more than men. Sixteen of the twenty-three comparisons have men earning more than women. Some ranks within a discipline are not included in the tables if there were not both men and women at that rank in that area. For example, Lecturer is not included in the discipline area of Business since there were no females at that rank in that discipline.

For Applied and Natural Science in Table Three, every rank except Instructor, showed that male faculty earned more than female. For Full, Associate, Assistant, and Lecturer the percent difference in all cases is less than 6.5% (compared to the overall difference of 20% reported in Table One). Additionally, for Full, Assistant, and Lecturer the differences are less than 3%. This is a substantial contrast to the 20% reported when you simply report All Females versus All Males. Once discipline and rank are included, much of the perceived pay gap disappears. Additionally, female instructors in the area of Applied and Natural Science earn 3.4% more than their male counterparts do.

In Table Four, the data for the Business area indicate that for half of the ranks, women earn more than men. Specifically, female Full Professors and female Assistant Professors on average earn more than their male counterparts. However, male Associate Professors and male Instructors earn more than their female counterparts. You will recall overall, women faculty in business earned 9% more than male faculty in Business. This helps to demonstrate the importance of looking not only at disciplines but also ranks. Different generalizations can be made depending on what level of information you are looking at.

Table Three

Applied and Natural Science by Rank	Gender	Average Salary	Percent Difference
Full Professor	F	\$75,341	
	M	\$83,972	2.6%
Associate Professor	F	\$63,157	
	M	\$67,507	6.4%
Assistant Professor	F	\$61,958	
	M	\$63,592	2.6%
Lecturer	F	\$61,575	
	M	\$62,356	1.3%
Instructor	F	\$51,580	
	M	\$49,825	3.4%*

“*” Percent Difference shows higher female salary

Table Four

Business by Rank	Gender	Average Salary	Percent Difference
Full Professor	F	\$153,017	
	M	\$145,122	5.4%*
Associate Professor	F	\$121,892	
	M	\$144,378	18.4%
Assistant Professor	F	\$160,111	
	M	\$114,696	39.67%*
Lecturer	F	na	
	M	\$76,787	na
Instructor	F	\$64,875	
	M	\$67,570	4.2%

“*” Percent Difference shows higher female salary

Similarly, in Tables Five, Six, and Seven the percent differences decrease from the overall 20% reported in Table One. In most cases, the percent difference is reduced to less than 10% and many less than 5%. Some outliers do exist. For Liberal Arts, there is a 35.1% pay difference for Lecturer; however, that pay difference favors women. Additionally, in Engineering and Science, female Full Professor and Associate Professors earn appropriately 5% more than their male counterparts.

Table Five

Education by Rank	Gender	Average Salary	Percent Difference
Full Professor	F	\$74,921	
	M	\$80,972	8.1%
Associate Professor	F	\$67,849	
	M	\$69,289	2.1%
Assistant Professor	F	\$62,409	
	M	\$60,418	3.3%*
Instructor	F	\$40,717	
	M	\$50,618	2.4%

“*” Percent Difference shows higher female salary

Table Six

Engineering and Science by Rank	Gender	Average Salary	Percent Difference
Full Professor	F	\$93,094	
	M	\$88,772	4.9%*
Associate Professor	F	\$94,176	
	M	\$89,493	5.2%*
Assistant Professor	F	\$75,001	
	M	\$79,629	6.2%
Lecturer	F	\$66,229	
	M	\$72,378	9.3%
Instructor	F	\$40,707	
	M	\$46,379	14%

“*” Percent Difference shows higher female salary

Table Seven

Liberal Arts by Rank	Gender	Average Salary	Percent Difference
Full Professor	F	\$66,677	
	M	\$70,076	5.1%
Associate Professor	F	\$55,260	
	M	\$60,973	10.3%
Assistant Professor	F	\$52,916	
	M	\$53,650	1.4%
Lecturer	F	\$53,960	
	M	\$39,955	35.1%*
Instructor	F	\$38,529	
	M	\$39,464	2.4%

“*” Percent Difference shows higher female salary

Tables Eight, Nine, Ten, Eleven, and Twelve go one step further differentiating discipline areas of study. Within each overall discipline area (Science, Business, Education, Engineering, and Liberal Arts) there are specific areas of specialization. For example, in Business, there are the areas of Accounting, Computer Information Systems, Economics, Finance, Management, and Marketing. The categorization of “Business” is quite broad. Similarly, for the other areas, pay between specific specializations at the various ranks is calculated. That is, Tables Eight through Twelve break down the broad areas into more specific areas while also maintaining rank comparisons. As we analyze more specific specialized areas with regard to rank, the number of faculty in a specific category becomes more limited. In many instances, there are no males and females both employed in a specific area and rank. For instances where a male and female comparison is not possible, the tables indicate this with “na” or not available.

In Table Eight, there are seven comparisons between male and female faculty possible. In four of the seven instances of comparison, females earn the same or more than their male

counterparts. Interestingly, in the case of Associate Professors of Biology, females earn 14% more than their male counterparts. For Applied and Natural Science, there is only one comparison (Associate Professor of Agricultural Science) showing a gender pay gap greater than 2% against women.

In Table Nine, only four comparisons are possible. In three of the four comparisons, the pay gap favors women. The one comparison (Professor of Management) that favors men, exhibits a difference in pay of 0.3% (i.e. less than 1%).

In Table Ten, four comparisons are possible with all four showing a pay gap in favor of males. However, in all four comparisons, the differences are less than 5% and in two of the four the differences were less than 1%. Again, this is a stark difference from the 20% difference when only comparing the female average to the male average.

Table Eight

Applied and Natural Science	Professor		Associate		Assistant		Lecturer		Instructor	
	F	M	F	M	F	M	F	M	F	M
Agricultural Science	\$81,056	\$78,803	\$65,702	\$71,148	\$66,950	\$66,950	na	na	na	na
% Difference	2.7%		8.3%		0%					
Biology	na	na	\$68,698	\$60,225	\$63,012	\$64,067	\$61,575	\$62,356	na	na
% Difference			14%*		1.7%		1.3%			
Health Management	na	na	\$56,485	\$55,925	na	na	na	na	na	na
% Difference			1.0%*							

“*”Represents a % difference that favors women

Table Nine

Business	Professor		Associate		Assistant		Lecturer		Instructor	
	F	M	F	M	F	M	F	M	F	M
Accounting	\$178,276	\$158,123	na	na	na	na	na	na	na	na
% Difference	12.75*									
Econ and Finance	na	na	na	na	\$153,750	\$105,289	na	na	na	na
% Difference					46%*					
Management	\$127,758	\$128,146	na	na	na	na	na	na	na	na
% Difference	0.3%									
Marketing	na	na	\$121,892	\$114,827	na	na	na	na	na	na
% Difference			6.2%*							

“*”Represents a % difference that favors women

Table Ten

Education	Professor		Associate		Assistant		Lecturer		Instructor	
	F	M	F	M	F	M	F	M	F	M
Curr & Instr	na	na	na	na	\$67,943	\$68,267	na	na	na	na
% Difference					0.5%					
Psychology	\$79,759	\$80,472	\$67,567	\$70,823	\$59,871	\$61,590	na	na	na	na
% Difference	0.9%		4.8%		2.9%					

“**”Represents a % difference that favors women

Table Eleven summarizes the comparisons within the area of Engineering and Computer Science. Of the twelve comparisons possible, seven of the twelve have females earning the same or more than males. These differences favoring women range from 0% to 15.2%. Five of the twelve comparisons have male average pay greater than females by a range of 3.4% to 20.8%.

Ten comparisons are possible within Liberal Arts and are presented in Table Twelve. Only two of the ten show a pay gap favoring females. Three of the comparisons favoring male pay are 3.5% or less.

Table Eleven

Engineering	Professor		Associate		Assistant		Lecturer		Instructor	
	F	M	F	M	F	M	F	M	F	M
Biomedical Engineering	na	na	\$97,781	\$94,126	\$66,232	\$80,000	na	na	na	na
% Difference			3.9%*		20.8%					
Chemical Engineering	na	na	na	na	\$85,745	\$82,640	na	na	na	na
% Difference					3.8%					
Chemistry	na	na	na	na	\$67,340	\$66,916	\$60,343	\$57,994	na	na
% Difference					6.3%*		4.1%*			
Civil Engineering	na	na	na	na	\$81,358	\$84,152	na	na	na	na
% Difference					3.4%					
Industrial Engineering	na	na	\$100,925	\$87,574	na	na	\$84,706	\$78,115	na	
% Difference			15.2%*				8.4%*			
Math	na	na	na	na	\$39,669	\$45,044	\$54,338	\$61,774		
% Difference					13.5%		13.7%			
Mechanical Engineering	na	na	na	na	\$82,388	\$82,388	\$77,420	\$82,599		
% Difference					0%		6.7%			

“**”Represents a % difference that favors women

Table Twelve

Liberal Arts	Professor		Associate		Assistant		Lecturer		Instructor	
	F	M	F	M	F	M	F	M	F	M
Communication	na	na	na	na	\$53,926	\$61,800	na	na	na	na
					14.1%					
Design	na	na	\$57,565	\$60,727	\$52,991	\$57,190	na	na	na	na
			5.5%		7.9%					
History	na	na	\$58,750	\$60,505	\$51,500	\$50,853	na	na	na	na
			3.0%		1.3%*					
Literature and Language	\$58,307	\$81,187	\$52,031	\$50,274	\$52,016	\$55,649	\$36,818	\$38,082	na	na
	28%		3.5%*		7%		3.4%			
Art and Music	na	na	\$50,128	\$54,027	na	na	\$36,970	\$38,110	na	na
			7.8%				3.1%			

“**”Represents a % difference that favors women

Conclusion

The pay gap debate is not only important but also interesting. A lot of generalizations are possible depending on the data one is considering. Our findings agree with the popular media statistic of a 20% pay gap against women when we are comparing all-male faculty salaries to all-female faculty salaries. This 20% pay gap was found even though we were comparing salaries within a specific career track (i.e. college faculty). At first glance, this is an alarming finding.

However, as the data was analyzed allowing for differences in faculty rank and area of specialization, findings shifted substantially. When allowances were made for general discipline area and rank, 30% of comparisons yielded a pay gap in favor of women. For the remaining 70% of comparisons that yielded a pay gap in favor of men, eighty percent showed a pay gap of less than 10%.

Taking the differentiation of the positions further, the comparison of men and women at the same rank and same specialization area, the pay gaps become even smaller. Thirty-eight comparisons were available at this level of differentiation. Sixteen of the thirty-eight comparisons (42%) yielded a pay gap favoring women or no pay gap. Of the remaining twenty-two comparisons (from the thirty-eight), forty-five percent show a pay gap of 5% or less.

This study demonstrates the importance of comparing, as they say, apples to apples. Even when considering university faculty, differences in rank and area of specialization play a key role in the determination of salaries. What initially appears to be a 20% pay gap penalizing women becomes a significantly smaller gap once rank and areas of specialization are considered. Additionally, in many instances the pay gap that does exist favors women. This study provides

some preliminary findings using basic mathematics to highlight issues with generalizations made regarding pay gaps showing gender discrimination.

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