FACULTY SALARY INEQUITY, 1992–2010
Rebecca Jean Emigh, Kate Norberg, Vilma Ortiz
March 22, 2016

EXECUTIVE SUMMARY

This report presents the results of an analysis of ladder faculty salary equity at UCLA from 1992–1993 to 2009–2010 using data drawn from the Longitudinal Electronic Academic Database (LEAD) and provided by the UCLA Office of Analysis and Information Management. Unfortunately, as we understand it, the decision was made by the UCLA administration not to continue to update the LEAD database after that date, so we have no way of updating these analyses. We focus on salary inequities in departments because academic evaluations that lead to salary decisions typically originate within them. We assesses two types of salary inequity: 1) *systematic salary inequity*, when faculty of a particular gender and/or ethnic origin have salaries that are on average lower than the salaries of their white male colleagues and 2) *individual salary inequity*, when some faculty of a particular gender and/or ethnic origin category have salaries that are lower than their white male colleagues.

We used a residual analysis to assess these two types of salary inequity in fourteen departments within the College of Letters and Sciences. The analysis provides evidence for either systematic or individual inequities in virtually all of the departments analyzed here. These findings are summarized in Table 1.

The detailed results and methodology are described in the full report presented to Carole Goldberg and Scott Waugh. LEAD data are not confidential, but our methodology reveals a considerable amount of information about individuals. Consequently, we do not present the full results here, but we request that they be made available to departments and individuals upon request. We emphasize that Table 1 only summarizes the results that we can widely distribute because they would not reveal information about individuals; Table 1 does not provide statistical results itself.

The methodology we used has advantages and disadvantages. It is particularly well suited to examine these two forms of salary inequity and can be used with a relatively small number of cases, as is typical of departments. Nevertheless, this methodology cannot be used with the very small departments in Letters and Sciences. In addition, of course, our analyses do not capture other forms of departmental inequity. Finally, we note that individual salary inequity, in contrast to systematic salary inequity, can stem from differences in faculty productivity, so remedies for individuals would be predicated on a qualitative review of their personnel cases.

FACULTY SALARY INEQUITY, 1992–2010

The 2003 Gender Equity Report recommended, as a first priority, a study of equity issues in faculty advancement at UCLA using data contained in the Longitudinal Electronic Academic Database (LEAD). In 2012, the UCLA Office of Analysis and Information Management provided the authors with data from LEAD on faculty advancement for the academic years 1992–1993 through 2012–2013 that included salary, rank and step, date of degree, date of hire, and type of degree. We checked the variables for systematic errors and outliers. There was little evidence of either type of error. We then reformatted them into person-year cases. A small sample of employee cases was compared to the records maintained by the Academic Personnel Office to check the reformatting procedure. When we inspected the data for 2004–2005, it was obvious to us that the data for this year were missing a large number of faculty, so we dropped it from the final tables. The data for the last few years were also clearly incomplete, so we did not analyze the years after 2009–2010. There was no way to check whether there were mistakes in individual cases or other types of errors or to estimate an error rate. To the best of our knowledge, the UCLA administrators made the decision to discontinue the LEAD database, and thus, we cannot analyze data after the 2012–2013. This was a very unfortunate decision, as there is now no systematic way to analyze longitudinal salary data.

The data were analyzed using a residual analysis procedure based on the AAUP/UC Irvine Model but applied to individual departments rather than larger academic divisions. We used this analysis to examine differences in salaries by gender and ethnic origin[1] in fourteen departments of the College of Letters and Sciences. The AAUP/UC Irvine Model starts from the premise that if advancement through the ranks and the assignment of salaries were fair overall, men and women would move through the ladder ranks at about the same average rate and have about the same average salary. Likewise, white faculty and faculty of color would move in parallel trajectories. Thus, the models look at overall differences between 1) men and women and 2) white faculty and faculty of color as evidence of inequity. To examine systematic inequity, these models do not need additional variables or measures of productivity. Instead, these models use only a few variables to focus on these aggregate differences by gender and ethnicity. They are unlike conventional regression analyses in which numerous variables are added to the models that attempt to capture all of the factors that might explain advancement and salaries for individuals (e.g., academic productivity, quality of work, recognition). Conventional regression models are useful when extensive data are available to search for causal explanations of outcomes. Such data are not available for UCLA. UCLA's data collection has been notably deficient, both with respect to its own recommendations and in comparison to other universities (e.g., UC Irvine). The data collection recommended by the UCLA Gender Equity Reports, for

---

[1] This report uses the term "ethnic origin" since this is the language used by the university in data collection. The Technical Report provides details on the actual ethnic origin categories used by the university, which differ from those used in the final analysis.

example, has not been implemented. However, the models used here do not necessarily explain an individual's salary, which depends on many factors not captured by these data. These analyses point to individuals that may be underpaid, but an examination of their personnel cases would be necessary to determine whether their salaries should be adjusted. Furthermore, like all analyses based on data analytic techniques, some of the results are artifacts of the technique. Thus, the models cannot be used directly to determine an individual's salary.

Thus, this technique permits a broad assessment of two types of inequities by gender and ethnic origin: 1) *systematic salary inequity*, when faculty of a particular gender and/or ethnic origin have salaries that are on average lower than their white male colleagues and 2) *individual salary inequity*, when individual faculty of a particular gender and/or ethnic origin category have salaries that are lower than their white male colleagues. These models are useful for analyzing small populations (such as departments) for which standard statistical significance tests are technically inappropriate. Residual models provide intuitive easily interpretable results given in dollars that do not rely on significance testing.

In the first step of the residual analysis, a multivariate regression analysis was performed with salary as the dependent variable, and with year of degree and year of hire as the independent variables, for white men only. The coefficients from this model were then used to calculate predicted salaries for each employee using the employee's recorded values for year of degree and year of hire. Finally, the predicted salary for each employee was subtracted from the actual salary to create salary residuals. These models, and the residuals they created, are calculated separately for each department in each year between 1992–1993 and 2009–2010. The residuals are summarized by gender and ethnic origin category for each department-year, both by calculating the average salary residuals and reporting the percentage of the employees within each gender or ethnic origin category with a negative salary residual. The average salary residual for each gender and ethnic origin category can then be compared with the variation in white men's salaries (expressed by the mean standard errors of the residuals for white men's salaries) to assess the extent of systematic salary inequity. The percentage of employees with a large negative salary residual, on the other hand, can be used to identify potential patterns in low, outlying salaries, and thus to assess the extent of individual salary inequity.

Analyses were restricted to academic units in the College of Letters and Sciences with enough white male person-year cases to generate a linear model regressing salary on year of degree and year of hire. Units were included in the analysis if they had employed at least 15 white male tenure-track faculty members for 5 or more consecutive years. Fourteen departments (Computer Science, Electrical Engineering, Mechanical and Aerospace Engineering, English, Ecology and Evolutionary Biology, Psychology, Chemistry and Biochemistry, Earth and Space Sciences, Physics and Astronomy, Mathematics, Economics, History, Political Science, and Sociology) met these criteria.

The residual analysis was conducted by using the regression equation for men of white ethnic origin to predict salaries for faculty in five, nonmutually exclusive categories:

1) men of Pakistani, East Indian, and/or East Asian ethnic origin
2) men of black, Latino, Chicano, Filipino, American Indian, and/or other Asian ethnic origin
3) women of any ethnic origin
4) women of Pakistani, East Indian, and/or East Asian ethnic origin
5) women of black, Latino, Chicano, Filipino, American Indian, and/or other Asian ethnic origin

To assess *systematic salary inequity*, we examine the salary residuals. The salary residuals are expressed in dollar amounts, so they can be interpreted as the average amount a group is under- or overpaid relative to white men in their department (accounting for similar amounts of experience: years since Ph.D. and years at UCLA). To judge their relative size, the salary residual can be compared with the size of the mean standard error of the residuals for the model for white men. For example, when the salary residual for a particular group reaches or surpasses the mean standard error, the difference is large. The proportion of the variance explained by the regression model gives the overall assessment of the fit of the regression model, that is, it explains whether white men in the department move through the ladder steps in an orderly progression based on number of years in the department. We also give the percentage of faculty with negative salary residuals. A percentage larger than 50% suggests a pattern of underpayment. 50% can be used as a rough guideline because of the statistical procedure: in the baseline men's model, 50% of the men will fall above and below the average salary. Thus, a percentage larger than 50 suggests that more individuals are being underpaid than expected on the basis of the statistical model. To assess *individual salary inequity*, we give the percentage of individuals with large negative salary residuals (outliers, whose negative salary residual is larger than the mean standard error of the residuals for the white men) who are highly underpaid relative to white men.

The detailed tables and narrative reports describe the results of this residual analysis for each department analyzed by each of the gender and ethnic origin categories used. Table 1 provides a broad, nonstatistical and nonnumerical summary assessment of the evidence of both forms of inequity, stating whether the analysis provides little, possible, some, or strong indication of systematic salary inequity and whether the analysis provides little, possible, some, or strong indication of individual inequity. In the summary table, we used the following guidelines to classify the departments. We categorized systematic inequity as "little" when the residuals are positive or low in comparison to the mean standard error of the white men's salaries. We categorized systematic inequity as "possible" when at least one of the residuals approaches the mean standard error of the white men's salaries in at least one of the years but never exceeds it. We categorized systematic inequity as "some" when the residuals are negative and approach the

mean standard error of the white men's salaries in at least one of the years. We categorized systematic inequity as "strong" when the residual approach or exceed the mean standard error of the white men's salaries in many of the years. Similarly, we categorized individual inequity as "little" when none of the minorities or women has a large negative salary residual, "possible" when at least one of the women or minorities has a salary residual that was large but does not exceed the mean standard error of the white men's salary residual, "some" when at least one of the minorities or women has a large negative salary residual in at least one of the years, and "strong" when many of them do in numerous years. In a few instances, when the residuals were large and when they very close to, but did not actually exceed, the mean standard error of the white men's salaries, we also suggested that this pattern indicated salary inequity as explained in the full report in more detail. We note that departments commonly exhibit individual-level salary inequity. This may be from discriminatory causes, but this is not necessarily so. The personnel cases of these faculty should be examined carefully to determine if an advancement or salary adjustment is needed. It is less common for departments to exhibit systematic inequity. In these instances, the entire department's cases should be reviewed. In some departments, especially for the underrepresented minority faculty, the line between individual and systematic inequity may be difficult to discern because of the small number of faculty.

In some departments, there were very few women and minority faculty. The small number of these faculty preclude the application of this sort of analysis we use here; the underrepresentation statistics calculated by the Office of Faculty Diversity and Development could be used to determine whether these faculty are underrepresented in their department.

Table 1: Summary of Indicators of Salary Inequity by Race and Ethnic Origin for All Departments

Department (by Division)	Male — Pakistani, East Indian, and East Asian		Male — Black, Latino, Chicano, Filipino, American Indian, and Other Asian		Female — All Ethnic Origins		Female — Pakistani, East Indian, and East Asian		Female — Black, Latino, Chicano, Filipino, American Indian, and Other Asian	
	Systematic Salary Inequity (large mean salary residuals)	Individual Salary Inequity (many negative salary residuals)	Systematic Salary Inequity (large mean salary residuals)	Individual Salary Inequity (many negative salary residuals)	Systematic Salary Inequity (large mean salary residuals)	Individual Salary Inequity (many negative salary residuals)	Systematic Salary Inequity (large mean salary residuals)	Individual Salary Inequity (many negative salary residuals)	Systematic Salary Inequity (large mean salary residuals)	Individual Salary Inequity (many negative salary residuals)
Engineering										
Computer Science	little	little	some	some	some	some	n/a	little	n/a	n/a
Electrical Engineering	little	some	some	some	little	little	n/a	little	n/a	little
Mechanical & Aerospace Engineering	little	some	little	little	possible	possible	n/a	n/a	n/a	n/a
Physical Sciences										
Chemistry and Biochemistry	little	some	little	some	little	some	little	little	n/a	some
Earth and Space Sciences	n/a	little	n/a	n/a	some	some	n/a	little	n/a	n/a
Mathematics	little	some	little	little	little	some	little	little	n/a	possible
Physics and Astronomy	some	some	n/a	little	little	some	n/a	n/a	n/a	some
Life Sciences										
Ecology and Evolutionary Biology	little	little	some	some	little	some	n/a	some	n/a	some
Psychology	possible	possible	possible	some	little	some	little	some	little	little
Social Sciences										
Economics	strong	strong	little	some	little	some	n/a	little	little	little
History	little	little	some	some	little	strong	some	some	little	some
Political Science	some	some	some	some	some	some	n/a	n/a	n/a	some
Sociology	n/a	n/a	little	some	some	strong	possible	some	possible	some
Humanities										
English	possible	some	possible	some	little	some	possible	little	little	some