## Overview

In 2015, a joint Administration-Academic Senate Committee redesigned our annual campus pay equity study of ladder rank faculty salaries. The analysis includes an examination of equity by gender and ethnicity for the campus overall and by academic school that go beyond the annual residual analysis conducted in the past (1997-2014). Analysis of salary data from October 2016 indicate no evidence of systemic disparity in pay associated with gender and/or ethnicity at the campus level when experience, discipline, and rank are included in the model.

## Methodology

Multiple linear regression model: A series of regressions were used to examine potential correlations between gender/ethnicity variables and salary. This approach provides a broad view of faculty employment and pay structure by the demographic variables and by experience, discipline, and rank.

- Demographic factors enter the equation as indicator variables for Women, Asian, and Underrepresented Minorities (URM).
- Experience variables include Years Since Degree, Years of Service, and Decade of Hire.

Years Since Degree is the number of years passed from the year the highest degree was earned to the present. Years of Service is the number of years passed since the individual became a Ladder Rank faculty member. Decade of Hire consists of four binary categorical variables to account for the decade the individual became senate faculty: 2007 to 2016, 1997 to 2006, 1987 to 1996, or prior to 1996.

- Discipline is accounted for by adding an indicator variable for each school. The discipline variable accounts for internal demand and a market ratio derived using AAUDE salary data for UCl's peer institutions is used to account for external demand by field.
- Rank includes Current Rank and Step, Initial Rank and Step at time of hire, and Progress Rate as predictor variables.

Progress Rate measures number of years the faculty member is ahead or behind normal progression through the ranks. Normative time to achieve each rank is determined by computing the number of years it would take to move from the initial rank to the current rank and step, if the individual is progressing at the university's established normal rate. If an individual was promoted to their specific rank/step in the normative time, then rate of progression is 0 . If they took longer than normative time, rate of progression is expressed as a negative number (years). If they took less than normative time then rate of progression is expressed as a positive number (years). Appendix shows normative time table and sample calculations.

In order to evaluate whether biases exist within progression through the ranks, several box and scatter plots by gender, ethnicity, rank, and school were generated to visualize and investigate the data. Progression rate differences by demographic groups were also tested with t-tests, ANOVA, and Bonferroni statistical methods. Lastly, a series of regression models were run to quantify progression rate differences that may exist by gender or ethnicity.

There is a possibility that one or more of the explanatory factors in the salary regression models are correlated; we therefore evaluated the effect of multicollinearity in our models. For the whole campus data there was little evidence of collinearity and therefore all variables were included in the regression equations. However, in a small number of Schools/units there was evidence of collinearity and in those cases data is presented with and without removal of one or more of the variables from the regression analysis.

## Results for Salary Data (October 31, 2016)

Campus level

1. Salary data for all ladder rank faculty plotted as a function of rank/step/gender and rank/step/ethnicity are illustrated in Graphs 1 and 2.

Graph 1: General Campus, Salary by Rank/Step and Gender


Graph 2: General Campus, Salary by Rank/Step and Ethnicity

2. Multiple linear regression analysis: When these data are evaluated with the simplest model that includes only demographic variables the result indicate that women earn salaries that are $12 \%$ lower, compared to their colleagues who are white and male, but only $4 \%$ of the salary variation is explained by the model (Table 1-GC). As additional explanatory variables are added to the model, the percent of salary variation explained by the model increases to $91 \%$; and salary differences diminish to less than $1 \%$ between women, Asian, and URMs compared to white men. This indicates that at the campus level, there is little evidence of salary inequity associated with gender and/or ethnicity.

Table 1-GC.

|  |  | Salary Difference |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  |  | Significant | Women <br> vs <br> White | Asian vs <br> White |  |
| Submodel |  |  |  |  |  |

*p<0.05, **p<0.01, ${ }^{* * *}$ p<0.001
${ }^{1}$ Experience includes years of services, years since degree, decade of hire. Field includes department and the market ratio of salaries tied to the faculty member's department. Rank includes their starting rank at UCI, their current rank at UCI, and where they stand in relation to normal progress.
${ }^{2}$ Final model corrected for collinearity.
3. Rank/Step Distribution Analysis: When controlling for rank and step, regression analyses show salaries are similar by demographic variables at the time of hire as well. The distribution of faculty among ranks both currently and at time of hire is displayed in Table 2-GC and Table 3-GC. The tables reveal women and minorities predominately begin in the lower ranks while the ranks in which white men begin is more evenly dispersed. The current rank for white men is also normally distributed while the distribution for others are skewed to the right.

Table 2-GC. White Men vs. Women Faculty

| All Faculty |  | Current Salary |  |  |  | CPI Initial Salary |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | N | \% | Mean | StolErr | N | \% | Mean | StdErr |
| I. Asst Prof, all Steps | White/Unk Men | 54 | 38\% | \$96,081 | \$3,857 | 307 | 53\% | \$78,963 | \$1,055 |
|  | Women | 88 | 62\% | \$98,595 | \$3,608 | 267 | 47\% | \$80,453 | \$1,466 |
| II. Assoc Prof, all Steps | White/Unk Men | 89 | 44\% | \$112,902 | \$2,721 | 55 | 53\% | \$100,250 | \$3,608 |
|  | Women | 114 | 56\% | \$107,414 | \$2,044 | 48 | 47\% | \$99,327 | \$3,664 |
| III. Full Prof, Steps 1-5 | White/Unk Men | 154 | 61\% | \$135,910 | \$2,534 | 52 | 59\% | \$148,198 | \$6,409 |
|  | Women | 98 | 39\% | \$138,989 | \$3,457 | 36 | 41\% | \$139,507 | \$5,863 |
| IV. Full Prof, Steps 6-9 and Above Scale | White/Unk Men | 168 | 72\% | \$200,870 | \$3,638 | 51 | 77\% | \$208,810 | \$6,712 |
|  | Women | 66 | 28\% | \$191,805 | \$5,400 | 15 | 23\% | \$208,397 | \$12,928 |

Table 3-GC. White Men vs. Asian and URM Faculty

| All Faculty |  | Current Salary |  |  |  | CPI Initial Salary |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | N | \% | Mean | StdErr | N | \% | Mean | StdErr |
| I. Asst Prof, all Steps | White/Unk Men | 54 | 43\% | \$96,081 | \$3,857 | 307 | 58\% | \$78,963 | \$1,055 |
|  | Asian | 46 | 37\% | \$108,174 | \$5,375 | 150 | 28\% | \$87,094 | \$2,216 |
|  | URM | 26 | 21\% | \$91,981 | \$4,936 | 71 | 13\% | \$78,815 | \$2,275 |
| II. Assoc Prof, all Steps | White/Unk Men | 89 | 53\% | \$112,902 | \$2,721 | 55 | 65\% | \$100,250 | \$3,608 |
|  | Asian | 49 | 29\% | \$111,512 | \$3,938 | 21 | 25\% | \$107,774 | \$7,005 |
|  | URM | 29 | 17\% | \$109,234 | \$3,287 | 9 | 11\% | \$101,814 | \$8,362 |
| III. Full Prof, Steps 1-5 | White/Unk Men | 154 | 64\% | \$135,910 | \$2,534 | 52 | 65\% | \$148,198 | \$6,409 |
|  | Asian | 64 | 26\% | \$141,206 | \$4,931 | 17 | 21\% | \$134,675 | \$8,686 |
|  | URM | 24 | 10\% | \$149,142 | \$9,082 | 11 | 14\% | \$174,572 | \$8,007 |
| IV. Full Prof, Steps 6-9 and Above Scale | White/Unk Men | 168 | 76\% | \$200,870 | \$3,638 | 51 | 81\% | \$208,810 | \$6,712 |
|  | Asian | 37 | 17\% | \$188,370 | \$6,951 | 8 | 13\% | \$198,370 | \$16,167 |
|  | URM | 16 | 7\% | \$196,306 | \$11,403 | 4 | 6\% | \$206,455 | \$32,559 |

4. Progress Rate Graphs: By Gender and Ethnicity

Graph 3: General Campus, Salary by Progress and Gender


5. Progress Rate Analysis: Using a simple $t$-test, the progression rate for women is 0.55 years slower than white men ( 0.25 vs. 0.80 , respectively; $t(824)=-1.99, p=0.047$ using Satterthwaite variance estimator due to a lack of homogeneity of variance). Whereas URM and Asian faculty also progressed at a rate slower than white men ( 0.12 and 0.43 vs. 0.80 , respectively), these differences was not statistically significant (URM vs white male $t(558)=$ $-1.35, p=0.179$; Asian vs. white male $t(659)=-1.01, p=0.311$ ). Using multivariate regression in order to statistically adjust for experience, discipline, and initial rank, the rates of progression of female, URM, and Asian faculty were not significantly different than white male faculty (all $p$ 's $>0.05$ ).

Progress Rate (in years) Comparison

|  | $n$ | Mean | t | df | p-value |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Comparison | 465 | 0.80 |  |  |  |
| White Male vs | 366 | 0.25 | -1.99 | 824 | 0.047 |
| Women $^{\text {a }}$ | 95 | 0.12 | -1.35 | 558 | 0.179 |
| URM | 196 | 0.43 | -1.01 | 659 | 0.311 |
| Asian |  |  |  |  |  |

${ }^{a}$ Homogeneity of variance assumption not met. Satterthwaite variance estimator used.

Note. Multivariate regression was conducted estimating rates of progression adjusting for experience, discipline, and initial rank. These analyses showed no significant differences between White men and Women, URM, or Asian faculty.

## School Level

Analyses at the school level yield a range of results. When controlling for experience, department within the school, and rank, salary differences are, for the most part, similar to that of the campus as a whole, but there are exceptions. Some units show statistically significant lower salaries for women and minority groups while the opposite holds true in other units. Known limitations to the current analysis are that data on "Stop the Clock" was not readily available nor was there enough data to consistently address the impact of outside offers.

## Summary

In summary, we found no evidence for systemic inequity in salary associated with gender and/or ethnicity among faculty at the campus level. Although, overall progression rates are similar for all faculty, there were outliers and evidence to suggest that groups of faculty in specific academic units may benefit from intervention to help them progress through the ranks and steps.

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## Appendix

## PROGRESSION THROUGH THE RANKS

Normal time (in years) it takes to achieve rank/step


EXAMPLES:

Professor A: Normal Progression
Initial Rank/Step: Assistant Professor III
Current Rank/Step: Professor VI
Years of Service: 25 years
Expected time to get from Asst III to Prof VI: 25 years
Progress Rate: 0 (Normal Progression)

Professor B: Accelerated Progression
Initial Rank/Step: Assistant Professor II
Current Rank/Step: Professor VIII
Years of Service: 26 years
Expected time to get from Asst II to Prof VIII: 33 years Progress Rate: +7 (Accelerated Progression)

Professor C: Slower Progression
Initial Rank/Step: Assistant Professor
Current Rank/Step: Associate Professor IV
Years of Service: 20 years
Expected time to get from Asst I to Assoc IV: 12 years*
Progress Rate: -5 (Accelerated Progression)

## For Professor $C$, why is the progress rate not -8 ?

Because we have to correct for the 3 years that Prof C would have normally gotten to progress to the next step (it should not count against Prof C). Otherwise everyone who is between reviews and progressing normally will look like they are progressing slowly.
*It is not normative for someone who started at Asst I to end up as an Assoc IV. One would expect that this individual would have moved to Full Professor by now, which is why the matrix does not have a year attributed to that cross section. We obtained the expected time from Asst I to Assoc IV by adding 2 years (normal review cycle for Assoc III to Assoc IV) to the expected time from Asst I to Assoc III (10 years).

