



## *University of Colorado at Colorado Springs*

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### **Spring 2005 Pay Equity Analysis: UCCS Tenured and Tenure Track Faculty** *Research Brief No. 15*

#### **INTRODUCTION**

In Spring 2005, an amount equal to 3.5% of the total UCCS faculty compensation base was allocated for salary adjustments. This pool of funds was distributed to faculty on the basis of merit and according to the guidelines in the 2005-2006 Compensation Guidelines for Faculty in corporation with UCCS Deans, Vice Chancellors, the Chancellor, and the Faculty Compensation Policy Oversight Committee. Additional adjustments were provided for promotion/tenure, compression, and equity.

The purpose of this report is to determine if the new salaries reduced differences by gender and ethnicity. In this pursuit, we ran two regression analyses, one before the adjustments were made and one afterwards. The regression models tested if the following variables explained variance in both the new and old (pre-adjusted) salaries: rank, years in rank, merit (6-year average), market (an index based on peer salaries in departments at other institutions), gender, and ethnicity. While there is a salary gap between men and women as well as between minority and non-minority faculty, these gaps decreased after the salary adjustments were approved. Moreover, the variance in salaries attributed to rank, merit, and the market increased. We conclude that the adjustments improved salary equity among faculty at UCCS.

#### **ANALYSIS**

##### *Descriptive Data: Setting the Landscape*

Descriptive data illustrate the characteristics of a typical faculty member. These frequencies and means are important to keep in mind when interpreting regression results described in the next section. For example, we learn that minority status increases predicted salary by over one thousand dollars, but it applies to just 23 of 192 faculty members. By and large, the largest group of UCCS faculty is white men holding full professor rank for several years and who have also worked at UCCS for more than 10 years.

Table 1: Number of Faculty in Each Rank by Gender and Ethnicity

	Assistant	Associate	Full	Total
White Men	16	37	59	112
White Women	22	22	13	57
Minority Men	4	1	7	12
Minority Women	4	4	3	11
Total	46	64	82	192

Overall, male faculty average 5 more years in rank than women. This difference occurs primarily because 53% of men are full professors in comparison to 24% of women. Elaborated by rank, gender, and ethnicity, we see a more nuanced picture (Table 2). At the assistant rank, minority women have the highest average years in rank. While this result may be an indicator of discrimination in promotions, it is attenuated by the fact that there are a total of 4 assistant professors that are women of color. At the associate rank, white men have a relatively high (and somewhat inexplicable) average of 10.43 years in rank followed by minority women, minority men, and finally, white women. White men and minority men hold the highest average years in rank at the full professor rank.

Table 2: Average Years in Rank by Ethnicity and Gender

	Assistant	Associate	Full
White Men	2.56	10.43	12.02
White Women	3.64	4.55	6.69
Minority Men	2.50	5.00	11.71
Minority Women	4.00	8.00	7.00

Average years of service (Table 3) and average years in rank are the same values at the assistant professor rank. At the associate rank, white women tend to average 4-5 years less than the other groups. This is a finding worthy of further investigation: it appears that white women are advancing through the associate rank faster than other demographic groups. The average years of service at the full professor rank shows similarity across the gender and ethnic groups: they were all hired in the mid-1980s.

Table 3: Average Years of Service by Ethnicity, Gender, and Rank

	Assistant	Associate	Full
White Men	2.56	14.89	21.44
White Women	3.64	8.77	20.62
Minority Men	2.75	13.00	18.29
Minority Women	4.50	14.25	16.00

Women average more merit points than men in nearly every rank and ethnic category except minority associate professors (Table 4). Merit points are awarded annually and range from 1 to 4. A six-year average is calculated for each faculty member. Thus, one person's 6-year average may reflect as few as 1 or 2 years of evaluations, but no more than six.

Table 4: Average Merit Points by Ethnicity, Gender, and Rank

	Assistant	Associate	Full
White Men	3.05	3.14	3.37
White Women	3.08	3.38	3.45
Minority Men	2.88	3.60	3.29
Minority Women	3.39	2.46	3.69

The market index is intended to control for salary differences based on discipline or department. Based on nationwide data from the annual Oklahoma State University Faculty Salary Survey, the average salary of a department is compared or “indexed” to the department with the lowest average salary. An index of 0.18 means that faculty in that department earn 18% more than the lowest-paying discipline, which is currently the department of Visual and Performing Arts both at UCCS and nationwide. Of note here is the high index values for minority men at the assistant and full professor ranks; these minority men tend to work in high-paying engineering disciplines, which contributes to the relatively large coefficients for minority status in the regression models. The average market index for UCCS faculty shows a typical pattern: men tend to populate higher-paying disciplines whereas women populate lower-paying disciplines (Table 6 illustrates the average market index by discipline).

Table 5: Average Market Index by Ethnicity, Gender, and Rank

	Assistant	Associate	Full
White Men	.31	.33	.35
White Women	.23	.17	.23
Minority Men	.36	.09	.43
Minority Women	.09	.10	.20

Table 6: Average Market Index by Discipline, Sorted by Index

Discipline	Avg Index	Count
Business	0.85	23
Computer Science	0.58	11
Electrical Engineering	0.49	11
Economics	0.49	4
Mechanical Engineering	0.44	6
Public Affairs	0.33	2
Chemistry	0.26	6
Physical & Energy Sciences	0.26	5
Math	0.22	11
Psychology	0.21	13
Nursing & Health Sciences	0.20	14
Political Science	0.18	5
Education	0.16	16
Biology	0.16	6
Philosophy	0.14	5
English	0.13	9
Sociology	0.13	6
History	0.12	7
Geography & Enviro. Studies	0.12	7
Communication	0.11	9
Anthropology	0.08	5
Foreign Languages	0.02	4
Visual & Performing Arts	0.00	6

About Statistical Significance

In the regression results reported below, a t score and probability level are reported (*t* and *Sig.*) even though they have little, if any, application to this analysis. Typically, a significance level below .05 indicates that results can be inferred to a larger population of faculty with a degree of certainty that the results are not due to chance. The results (Tables 7 & 8) indicate that gender, ethnicity, and merit are *not* statistically significant (each is greater than .05). However, statistical significance does not determine substantial significance; determining the point at which a salary difference becomes relevant remains a human decision. Furthermore, the value calculated as the unstandardized coefficient for the gender variable is not explanative. In other words, the causes and factors leading to the salary difference attributed to gender are unknown.

The entire population of tenure track and tenured faculty at UCCS are included in the models so there is no need to infer to another population, limiting the applicability of the significance statistics. For more information on this topic, please refer to Haignere (2002).<sup>1</sup>

Model 1: Regression on Pre-Adjusted Salaries

The combination of rank, gender, ethnicity, years in rank, merit, and market explained 82% of the variance in pre-adjusted salaries among UCCS faculty. The largest predictor—with the largest coefficient—was market, followed by rank and ethnicity.

The market index coefficient of \$37,240 shows that a faculty member with an index of 1 would have a predicted salary that is \$37,240 more than his/her peer in Visual and Performing Arts (VAPA), which is the discipline with an index of zero. (To calculate the market coefficient for a specific discipline, multiply 37,240 by the market index in Table 6.)

Each step upwards in rank (assistant, associate, and full) is predicted to be worth \$10,308 per faculty member. Minority status has a beneficial impact by increasing predicted salary by \$2,134 whereas women's predicted salary is \$1,235 less than men's. The variable 'years of service' is eliminated from the model due to collinearity.

Table 7: Regression Results (Pre-Adjusted Salary)

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	28579.596	3517.925		8.124	.000		
Rank	10307.894	782.987	.499	13.165	.000	.731	1.368
Gender (Female)	-1235.368	1215.050	-.037	-1.017	.311	.802	1.247
Ethnicity (Minority)	2134.179	1588.733	.044	1.343	.181	.985	1.015
Years in Rank	379.400	81.163	.176	4.675	.000	.740	1.352
6-YR Merit	446.314	1037.124	.015	.430	.667	.870	1.150
Market Index	37240.477	2129.846	.593	17.485	.000	.916	1.092

<sup>1</sup> Haignere, L. 2002. *Paychecks: A Guide to Conducting Salary Equity Studies for Higher Education Faculty*. Second edition. Washington, D.C.: American Association of University Professors.

Model 2: Regression on Adjusted Salaries

Model 2 includes the same predictor variables, but the dependent variable reflects faculty salaries after adjustments were approved (Table 8). Market, rank, and ethnicity continue to be the top 3 largest (and positive) coefficients and gender continues to have a negative impact on predicted salary. The merit coefficient increased dramatically, reflecting the impact of merit-based salary adjustments.

Table 8: Regression Results (Adjusted Salary)<sup>2</sup>

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	25886.008	3372.506		7.676	.000		
Rank	10663.635	750.621	.505	14.206	.000	.731	1.368
Gender (Female)	-1160.092	1164.824	-.034	-.996	.321	.802	1.247
Ethnicity (Minority)	1864.427	1523.060	.038	1.224	.223	.985	1.015
Years in Rank	341.738	77.808	.155	4.392	.000	.740	1.352
6-YR Merit	1506.673	994.253	.049	1.515	.132	.870	1.150
Market Index	39190.721	2041.805	.610	19.194	.000	.916	1.092

Quick Comparisons & Conclusion

The following observations are changes in **predicted salaries** based on comparisons of unstandardized coefficients between Models 1 and 2:

- Rank increased by \$356
- Years in rank decreased very little, by \$38
- Merit increased by \$1,060
- Gender differences decreased by \$75
- Ethnicity differences decreased by \$270
- New average salary is \$68,915 (an increase of \$1800)

According to regression analyses of 2004-2005 faculty salaries, differences attributed to gender and ethnicity decreased after salary adjustments were approved. The dramatic increase in the merit coefficient suggests that the salary adjustments were indeed based on merit as intended and that the distribution did not affect any demographic groups adversely.

<sup>2</sup> The analysis of residuals for this model indicated some heteroskedasticity in the residuals (error terms), especially among cases with higher salaries. While this violates the regression assumption that error terms are the same, and suggests that the model is inefficient, it does not bias the coefficients.