

REPORT ON THE UC BERKELEY FACULTY SALARY EQUITY STUDY

OFFICE OF THE VICE PROVOST FOR THE FACULTY

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1. Executive summary

This report focuses on the salaries of ladder faculty at Berkeley, with particular attention to equity by gender and ethnicity. A joint Senate-Administration steering committee has overseen both the preparation of this report and the design of the underlying study.

The study draws on a rich campus dataset that allows investigation of information concerning salary, gender, and ethnicity, while controlling for other important factors, including career experience, field, and rank. The main analysis focuses on two key submodels: one that includes controls for experience, field, and rank, and a second that includes controls for experience and field but excludes rank. (Both of these submodels are presented because there is some debate about which is preferable.)

At the campus level, these two submodels suggest that women and members of ethnic minority groups earn somewhat lower salaries on average than male non-minority faculty members. For women relative to white men, the two submodels yield differences of -1.8% (including controls for rank) and -4.3% (excluding controls for rank); for minority groups relative to white men, the two submodels show differences that range from -1.0% to -1.8%.

It may be helpful to express these differences in relation to the rate of annual growth in earnings experienced by a typical faculty member. Interpreted in this way, the average salary difference between white men and female faculty members is equivalent to about 1 to 4 years of career experience, and the difference between white men and minority faculty members is equivalent to about 1 to 2 years of career experience.

Results at the levels of schools, divisions, and colleges are variable. Some of these units show larger negative differences for women and ethnic minority-group members than those for the campus as a whole; some show smaller negative differences; and some show positive differences. Several sub-studies focus on areas of special interest to the steering committee: rank and time in rank; the significance of citation data; and the impact of retention.

By their nature, the kinds of statistical studies of salary undertaken here are not able to determine the underlying causes of the differences they identify. Section 4 of the report provides an interpretative discussion of a range of possible contributing factors, including aspects of time in rank; implicit association (unconscious bias) in the review process; citation indices as assessments of research impact; social factors bearing upon access to academic opportunities; and external academic factors, including market factors and retention.

Although the study cannot identify the causes for the salary differences it identifies, the steering committee believes that the study's findings, together with the interpretative discussion in this report, provide a solid basis for making a number of recommendations. Some

recommendations concern additional studies that the campus should conduct in the future, including annual updates of this study. Others stress the need for enhanced attention to issues of climate, work/life balance, and the fair distribution of opportunities and responsibilities. The steering committee also recommends programs of salary review and salary increases that, while open to all faculty members, would provide the campus with additional opportunities to meet its broadest equity ideals.

The steering committee urges in the strongest terms that this study not be put on the shelf. It should mark the beginning of a new era of thoughtful engagement with issues of faculty salary equity at Berkeley, and it should serve as a basis for fostering sustained and collective discussion and action.

2. Background

This section provides a history of this study and a discussion of current faculty salary policies and programs. It then turns to ideals of salary equity at Berkeley and their evolution over time.

2A: History of this study

Several studies of faculty salaries at Berkeley were carried out by faculty members in the 1980s and 1990s. A campus faculty climate survey released in the spring of 2011, along with concerns about gender equity expressed by some groups of faculty, prompted interest in undertaking a new salary equity study. Campus action was put on hold, however, in light of work being carried out at the system-wide level of the University of California.

In September 2011, the University of California completed a system-wide study of salary equity, with attention to gender and ethnicity. The study was transmitted to the campuses and the Senate divisions for review and response, and two outside consultants were also invited to review the study and provide comments. The study had been commissioned by the UC Senate's Academic Council, at the request of the system-wide Senate committee on Affirmative Action and Diversity (UCAAD), and it was intended to serve as the basis for any corrective actions that might be called for on the campuses.

In January 2012, after reviewing responses from the campuses and the outside consultants, President Mark Yudof wrote to the Academic Council that the UCAAD report "provides insufficient basis for specific corrective action." In July 2012, the Academic Council recommended to President Yudof that he ask each campus perform its own study; in September 2012, President Yudof directed the campuses to develop plans for salary studies and to submit them to the UC Office of the President for review and approval. In May 2013, the Academic Council completed its review of the campus plans and provided its comments to President Yudof.

Berkeley's plan for an equity study was developed through consultation between the Administration and the Senate's committees on the Status of Women and Ethnic Minorities (now Diversity, Equity, and Campus Climate) and Budget and Interdepartmental Relations. It was approved by UC Provost Aimée Dorr in August of 2013.

As announced in an email to Berkeley's ladder faculty in September of 2013, a joint Administration/Senate steering committee was formed. It has this membership:

- Professor Gibor Basri (Astronomy), Vice Chancellor for Equity and Inclusion,
- Professor Janet Broughton (Philosophy), Vice Provost for the Faculty,

- Professor David Card (Economics),
- Professor Jose Carmena (EECS and HWNI), for the Senate’s Committee Diversity, Equity, and Campus Climate,
- Dr. Marc Goulden, Director of Data Initiatives for the Office of the Vice Provost for the Faculty,
- Professor Jennifer Johnson-Hanks (Demography and Sociology),
- Professor Marjorie Shapiro (Physics), for the Senate’s Committee on Budget and Interdepartmental Relations,
- Professor Angelica Stacy (Chemistry), Associate Vice Provost for the Faculty.

The steering committee provided an interim report on its progress through an email sent to ladder faculty in September of 2014. A Q&A page was posted subsequently and updated at intervals.

Each campus has used its own datasets and preferred methodology. Berkeley’s methodology and datasets are described in section 3 below and more fully in Appendices A and B.

2B: Current salary components, policies, and programs at Berkeley

To provide background that may be useful, we offer here a brief discussion of current approaches to faculty salary determination at Berkeley and some of the ways in which these approaches have changed over time.

We note that salary decisions are to be made in accordance with the policies set forth in the UC’s Academic Personnel Manual and in accordance with campus policies. Cases for salary increases for Berkeley faculty provide opportunities to the candidate to contribute information and perspective. Recommendations concerning salaries are made by department chairs and cognizant deans; salary decisions are made by central academic administrators with the advice of the Academic Senate’s Committee on Budget and Interdepartmental Relations (the “Budget Committee”).

Components of salary. The salaries of all faculty members except for those in Above Scale status include a rank/step scale component that is determined by the relevant UC pay scale approved each year by the UC President. The salaries of many faculty members also include an off-scale, or “decoupled,” component.¹ Other forms of compensation (e.g., stipends or summer salary) are not considered here.

¹ Through 2007-08, Berkeley used the expression “off-scale” to indicate salaries that were higher than the rank/step salary indicated by the UC scale but below the rank/step salary for the next highest step. Salaries higher than the next highest step were called “decoupled.” In this sense of “decoupling,” the practice of decoupling started in 1990. Starting in 2007, the campus began to use a modified Berkeley scale that indicated half steps and “shadow” steps above Assistant Professor, Step VI, and Associate Professor, Step V. At that time, the term

Salary setting at recruitment. Berkeley currently sets salaries at the time of recruitment in light of the following data-points: current academic salary elsewhere or competing offers in hand, if any; the median salary for Berkeley faculty in the same discipline at the same career-stage, if any; and data for the appropriate rank and discipline as provided through the American Association of Universities Data Exchange (AAUDE).²

Salary increases. Salaries may be increased in several ways:

- Advancement in rank/step results in an increase to the scale component of salary in accordance with the salary scales.³ (At Berkeley, Above Scale faculty members receive a fixed dollar increase to their salaries when they are advanced.) Rank/step advancement occurs after a multi-layered merit or promotion review has been carried out. Merit reviews normally occur every two years for early-career faculty, then every three years, with the interval increasing to four years for faculty being advanced to, or within, Above Scale status.
- Range adjustments are increases in the salaries associated with each step on the rank/step scales.⁴ The funding is provided by the campus, but authority to make range adjustments lies with the UC President.
- Provision of, or increases to, decoupling may be provided through a campus program (see below) or through a response to an outside offer.

Campus salary programs. In recent years, the campus has used three programs that can result in salary increases:

- *Salary adjustment at promotion to tenure.* At the time of tenure, faculty members' salaries are compared to data for their field, and upward adjustments are made as needed.

“decoupled” began to be used for all salaries greater than the relevant rank/step, where the relevant rank/step includes the half steps and shadow steps used on the Berkeley scale.

² From the AAUDE web site: “The Association of American Universities Data Exchange (AAUDE) is a public service organization whose purpose is to improve the quality and usability of information about higher education. Our membership is comprised of AAU institutions that support this purpose and participate in the exchange of data/information to support decision-making at their institution.” Through its participation in AAUDE, Berkeley is able to obtain salary information by academic unit and rank for comparable public and private institutions identified by Berkeley’s deans as our peers. Our receipt of the data is subject to rules of confidentiality.

³ Note that there are separate scales for Law and for Business/Engineering/Economics.

⁴ In some recent years, the President has mandated increases on decoupled increments as well as rank/step salary.

- *Targeted Decoupling Initiative (TDI)*. The most recent iteration of this program added a total of about \$1.5 million to the annual faculty payroll in order to address problems of inversion⁵ and of the “loyalty penalty.”⁶ The most recent TDI program resulted in salary increases effective July 1, 2012, 2013, or 2014.
- *Career Equity Review*. This is a program intended to address inequities in evaluation that become apparent only over the course of multiple review periods. In some circumstances, its provisions allow for an adjustment in salary.

School salary programs. The Haas School of Business and Berkeley Law use a part of their revenues in order to provide a significant portion of the salaries of their faculty, including increased decoupling at the time of merit advancement. The relevant programs were reviewed and supported by the Senate’s Budget Committee and approved by the Administration.

2C: Ideals of salary equity at Berkeley

Here, we summarize how salary equity ideals for Berkeley faculty have evolved over the past four decades and where campus ideals may now be under the greatest stress. We return to several of these matters in sections 4 (interpretation) and 5 (recommendations).

We preface the historical discussion with a point that is vital to make in the context of this study. As the discussion below emphasizes, Berkeley’s equity ideals have frequently been articulated over the years in terms of such considerations as academic accomplishment, discipline, rank and step, but it is important to emphasize that campus equity ideals also incorporate principles that underlie legal standards of nondiscrimination in employment. State and federal law prohibit both discriminatory “treatment” on the basis of sex or ethnicity and employment practices that have discriminatory or disparate “impact” on one sex or any ethnic group. As these concepts relate to campus-level salary findings, unlawful disparate treatment occurs when there is a pattern or practice of intentionally disadvantaging a particular gender or ethnic group, for example by intentionally compensating their members at a lower rate than comparable members of other groups. Unlawful disparate impact occurs when an employer uses identified employment practices that are neutral on their face but (a) these practices have greater negative effects for one group than another and (b) these practices cannot be justified as significantly serving legitimate goals of the employer.

Through the 1970s. As recently as the 1970s, the UC scales were roughly at national market levels for university professors, and there were few differences in salaries among disciplines. These conditions meant that Berkeley could usually successfully recruit faculty and then

⁵ “Inversion” occurs when faculty at higher ranks/steps have lower salaries than faculty at lower ranks/steps.

⁶ This expression is sometimes used for faculty members whose salaries have not benefited from recent recruitment or retention, especially when they have strong records of research, teaching, and service.

appropriately reward them simply by initially assigning them to, and then advancing them to, a step and rank appropriate to their accomplishments.

In those years, the ideal was that faculty across the campus with similar levels of accomplishment in research, teaching, and service would be at the same rank, step, and salary. Even then, however, salaries within several disciplines nationwide were higher than they were for the rest of the campus. Disciplinary differences for Law were accommodated in 1967 by the creation of a special salary scale.

In this era, then, Berkeley generally aspired to the following ideal:

Faculty members of equal accomplishment should be at the same rank and step and should receive the salary indicated for their rank and step on the appropriate salary scale.

The 1980s and 1990s. In general, the UC scales lagged national markets more and more each year. During the 1980s and 1990s, national salary levels in different disciplines became increasingly different; special salary scales for Business and Engineering were created in 1981. Although we lack the relevant data, there is some reason to believe that the number of Berkeley faculty receiving outside offers increased during this time period.

During these decades, Berkeley tried to cling to the old ideal even as it started using several strategies to cope with changing conditions. For example, the step assigned at appointment might be slightly higher than would have been otherwise warranted in order to achieve a competitive salary at recruitment. “Off-scale” or “decoupled” salaries were offered with increasing frequency in order to succeed in recruitment and retention.⁷

Some of the growing tensions that developed between ideal and practice during these decades were addressed by a modified ideal enunciated by the Budget Committee (BC) early in the 2000s:

Faculty members of equal accomplishment should be at the same rank and step, and faculty within the same discipline at the same rank and step should receive the same salary.

While affirming that rank and step should reflect equal accomplishment across the entire campus faculty population, this ideal accepted the reality of disciplinary market forces and described salary equity in terms relativized to discipline.

⁷ Starting in the 1990s, the off-scale or decoupled increments were “absorbed” in subsequent merit increases in order to preserve internal equity; faculty objected to this practice, however, and it was phased out starting in the early 2000s.

The 2000s and 2010s. As the UC salary scales fell further and further behind national salaries at peer institutions, Berkeley’s ways of setting and raising salaries became more sensitive to data about national salary trends. AAUDE data⁸ enable Berkeley to review salary information for peer public and private universities by department and school, sorted by rank. Berkeley now uses the AAUDE data for peer private universities for several purposes.

The campus uses these AAUDE data, in addition to other information, to help set salaries at the time of recruitment and at the time of promotion to tenure, when a “market adjustment” to the faculty member’s salary may be appropriate.⁹ In addition, the AAUDE data are among the factors that help Berkeley to gauge the appropriate response when other universities attempt to recruit our faculty.

But these recruitment, tenure, and retention measures sometimes produce undesirable differences between the faculty who have benefited from them and those who have not. For example, assistant professors, whose salaries are pegged to the recent market figures for their field, sometimes make more than departmental colleagues at the associate rank (salary inversion), and recruitment salaries or retention increases can produce differences between the salaries of equally accomplished faculty in the same discipline (the “loyalty penalty”).

These developments might be summed up with these further modifications to Berkeley’s ideal:

Faculty members of equal accomplishment should be at the same rank and step; faculty within the same discipline at the same rank and step should receive salaries as similar as possible; and meritorious faculty at higher rungs of the ladder should, as far as possible, have higher salaries than faculty members within their discipline who are at lower rungs.

Constraints. This last set of ideals includes several phrases that call for comment: “as similar as possible” and “as far as possible.”

Within many departments on campus, we can see instances of salary inversion and instances in which faculty at the same rank and step make very different salaries. Why doesn’t Berkeley simply eliminate these undesirable features of our departmental salary structures?

With a much, much larger budget, Berkeley could do this. It could simply raise the salaries of all faculty members at a given rank and step within a particular discipline to match salaries provided in responding to competition in recruitment or retention, and within disciplines we could also raise salaries for faculty at higher ranks and steps in order to eliminate inversion. (In fact, with a truly enormous budget, Berkeley could pay equally accomplished faculty members

⁸ See note 2 above.

⁹ The salaries for all new hires now include a decoupled increment. An early version of the tenure adjustment was introduced in 2006; the current version was introduced in 2008.

in all disciplines at the highest salary levels found in any disciplines.) But such a solution is simply unaffordable for Berkeley; thus one kind of constraint on our policies and practices is budgetary.

A different approach could be to stop using AAUDE data at the time of appointment and tenure and to stop responding to the offers that other institutions make when we are competing against them in recruitment or retention. While this would not immediately put the ideal of the 1980s and 1990s within reach, over time it would bring Berkeley much closer. But as campus survey data suggest,¹⁰ even those who are most troubled by the salary differences introduced by current salary practices in recruitment, tenure, and retention would be reluctant to support this second strategy. It would leave Berkeley unable to recruit as successfully as it has; the campus would lose many valued colleagues to other universities; and other universities would step up their efforts to recruit faculty away from Berkeley. Yet simply ignoring inversions and salary differences is not an option either. Hence “as possible.”

¹⁰ Although 60% of respondents believed that retention practices are unfair, 84% believed they are necessary if Berkeley is to retain excellent faculty members. See 2011 survey, p. 41.

3. The study

This section of the report presents relevant data and the findings of analyses; interpretation and recommendations follow in sections 4 and 5.

A basic presentation of data and methodology in subsection 3A is followed by four subsections discussing data and findings for the campus as a whole. Subsection 3B looks at baseline variables; subsection 3C describes the results of including variables for field and rank; subsection 3D compares the results of three different statistical models employed; subsection 3E explores time-series results; subsection 3F looks at unit-level results; and subsection 3G presents the results of sub-studies concerning citation data, rank, and retention.

Fuller information is available in several appendices. Appendix A describes the study's methodology in greater technical detail; Appendix B provides a detailed description of the variables used in the regression analyses; and Appendix C presents full regression tables for all models, submodels, and sub-studies.

3A: Data and basic methodology

UC Berkeley is fortunate in having complete salary data¹¹ for ladder faculty as well as complete historical data going back to 1979. The present study does not include summer salary, administrative stipends, administrative salary, or other types of supplemental compensation. The study includes all professorial-series faculty (n=1519), with salary data as of December 15, 2014. In the interests of conducting a fully transparent study, no “outlier” salaries were omitted.¹² Some degree data were missing from campus records, but these have all been filled in. Some limited but useful data on faculty members' outside job offers and retentions are tied to these base data, along with [Google Scholar](#) citation data for faculty in a handful of selected departments. For more information about the data for the study, please see Appendix B.

This study uses regression analysis so that it can simultaneously examine the impact of multiple factors on faculty salaries. It employs three different broad classes of regression models: (1) models fit to the logarithms of annual salaries of all faculty members (“log salary models”); (2) models fit to the levels of annual salaries of all faculty members (“total population models”); and (3) models fit to the levels of salaries of white male faculty members only and then extrapolated to minority and female faculty (“white-male models”).¹³ In many of the figures below, results from log salary models are displayed; please note that in general, the log model

¹¹ The data are drawn from the central-campus Human Capital Management system ([HCM](#)). The salary data are annualized at a 1.0 full time equivalency (FTE) rate to make them consistent across the campus, across different salary scales, and among full- and part-time faculty.

¹² In the AAUP-sponsored report by Lois Haignere, “[Paychecks: A Guide to Conducting Salary-Equity Studies for Higher Education Faculty](#),” several methods for dropping outliers are discussed (pp. 95-96), along with the circumstances in which it could be useful to investigate the effects of dropping them.

¹³ These three types of models are recommended by Haignere.

seems to estimate slightly larger negative salary differences for women and minorities than do the other two models.

Within each of the three broad classes of models, a series of submodels was produced by successively introducing controls for demographic factors (gender and ethnicity), professional experience, field, and rank. Time-series analyses enable the study to examine change over time, and both campus-level and unit-level studies allow for additional insight. Finally, case studies explore the relationship of citation counts, rank, and outside job offers with current salary. For a more detailed discussion of methodology, please see Appendix A of this report.

The models used in the main body of this report include indicators for women faculty and for two main groups of minority faculty members: Asians and under-represented minorities (URMs), a group that includes African Americans, Hispanics (of any race), and Native Americans.¹⁴ The structure of these models implies that the salary differential for minority female faculty relative to white men would be the sum of the gender and ethnicity differentials. As discussed in Appendix A, this "additive" assumption appears to be statistically acceptable. We return to this "additive" implication in the recommendations in section 5 below.

Finally, we note that this study differs from the 2011 system-wide study¹⁵ in several ways. Among the most important differences are these:

- All faculty are included, and the degree data used in this study are complete.
- This study uses three broad classes of models instead of a white-male model only.
- Within each broad class of models, this study reports results using four sub-models.
- This study reports estimates both from data for 2014 and from many years of earlier data.
- Detailed investigations at the campus level are carried out in this study.¹⁶
- This study explores the potential role of citations data in explaining salary differences and the effect of pay increases provided in response to outside offers.

3B: Campus level—baseline variables (demography and experience)

The focus of this study is on the variation in faculty salaries by gender and ethnicity.¹⁷ These basic demographic categories are, however, correlated with other factors that can be expected

¹⁴ A small number of faculty (33 males and 13 females) have an unknown ethnicity. Salary differences for these faculty are explored in models presented in Appendix A.

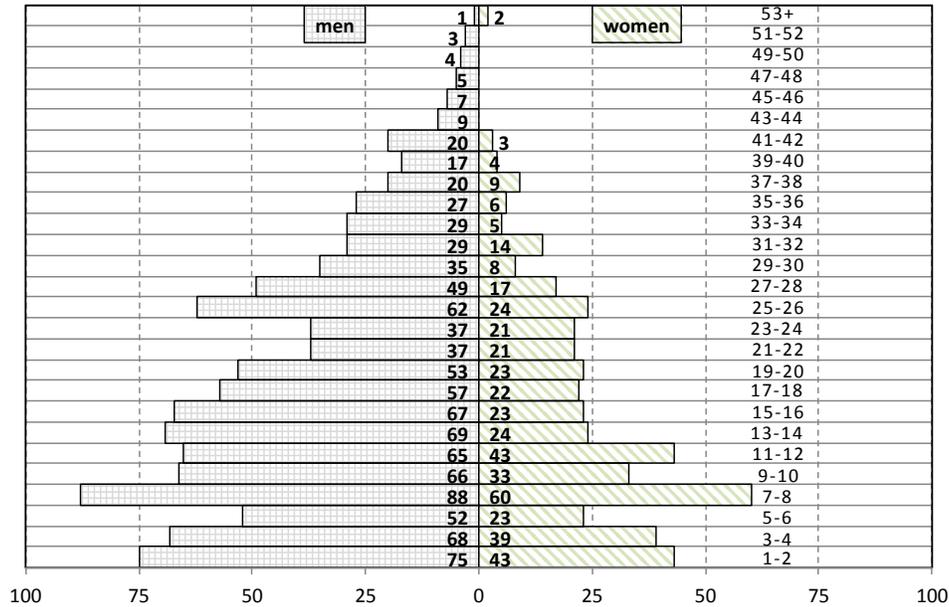
¹⁵ See subsection 2A above and P. Yahr's report, [Analysis of UC Pay Equity by Sex and, Among Men, Ethnicity, 2009-10](#). This 2011 report drew upon payroll extracts and, due to title-code issues, omitted salary data for over 100 Berkeley faculty. It also was unable to access large amounts of degree data.

¹⁶ Like the 2011 study, this one investigates salaries at decanal levels, though only for units of statistically adequate size. Several sub-studies of small units are presented, however; larger units were not selected for these sub-studies because data collection was very labor-intensive.

¹⁷ Campus records concerning gender are complete. Ethnicity information is provided voluntarily by faculty members, and all but 46 faculty members have provided this information. Individuals with unknown ethnicity are treated as a separate group unless there are fewer than 10; in that case, they are grouped with white faculty in the particular regression model. Where possible, analysis is provided separately for Asian and under-represented minority (URM) faculty.

to affect salary. Among these are measures of training and career experience: years since hire, years since highest degree, and degree type. For example, Figure 1A displays how men and women faculty at UCB are distributed by years since hire; figure 1B does the same for ethnicity.

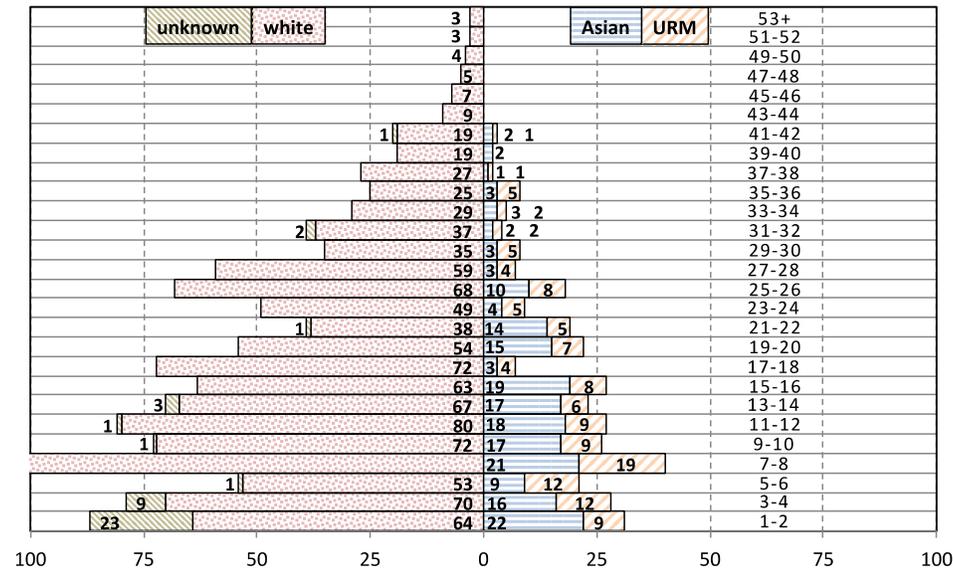
Figure 1A: faculty headcount, by years of service* and gender



Source: UC Berkeley Faculty Personnel Records, 12/15/2014.

*Years of service at Berkeley at end of academic year, calculated based on first year of faculty appointment.

Figure 1B: faculty headcount, by years of service* and ethnicity



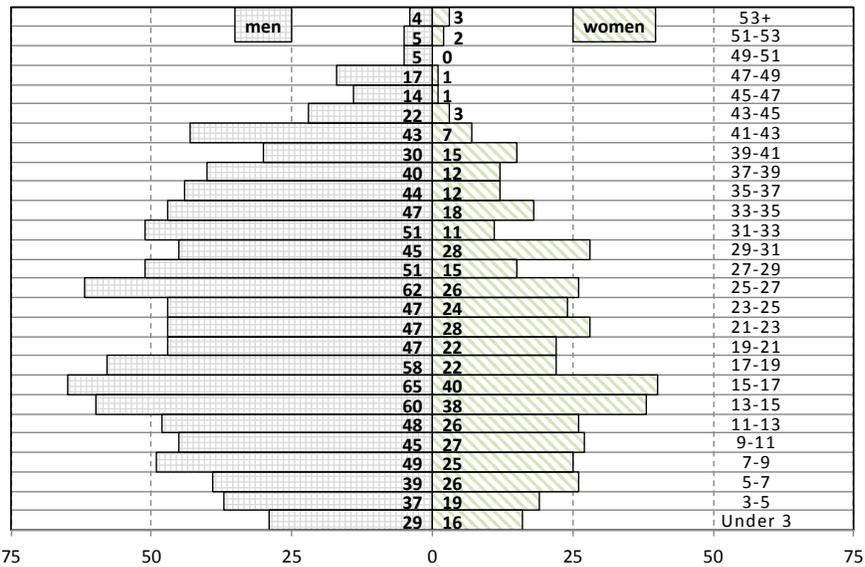
URM includes African Americans, Hispanic, and Native Americans.
Source: UC Berkeley Faculty Personnel Records, 12/15/2014.

*Years of service at Berkeley at end of academic year, calculated based on first year of faculty appointment.

These figures illustrate the fact that male faculty members at Berkeley have substantially higher average years of service than female faculty, and that white faculty have substantially higher average years of service than Asian and URM (under-represented minority) faculty. This reflects the fact that over time, Berkeley has increased the proportions of women, Asian, and URM faculty among those it hires.

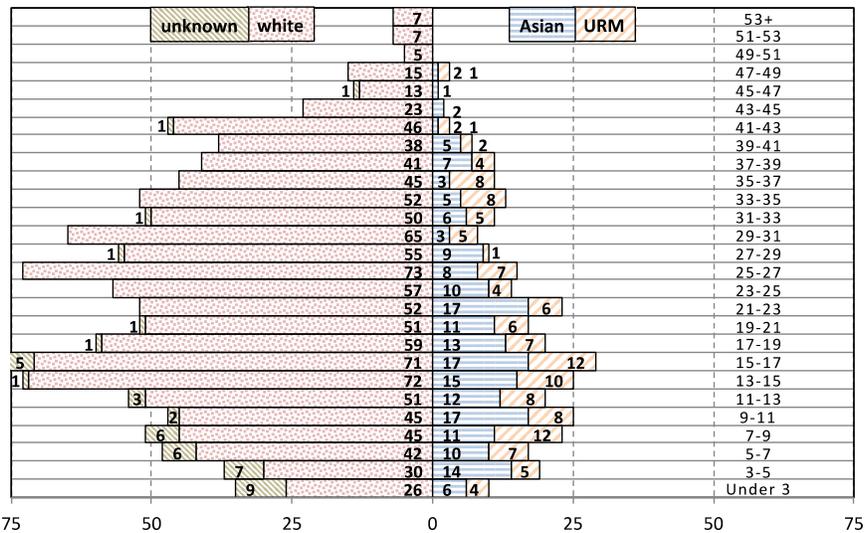
Figures 1C and 1D look at years since highest degree; again we see that the proportional representation of women and ethnic minority faculty is higher in the more junior cohorts.

Figure 1C: faculty headcount, by years since highest degree and gender



Source: UC Berkeley Faculty Personnel Records, 12/15/2014.

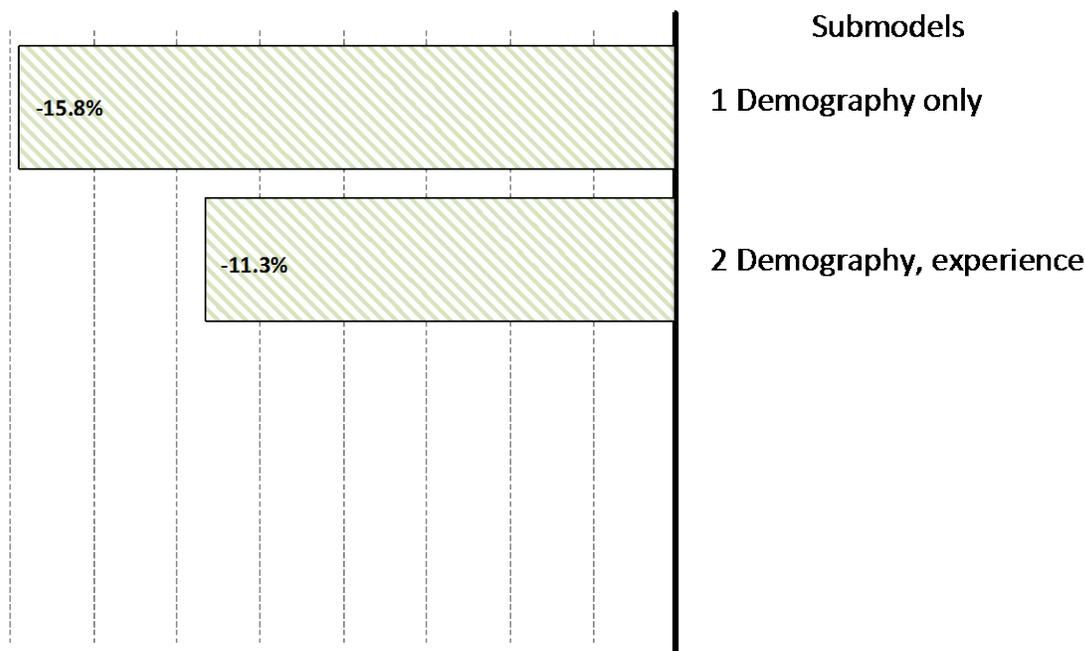
Figure 1D: faculty headcount, by years since highest degree and ethnicity



URM includes African Americans, Hispanic, and Native Americans.
Source: UC Berkeley Faculty Personnel Records, 12/15/2014.

Because academic salaries are on average higher for those with more professional experience (years of service and years since highest degree), it is not surprising to find that regression analyses taking experience into account reduce the salary differences that are found when considering demography alone. Figure 2 shows this reduction in the case of women:

**Figure 2: women vs. white men
log salary submodels 1, 2**



Tot. N=1519; White Male N=801; Female N=467; Minority Male N=218; Unknown Male=33. Asian N=204; URM N=133.

Source: UCB Faculty Personnel Records, 12/15/2014.

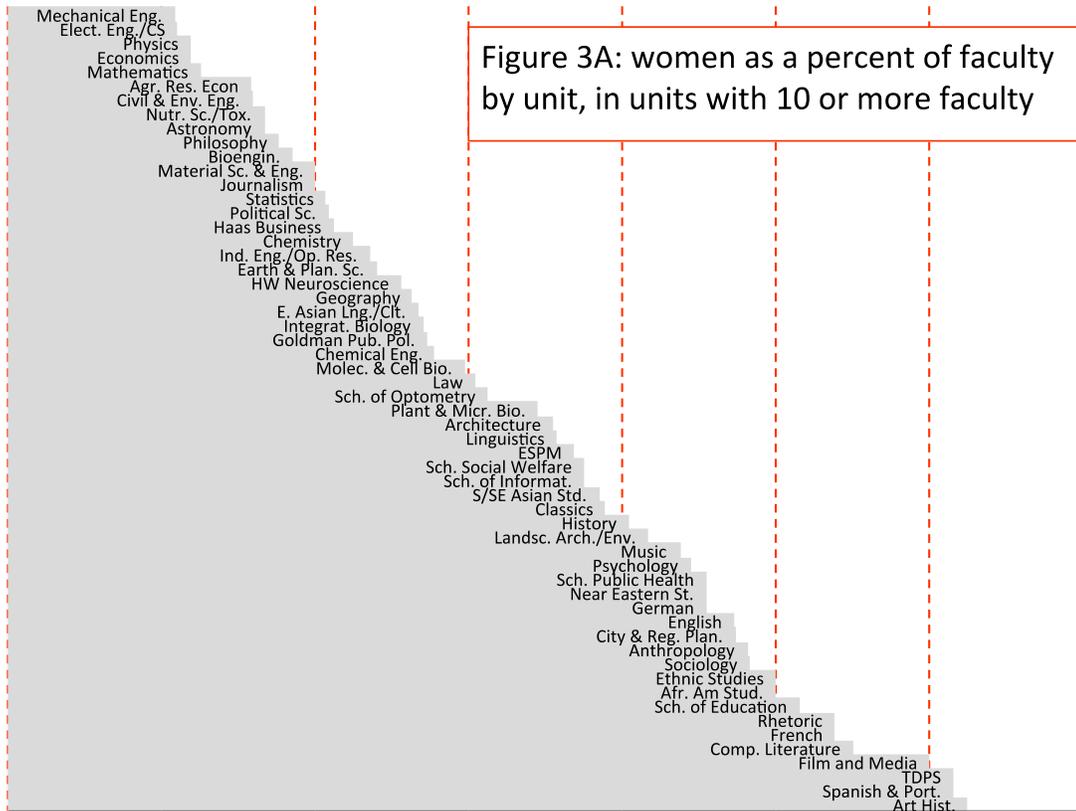
1 Women, Asian, URM (African American, Hispanic, Native American), Unk. Eth.
2 Years since degree & hire; years since degree squared (curvilinear); degree type.

Figure 2 shows the impact of experience on observed salary differences by gender using the log salary model. Submodel 1 includes demography only; Submodel 2 includes demography and experience. When demography alone is considered, women relative to white men have a negative salary difference of -15.8%. Once experience is taken into account, the negative difference is reduced to -11.3%. The reduction is unsurprising in light of two facts: faculty members with more experience can generally be expected to earn more than those with less experience, and current campus subpopulations reflect earlier years in which the proportion of women being hired was smaller than it is now. (For minority faculty, see Figures 4B and 4C below.)

While these submodels serve as a baseline for this study, they do not by themselves provide an adequate analysis of salaries by gender and ethnicity. The reason is that they do not take into account additional variables that can generally be expected to be associated with salary levels. We turn to those variables now.

3C: Campus level—variables for field and rank

Demographic patterns vary considerably by field. As Figure 3A shows, although women comprise 31% of the total Berkeley faculty, they comprise just over 10% of faculty in some departments and over 60% in others.

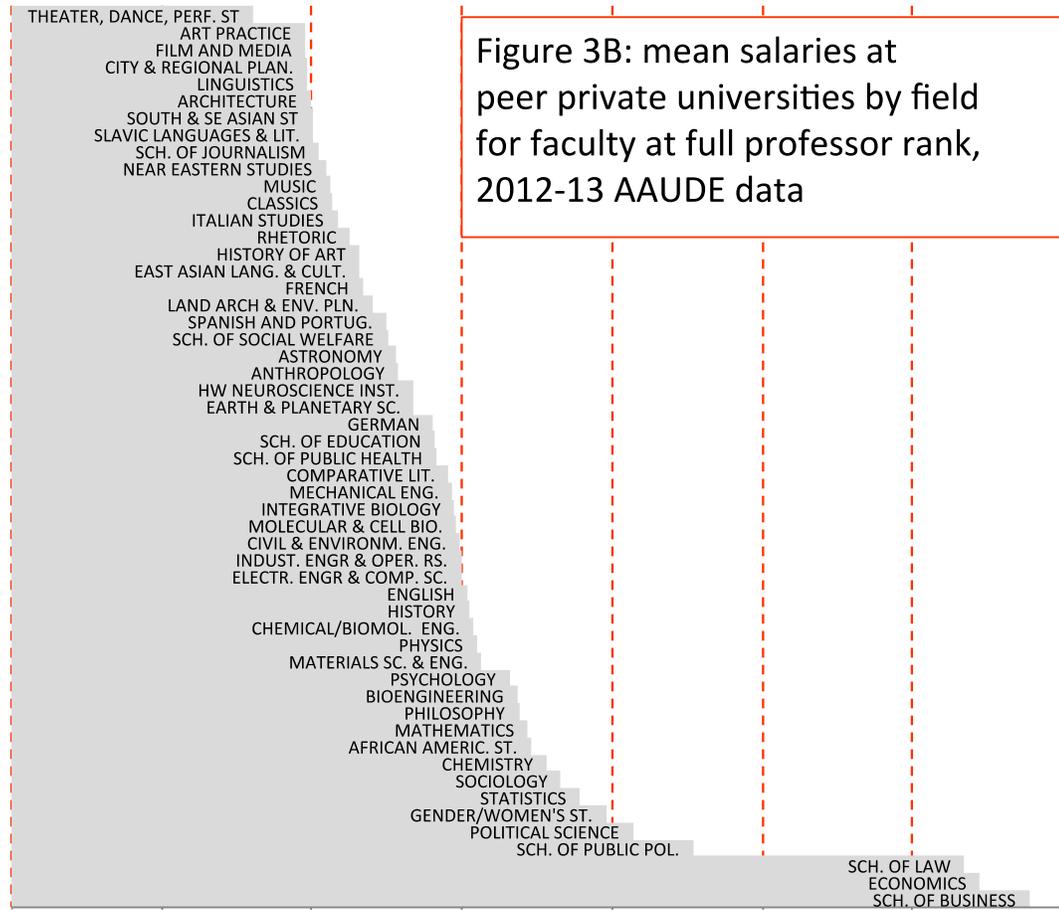


5/2014.

This pattern reflects well-documented national trends, with women and URM (under-represented minority) faculty more highly concentrated in humanities and some social science fields and substantially under-represented in many STEM fields (sciences, technology, engineering, and mathematics).

The reason this is relevant to a study of salaries is that average faculty salaries nation-wide also vary considerably by field, with fields in the humanities and several other areas generally less

well compensated. Figure 3B presents this spread by displaying mean full-professor salaries by field at peer-private universities.¹⁸



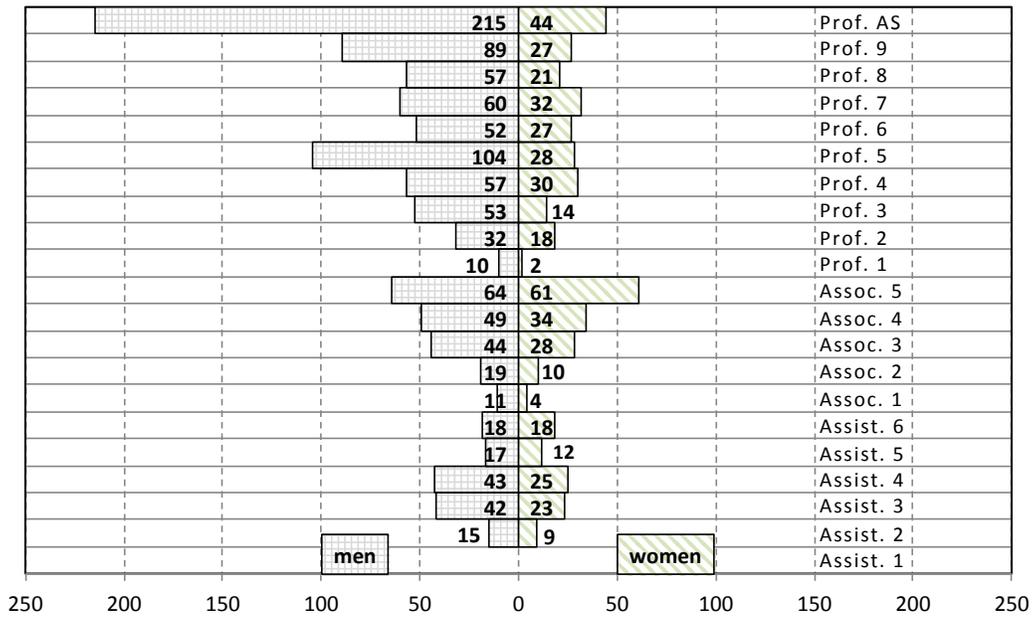
: AAUDE via OPA, AY 2012-2013.

Clearly field is a significant factor in faculty salaries, and so controls for field are important to include in this study. (Appendix B describes these controls in greater detail.)

Rank and time in rank can also be expected to be associated with salary. Gender and ethnicity patterns vary substantially by faculty rank and step, as Figures 3C and 3D show.

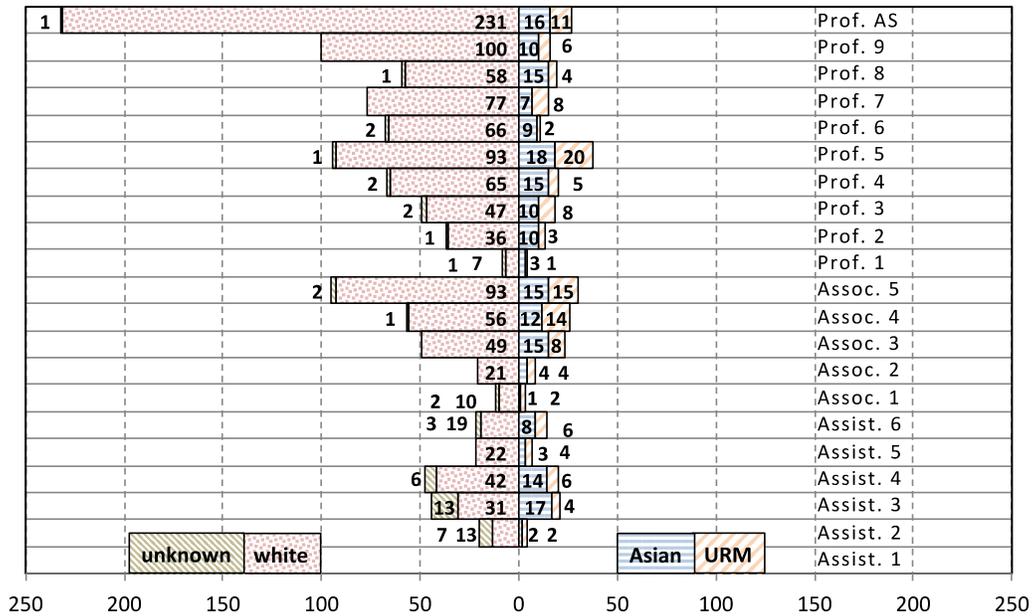
¹⁸ The data are drawn from AAUDE; see note 2.

Figure 3C: faculty headcount, by rank/step and gender



Source: UC Berkeley Faculty Personnel Records, 11/15/2014.

Figure 3D: faculty headcount, by rank/step and ethnicity



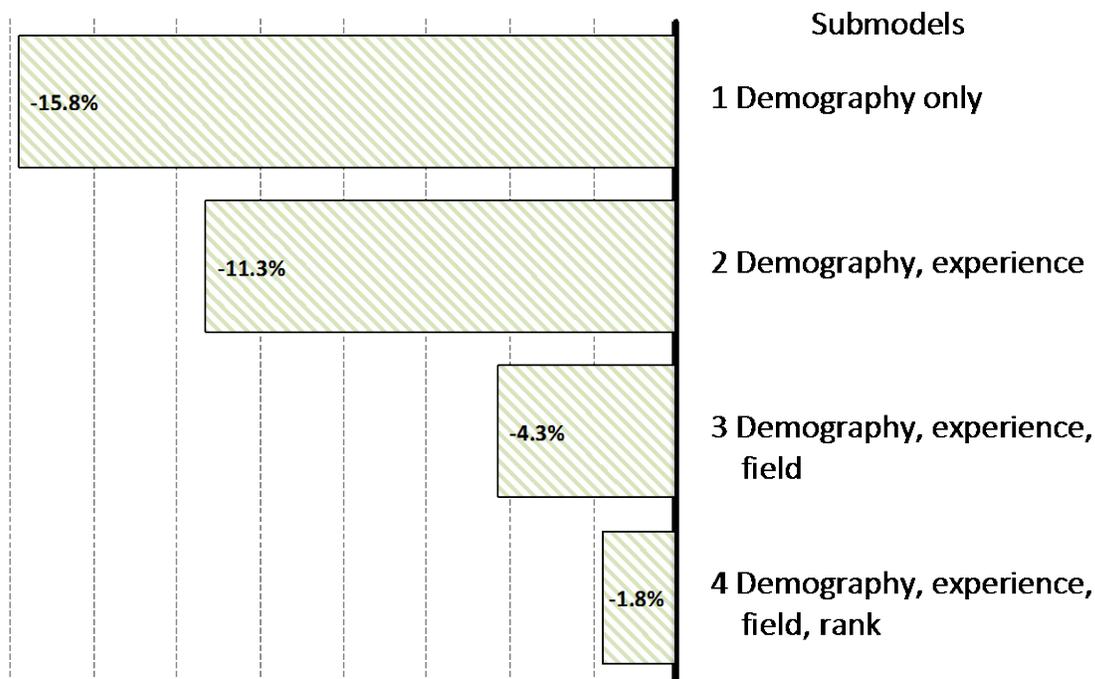
URM includes African Americans, Hispanic, and Native Americans.

Source: UC Berkeley Faculty Personnel Records, 12/15/2014.

While to some extent these distributions reflect experience factors, they would not be expected to map neatly onto distributions based on experience alone. Of particular note is the concentration of large numbers of faculty members in certain “threshold” steps, especially Associate Professor, Step 5, and Professor, Steps 5 and 9.

Figure 4A shows the effects of variables for field and rank¹⁹ on salary differences by gender.

**Figure 4A: campus level, women vs. white men
log salary submodels 1, 2, 3, 4**



Tot. N=1519; White Male N=801; Female N=467; Minority Male N=218; Unknown Male=33. Asian N=204; URM N=133.

Source: UCB Faculty Personnel Records, 12/15/2014.

- 1 Women, Asian, URM (African American, Hispanic, Native American), Unk. Eth.
- 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
- 3 Departments plus multiple appointment indicators.
- 4 Current rank (assistant or associate vs. full professor); years in current rank.

With the introduction of field, the observed gender salary difference, relative to white men, is reduced from -11.3% to -4.3%. Once rank variables²⁰ are entered into the regressions, the difference is further reduced, to -1.8%.

Given the systematic variation in salaries by experience and field, the committee believes that both of those variables should be considered in any analysis of salary equity issues. The

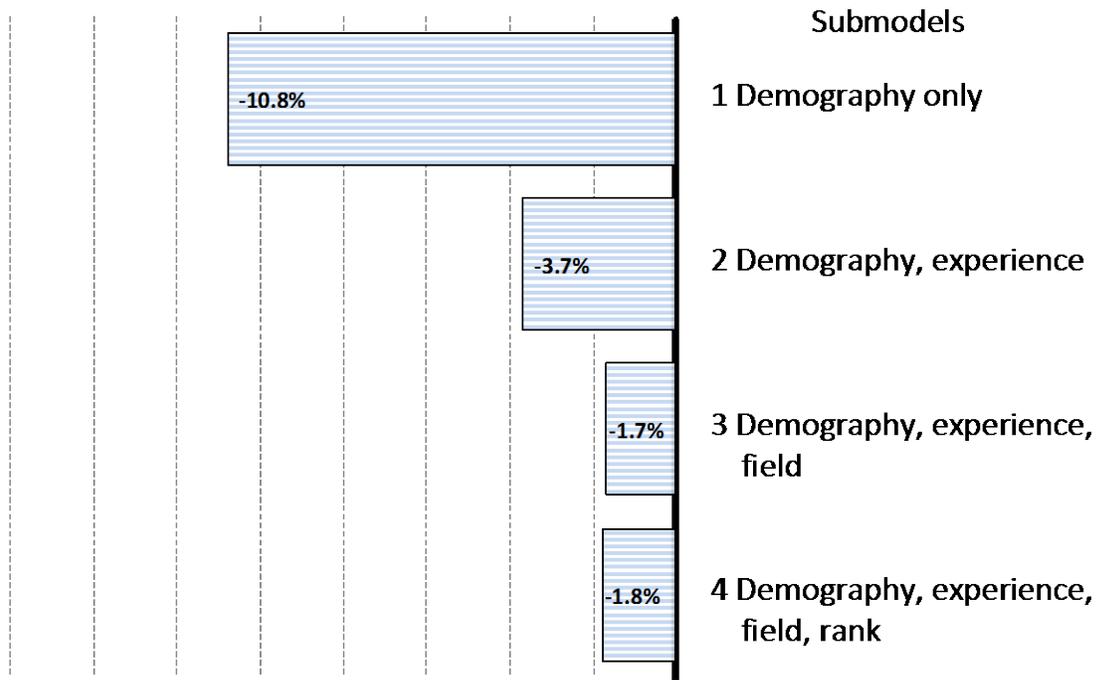
¹⁹ For a detailed discussion of the construction of all regression variables, see Appendices A and B.

²⁰ Rank variables are for (a) assistant and associate versus full professor and (b) years at current rank (as recommended by [Haignere](#), p. 22).

committee also believes it is helpful to consider the results both of including and excluding rank variables, noting that there is some debate about whether they ought to be included or not. (See subsection 4A below.) Focusing, then, on submodels 3 and 4, the conclusion is that at the campus level, there is a negative salary difference between women and white male faculty of -4.3% and -1.8%.²¹

As Figure 4B shows, salary differences for Asian faculty relative to white male faculty are also negative, though generally smaller than the negative differences for women.²²

**Figure 4B: campus level, Asian vs. white men
log salary submodels 1, 2, 3, 4**



Tot. N=1519; White Male N=801; Female N=467; Minority Male N=218; Unknown Male=33. Asian N=204; URM N=133.

Source: UCB Faculty Personnel Records, 12/15/2014.

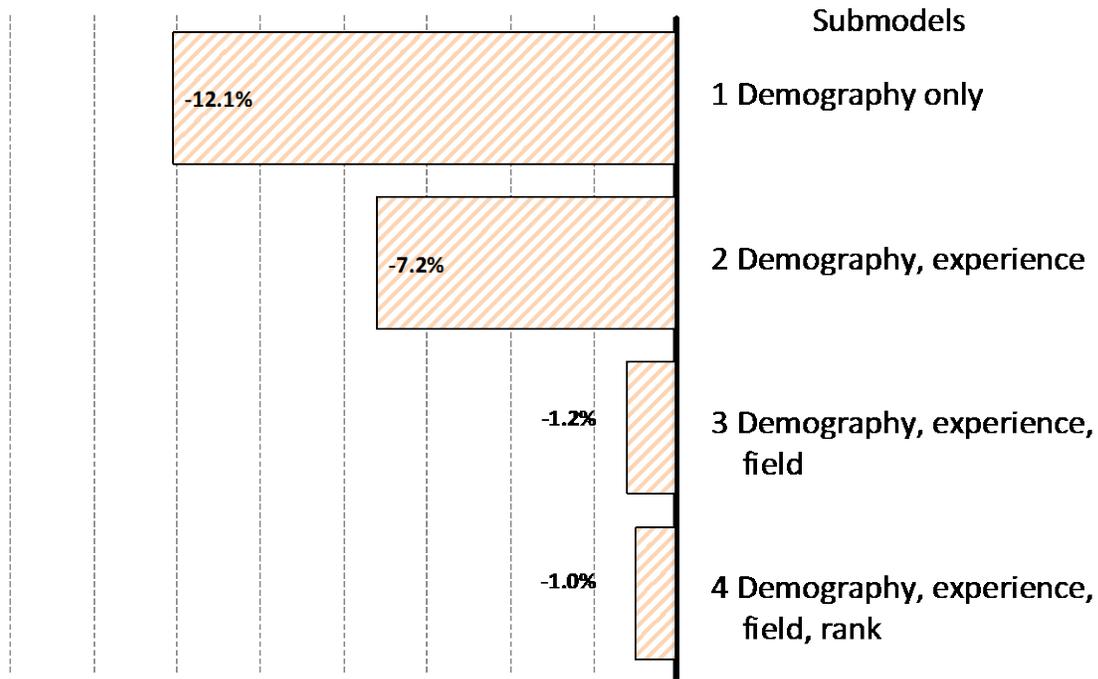
- 1 Women, Asian, URM (African American, Hispanic, Native American); Unk. Eth.
- 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
- 3 Departments plus multiple appointment indicators.
- 4 Current rank (assistant or associate vs. full professor); years in current rank.

Submodels 3 and 4 display negative salary differentials between Asian and white male faculty of -1.7% and -1.8%. Similarly, Figure 4C displays negative differentials of -1.2% and -1.0% for URM faculty relative to white male faculty.

²¹ For full regression output, see Appendix C, Table A1, which includes levels of statistical significance.

²² See note 17 for information about ethnicity data.

Figure 4C: campus level, URM vs. white men
log salary submodels 1, 2, 3, 4



Tot. N=1519; White Male N=801; Female N=467; Minority Male N=218; Unknown Male=33. Asian N=204; URM N=133.

Source: UCB Faculty Personnel Records, 12/15/2014.

- 1 Women, Asian, URM (African American, Hispanic, Native American), Unk. Eth.
- 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
- 3 Departments plus multiple appointment indicators.
- 4 Current rank (assistant or associate vs. full professor); years in current rank.

Although these differences for URM faculty and Asian faculty are not statistically significant, they are important to note. In general, statistical significance is less likely to be established for smaller groups, yet despite their size, the groups of URM faculty and Asian faculty are central to the questions this study is examining. In addition, the data provide a complete census of all salaries and not a sample, so measures of statistical significance may be somewhat less relevant than they would otherwise be.

To understand these differences, it may be helpful to express them relative to the rate of annual growth in earnings experienced by a typical faculty member. Interpreted in this way, the average salary difference between white and female faculty members is equivalent to about 1 to 4 years of career experience, and the difference between white males and minority faculty members is equivalent to about 1 to 2 years of career experience.²³

²³ Each year since hire is associated with a salary increase of approximately 1.4%.

3D: Campus-level—the three regression models

So far, campus-level findings have been presented using the log-salary model. In subsection 3E below, the presentation of time-series analysis will bring out one distinct advantage of the log-salary model: trends over time can be seen without the introduction of adjustments for economic inflation or deflation. Given the consistency of Berkeley’s faculty dataset, the value of longer-trend historic analysis seems clear, as it allows us to examine observed salary differences over time and to consider them in light of administrative and historic changes.

In this subsection, results from the log-salary model are compared with those from the white-male and total-population models. In contrast to the log-salary models, which estimate percentage salary differences, these models estimate the average salary difference between groups in dollars. The implied differences are all quite similar, suggesting that the basic conclusions of this study are unaffected by choice of specific model,²⁴ although as noted earlier, the log model seems generally to estimate slightly larger negative salary differences for women and minorities than do the other two models.

The white-male model²⁵ shows negative salary differences of -\$6,092 (submodel 3) and -\$2,150 (submodel 4) for female faculty relative to white male faculty. Using the mean salary of white male faculty as a benchmark, these dollar differences represent percentage differences of -3.7% (submodel 3) and -1.3% (submodel 4)—somewhat less than the -4.3% difference for submodel 3 and the -1.8% difference for submodel 4 from the log-salary models. Similarly, the total-population model (Appendix C, Table A3) shows a negative salary difference for women of -\$6,700 for submodel 3 and -\$2,893 for submodel 4, when comparing women to white men—close to the differences shown by the white-male models. Again using the mean salaries of white men as a benchmark, these translate to percentage differentials of -4.0% for submodel 3 and -1.7% for submodel 4—very close to the results of the log-salary model.

Turning to the results for Asian and URM faculty, again the alternative models give similar results. For example, the total population models (Appendix C, Table A3) show estimated salary gaps for Asians relative to white males of -\$2,709 (submodel 3) and -\$2,846 (submodel 4), corresponding to percentage differences of -1.6% and -1.7%—quite similar to the -1.7% and -1.8% differences from the corresponding submodels using log salaries for all faculty members. Likewise, for URM faculty these models show estimated salary differences relative to white males of -\$1,700 (submodel 3) and -\$1,268 (submodel 4), corresponding to percentage differences of -1.0% and -0.8%—quite close to the results shown in Figure 4C from the log salary models. The implied differences for Asian and URM faculty from the white male models (Appendix C, Table A2) are a little more variable across specifications, but overall they are similar to the differences from the other two sets of models.

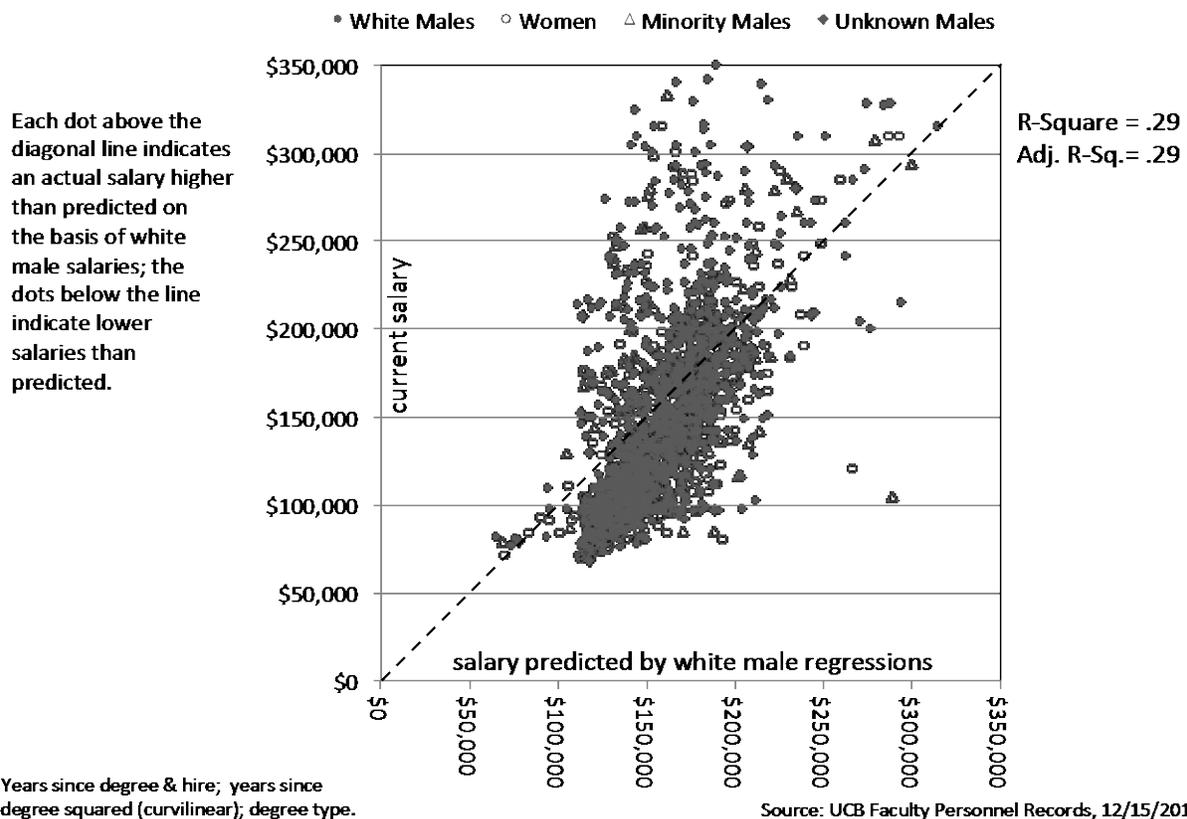
²⁴ Per [Haignere](#), pp. 41-43.

²⁵ Appendix C, Table A2.

Of the three different regression model types, the white-male approach is substantially different from the other two. Specifically, the white-male model provides a regression based solely on the white male population (n=801), and then actual salaries are compared to the salaries predicted on the hypothesis that salaries for all faculty will be the same as those for white men who have similar descriptors for the introduced variables concerning experience, field, and rank. The differences between predicted and actual salaries for individuals—called “residuals”—are then used to calculate mean salary differences between expected and actual salaries for different groups. A scatter-plot can thus be constructed with predicted salaries for individuals marked along the X-axis, actual salaries for individuals marked along the Y-axis, and a plotted white-male regression line.

Figure 5A shows a scatter plot for submodel 2, which includes only experience-related variables.

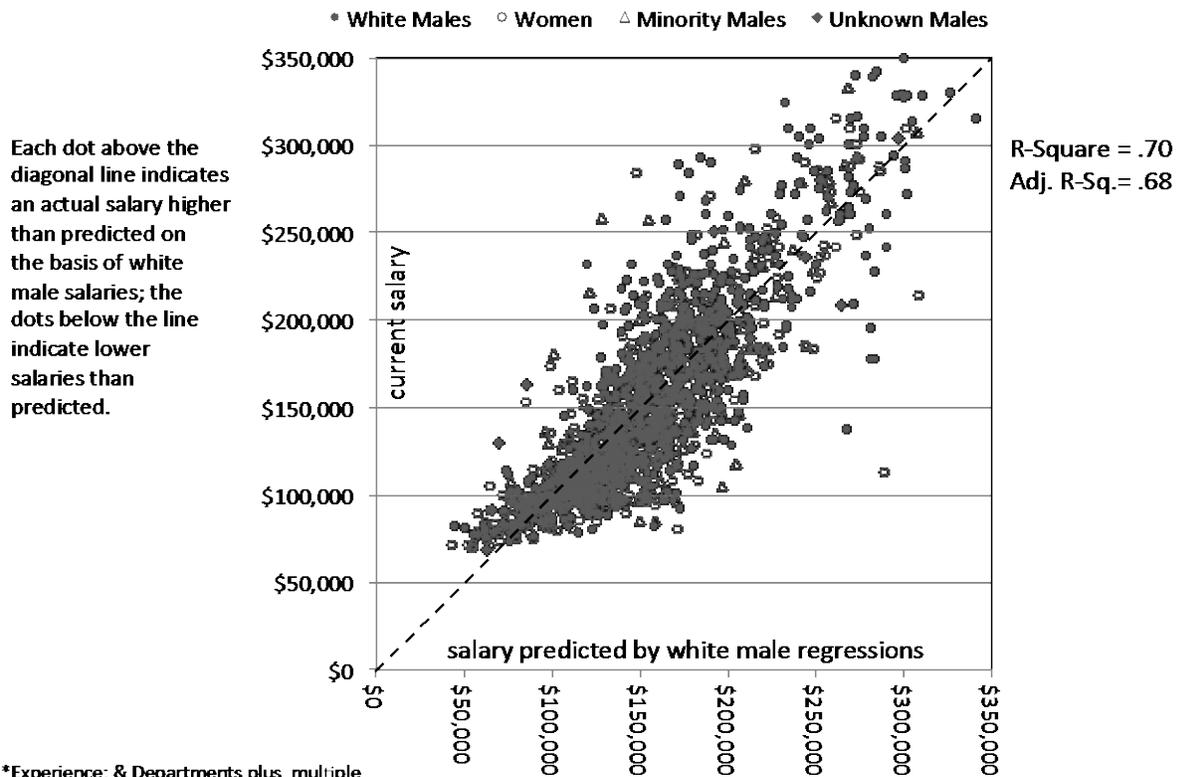
Figure 5A: current salary vs. salary predicted by regression white male submodel 2 (experience)



Given the limitations of submodel 2, which includes experience-variables only, it is not surprising to see considerable scatter around the white-male linear regression line. The R-square value and adjusted R-square values for this submodel are relatively low, with just 29% of the salary variance described.

As figure 5B shows, once field is included in the regressions (submodel 3), there is markedly less scatter, and the percentage of variance that is described increases to 68-70%.

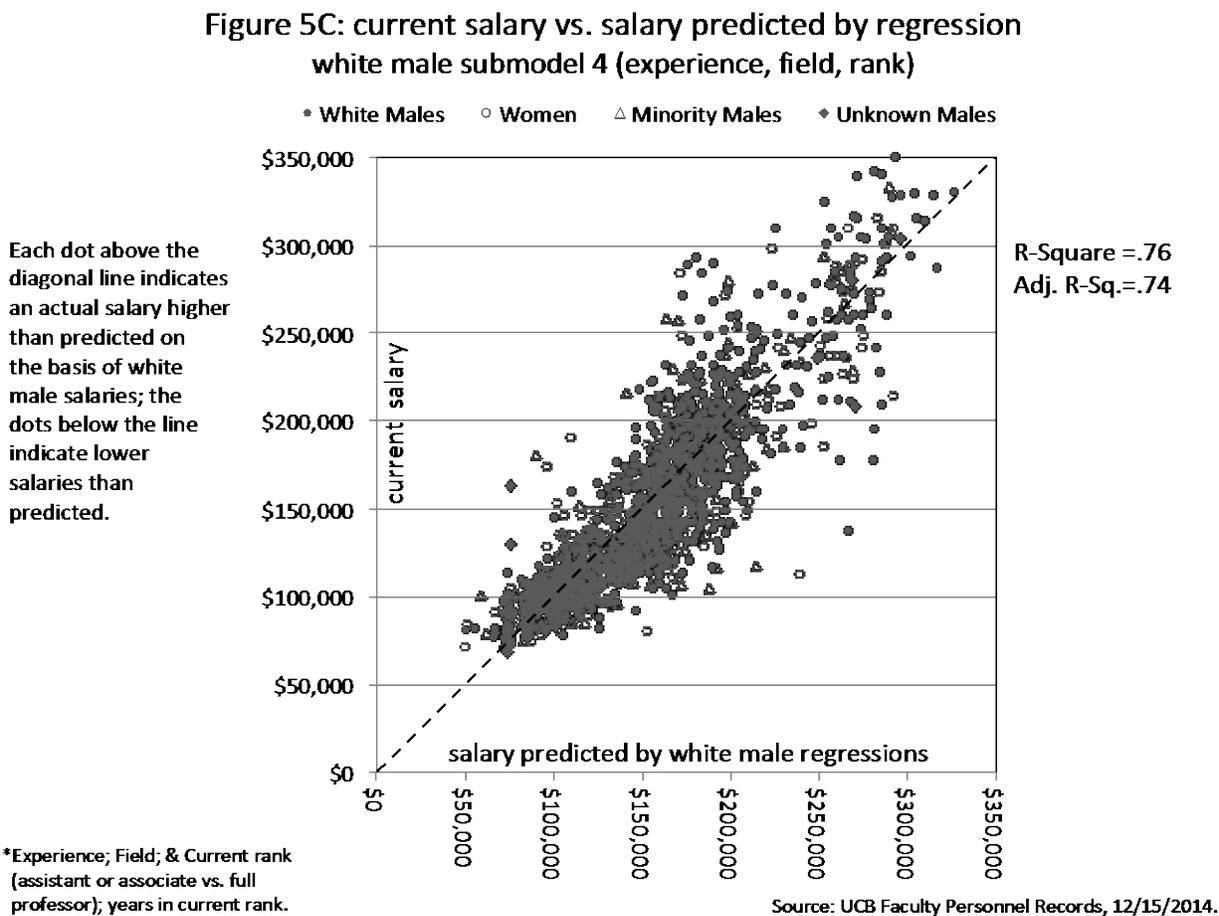
Figure 5B: current salary vs. salary predicted by regression white male submodel 3 (experience and field)



*Experience; & Departments plus multiple appointment indicators.

Source: UCB Faculty Personnel Records, 12/15/2014.

Figure 5C shows the introduction of rank variables, which further reduces scatter and yields an R-square value of .76 and an adjusted R-square of .74.

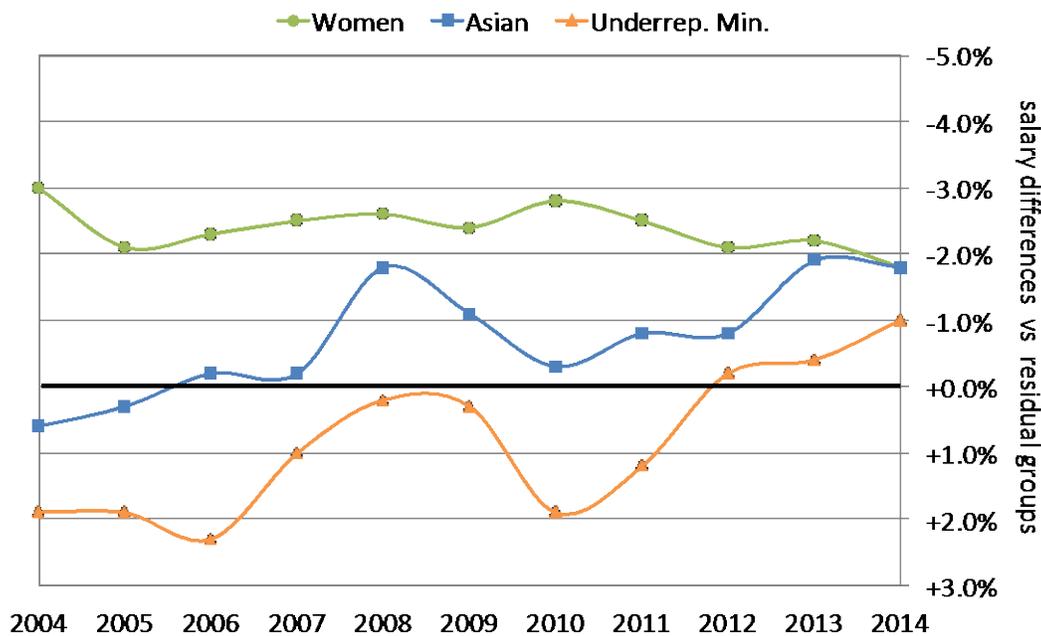


Two points are worth noting here. First, we can see that submodel 3, which takes field into account, provides much better fit than submodel 2 does. Second, even with the inclusion of rank and years in rank in submodel 4, about 25% of salary variance remains undescribed. Still, the adjusted R-square values are relatively high for submodels 3 and 4, and they are at levels that provide support to the findings of this study.

3E: Time-series regression analysis

As mentioned above, the log salary model simplifies historical analysis. Figure 6, for example, shows changes over the past decade in salary differences, using submodel 4, which controls for experience, field, and rank.

**Figure 6: campus time-series
women vs. white men, Asian vs. white men, URM vs. white men
log salary submodel 4 (demography, experience, field, rank)**



Tot. N (2014)=1519: White Male N=801; Female N=467; Minority Male N=218; Unknown Male=33. Asian N=204; URM N=133.

Source: UCB Faculty Personnel Records, 12/15/2014.

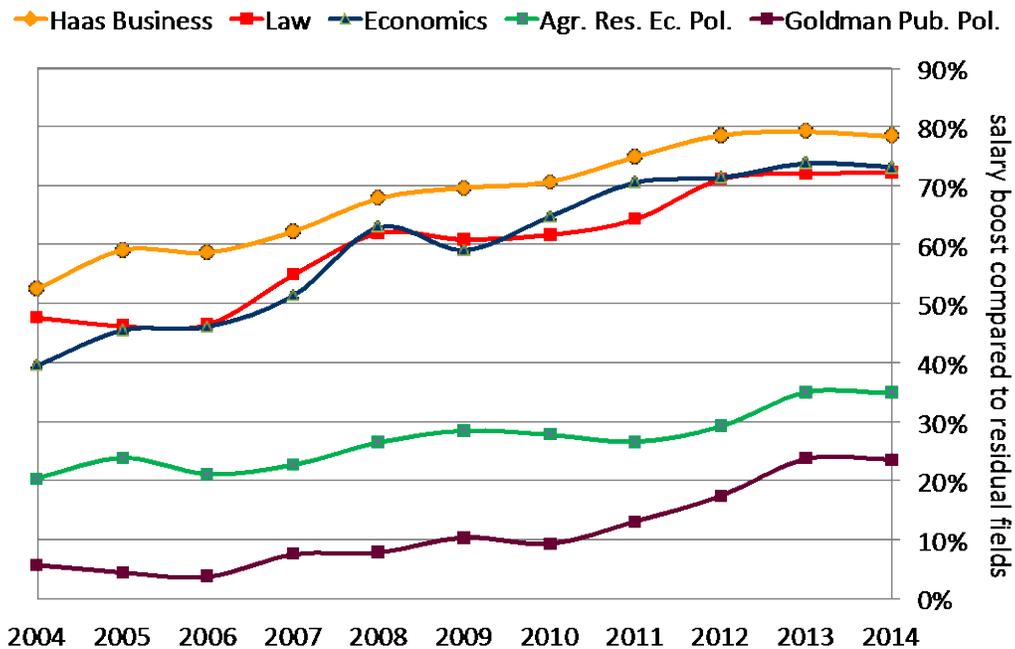
Year-to-year volatility for Asian and URM faculty probably reflects their relatively small numbers; the timing of just a few hires, separations, or salary increases can have considerable impact. For women, negative salary differences in earlier years generally hovered between -2.5% and -3% but have decreased since 2011. Of possible relevance is the fact that the most recent Targeted Decoupling Initiative provided salary increases effective in 2012, 2013, and 2014.

Tables B1, B2, B3, and B4 in Appendix C provide fuller information about time-series analyses that use each of the four submodels. Table B1 tracks results for submodel 1 over time. (Recall that submodel 1 uses demographic data only.) Table B1 makes clear that demography on its own has described relatively little salary variance in each of the past eleven years, with R-square values ranging from .07 to .09 (meaning that only 7-9% of variance is explained by demography alone). Table B2 tracks the results for submodel 2 over time; here experience

variables are included along with demographic variables. The R-square values are greater but are not large, and they declined over time from .50 in 2004 to between .38 and .39 since 2011. Thus the capacity of demography and experience variables to describe salary variance is not substantial and has declined some over the last decade.²⁶ Table B3 tracks the results for submodel 3 over time, showing the results of using demographic, experience, and field variables. With the addition of field variables, the R-square values rise considerably, and they do not exhibit a decline over time, moving slightly up and down between .68 and .71. Table B4, whose results are plotted in Figure 6 above, shows adjusted R-square values that are higher still, consistently between .76 and .79.

One possible way to think about these patterns is that the role of market has become increasingly powerful in recent years, just as the importance of the experience-related terms seems to have declined. This shift may be related to the fact that certain departments and or fields have experienced unusually large increases in their salaries relative to other fields. Figure 7 shows rapid escalation in salaries over the last decade in five fields: business, law, economics, agricultural economics, and public policy.

Figure 7: selected units with high and rapidly increasing salaries
log salary submodel 3 (demography, experience, & field)



Source: UCB Faculty Personnel Records, 12/15/2014.

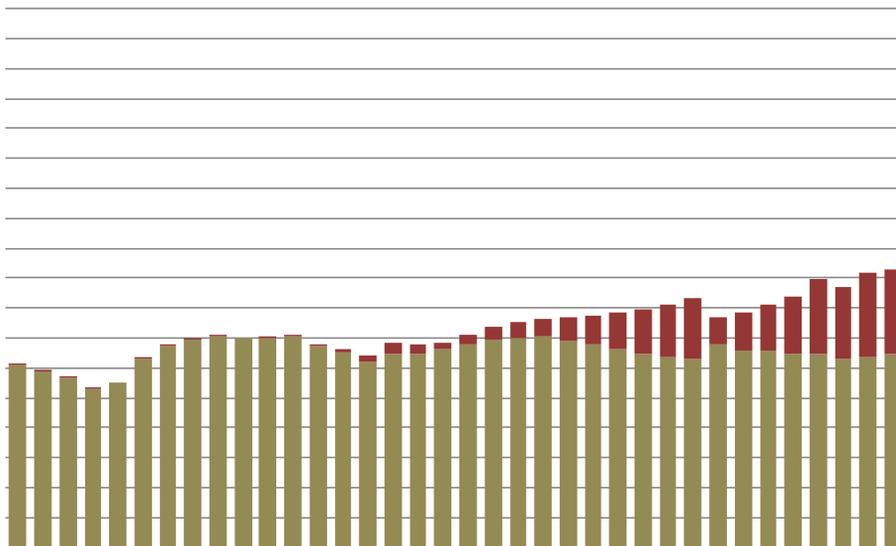
Demography; experience; departments plus multiple appointment indicators.

²⁶ We can also observe that in submodel 2, the results for Asian faculty are not statistically significant. (This is indicated by their relatively high P-values.)

Market forces seem to be at work here, as the AAUDE data displayed in Figure 3B above depict a similar grouping of high-paid fields.²⁷

Other time-series descriptive data drawn from the UCB personnel records suggest that market forces are altering the composition of salaries on our campus, given stagnation in UC's salary scales. Figure 8 looks back over the years since 1979, showing mean base salaries and decoupled increments for academic-year salaries for assistant professors who are at Step III on the regular professorial scale.²⁸ In aggregate, decoupled salary increments have functioned to back-fill salaries that would otherwise have declined over time in real terms due to inflation.

Figure 8: mean base salary and off-scale/ decoupling assistant professors at step III, regular scale



UCB Faculty Personnel Records, AY1979-80—2014-15 (as of 12/15/14).

Similar analysis shows that market forces have pushed decoupled amounts upwards more quickly for assistant professors (step III) than for full professors (step VII) and for faculty on the Business, Engineering, and Economics scale than for faculty on the regular professorial scale. In short, major market changes are clearly affecting patterns of UCB faculty compensation.

²⁷ Figure 3B does not include agricultural economics, which does not have the necessary minimum number of private institutions to be displayed in accordance with AAUDE rules.

²⁸ These data use a Consumer Price Index deflator in order to provide constant dollar amounts in 2014 dollars.

3F: Unit-level regression analyses

In addition to carrying out studies at the campus level, we segmented the faculty to discover whether observed salary differences tend to be unit-specific or not. As much as possible, this segmentation is by decanal unit. This is in part because deans made recommendations concerning faculty salaries and advancement, and in part because we would like the results of these unit-level studies to support any administrative actions that may be appropriate. Also, although many decanal units include faculty members with diverse disciplinary training and interests, studies by decanal unit generally group together sub-units that may be affected by similar market and academic forces.

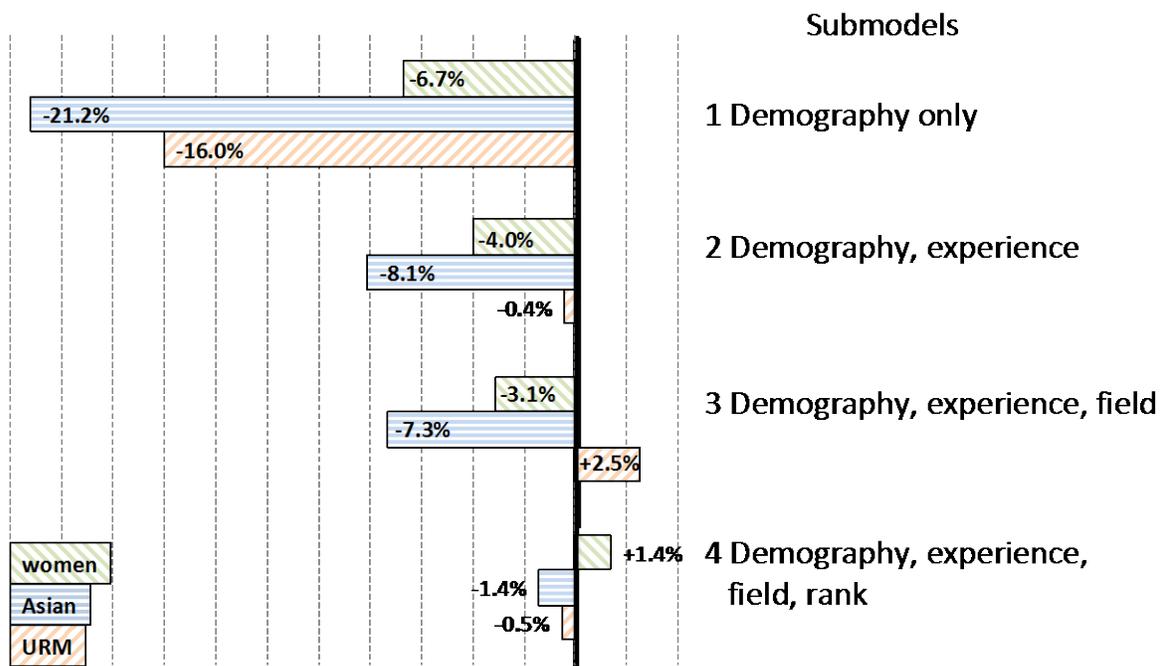
To support analytical rigor, however, we do not provide separate results for the smaller decanal units, whose ladder-faculty sizes are too small to provide meaningful results. Thus we have grouped the following decanal units together: Education, Environmental Design, Information, Journalism, Optometry, Public Health, Public Policy, and Social Welfare. We also note that in the smaller of the units that are individually discussed below, time-series fluctuations suggest that relatively little weight should be given to a single year's snapshot. These smaller units are the College of Chemistry, the Haas School of Business, and Berkeley Law. Where the number of URM or Asian faculty within a unit is less than 10, faculty in the two categories are combined as "Minority."

For each unit or group of units below, Appendix C contains four detailed tables: (1) log salary 2014, with submodels 1-4; (2) white-male 2014, with submodels 2-4;²⁹ (3) log salary time-series, submodel 3, 2004-2014; and (4) log salary time-series, submodel 4, 2004-2014. Tables for total population models are not included; the steering committee determined that this model shed little additional light on the observed salary patterns. Please note that faculty with multiple appointments appear in the analysis of all units in which they have an appointment; Appendix B includes a discussion of coding for multiple appointments.

²⁹ Submodel 1 is not possible given the construction of the white-male model.

L&S Arts and Humanities. Figure 9A below shows that in submodel 4, which includes rank, the salary difference for women is positive, at +1.4%. In submodel 3, which does not include rank, the difference is negative, at -3.1%. Tables C1c and C1d show that during the past several years, negative differences for women have decreased or differences have become positive. Salary differences for Asian and URM faculty vary considerably depending on the selected model, and time-series results are fairly volatile year to year. For example, in the four most recent years, submodel 4 shows salary differences for Asian faculty were -4.2%, +0.4%, -0.6%, and -1.4%. The statistical significance of these results is low, as reflected in high p-values. The variation and volatility probably arise from the fact that the numbers of Asian and URM faculty are relatively small, meaning that a few appointments, separations, promotions, or salary increases can have a relatively large impact.

Figure 9A: Arts & Humanities
women vs. white men, Asian vs. white men, URM vs. white men
log salary submodels 1, 2, 3, 4



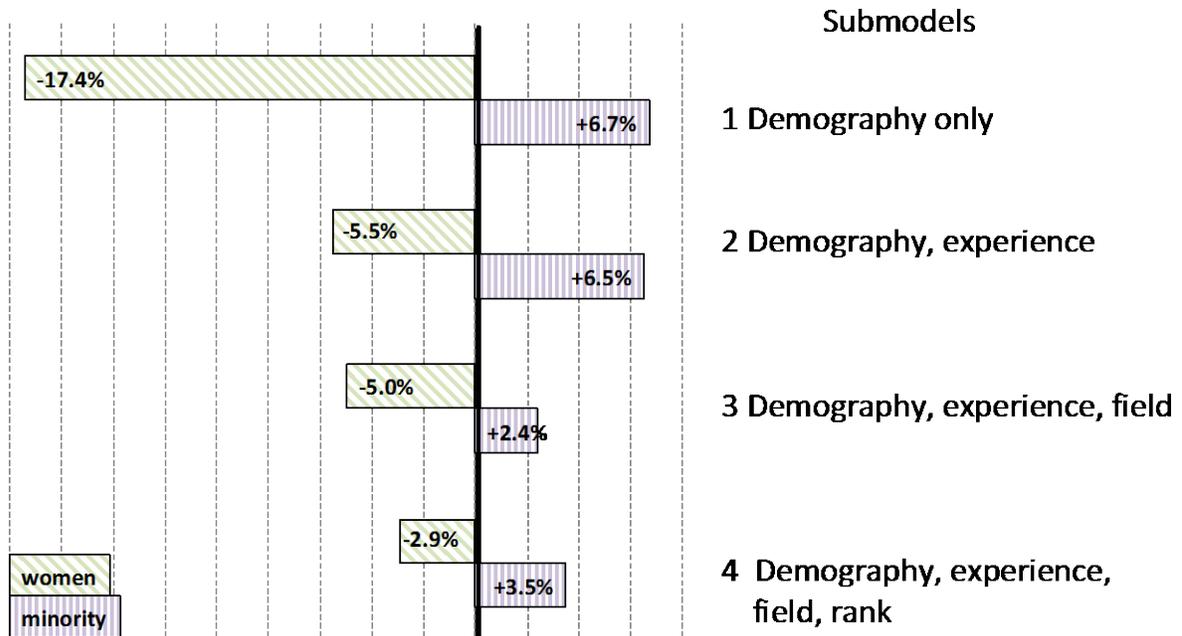
Tot. N=247; White Male N=101; Female N=118; Minority Male N=22; Unknown Male=6. Asian N=24; URM N=20.

Source: UCB Faculty Personnel Records, 12/15/2014.

- 1 Women; Asian; URM (African American, Hispanic, Native American), Unk. Eth.
- 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
- 3 Departments plus multiple appointment indicator (yes/no).
- 4 Current rank (assistant or associate vs. full professor); years in current rank.

L&S Biological Sciences. For women in the Division of Biological Sciences, Figure 9B shows negative salary differences of -5.0% and -2.9% in submodels 3 and 4. Salary differences for minority faculty are positive. The time-series studies suggest that negative differences for women have increased somewhat over time, but given the relatively small numbers of women and minority faculty in this unit, neither positive nor negative differences are statistically significant. A sub-study of the Department of Molecular and Cell Biology that includes citation rates may be relevant to the discussion of this Division; it may be found in subsection 3G below.

Figure 9B: Biological Sciences
women vs. white men, minority vs. white men
log salary submodels 1, 2, 3, 4



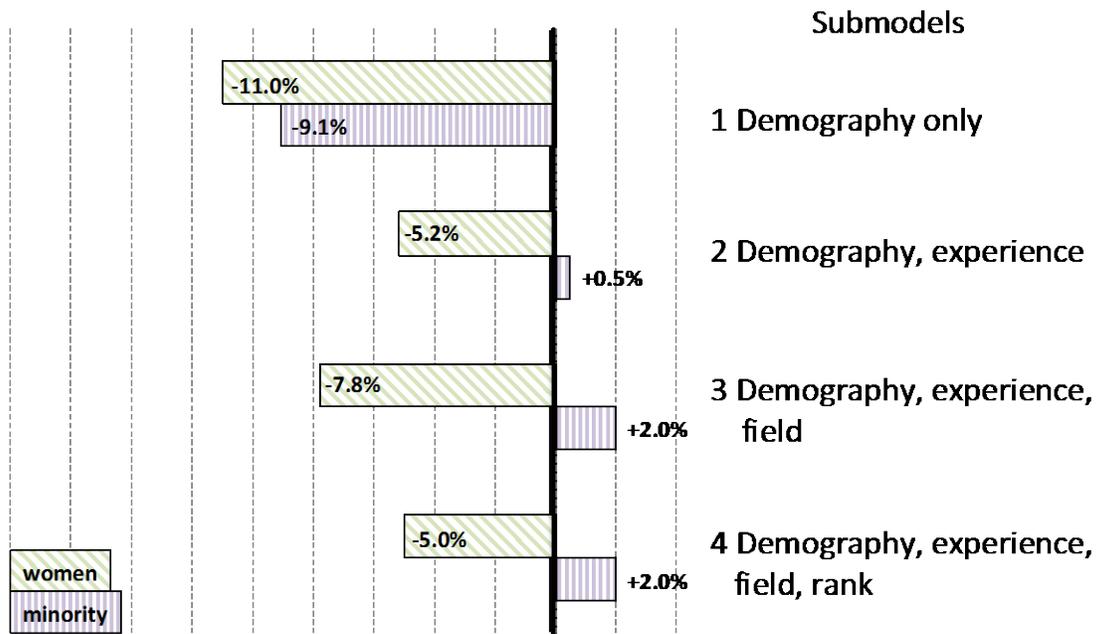
Tot. N=119; White Male N=66; Female N=35; Minority Male N=13; Unknown Male=5. Asian N=18; URM N=3.

Source: UCB Faculty Personnel Records, 12/15/2014.

- 1 Women; Asian plus URM (African American, Hispanic, & Native American)
- 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
- 3 Departments plus multiple appointment indicator (yes/no).
- 4 Current rank (assistant or associate vs. full professor); years in current rank.

L&S Mathematical and Physical Sciences. As Figure 9C below indicates, salary differences for minority faculty in the MPS Division are positive, and in the two key submodels, differences for women are negative, ranging from -7.8% (submodel 3) to -5.0% (submodel 4). These negative differences for women are somewhat higher than the campus differences. The times-series results for submodels 3 and 4 suggest that a negative difference for women has persisted over time, but that its size has been volatile from year to year. This volatility is unsurprising given the small number of women in the Division. Adjusted R-square values are relatively low for submodel 3 (around .50 to .55 in recent years), and in only two years are the data points statistically significant at the $p < .10$ level. None of the differences is statistically significant for submodel 4.

**Figure 9C: Mathematical & Physical Sciences
women vs. white men, minority vs. white men
log salary submodels 1, 2, 3, 4**



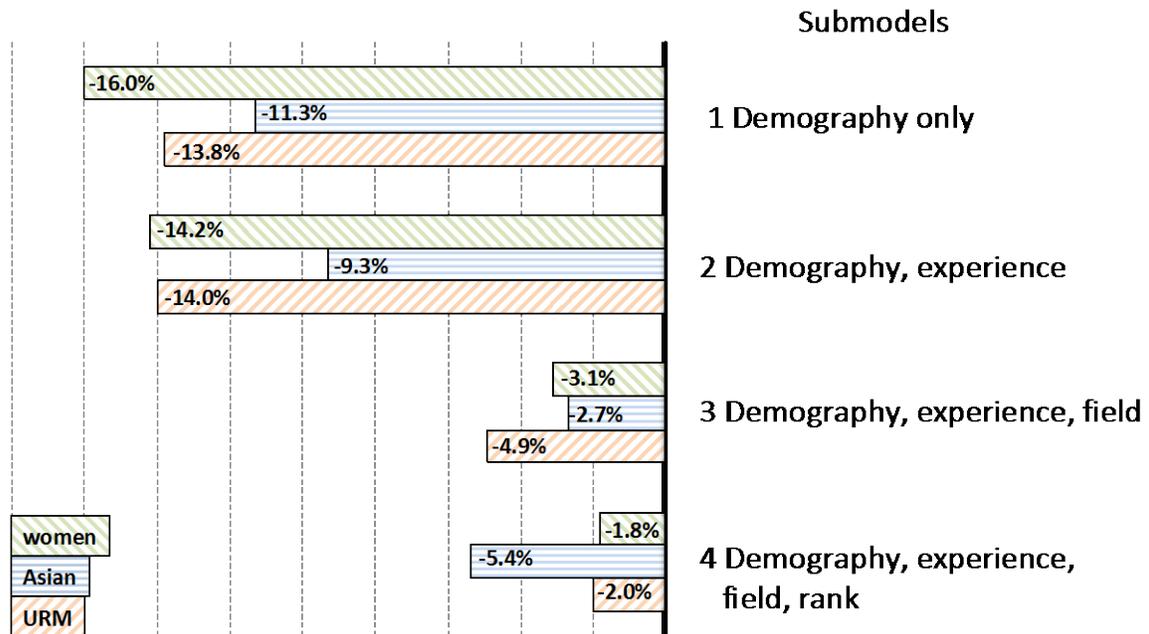
Tot. N=173; White Male N=118; Female N=27; Minority Male N=23; Unknown Male=5. Asian N=24; URM N=3.

Source: UCB Faculty Personnel Records, 12/15/2014.

- 1 Women; Asian plus URM (African American, Hispanic, Native American)
- 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
- 3 Departments plus multiple appointment indicator (yes/no).
- 4 Current rank (assistant or associate vs. full professor); years in current rank.

L&S Social Sciences. Figure 9D shows strikingly large negative salary differences for women and minority faculty in the baseline submodels (1 and 2), and then a striking reduction in the size of those negative differences in the key submodel that introduces field (submodel 3). These findings probably reflect the fact that the Department of Economics, compared to other departments in the Division, is both less demographically diverse and more highly compensated. For the key submodels (3 and 4) that introduce field and rank variables, negative salary differences for women are -3.1% and -1.8%. Negative differences for URM and Asian faculty are generally somewhat larger than those for women. The time-series tables (C4c-d) suggest that negative salary differences for women have decreased over time; the negative differences for Asian and URM faculty show year-to-year volatility but may be trending slightly upward. The departments of Sociology and Psychology were both included in a sub-study introducing variables for citation rates; those findings are in subsection 3G below and may be relevant to this discussion.

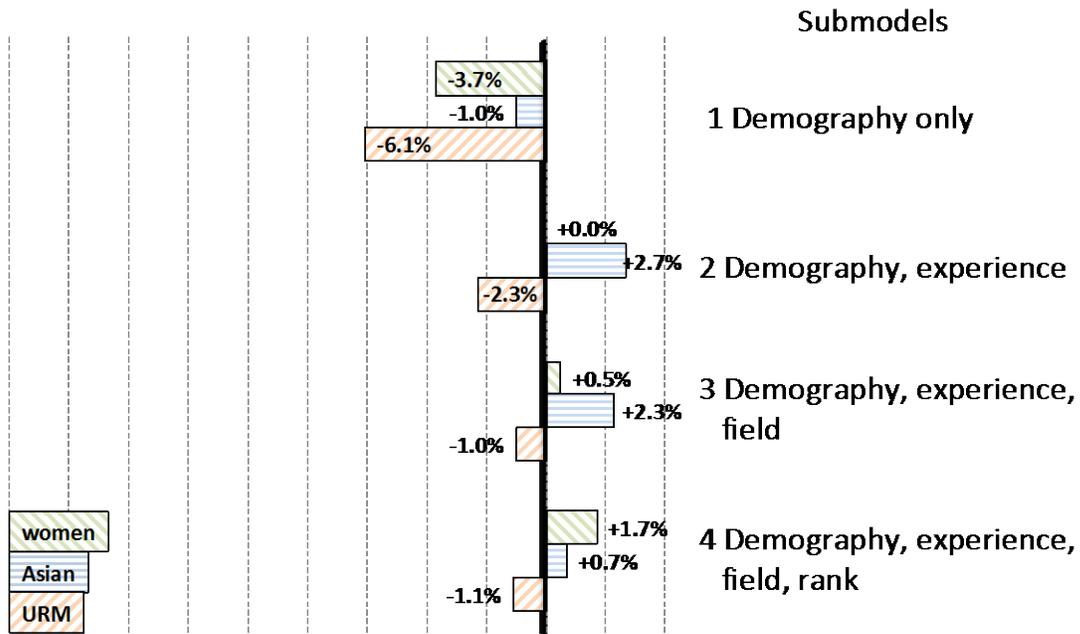
Figure 9D: Social Sciences
women vs. white men, Asian vs. white men, URM vs. white men
log salary submodels 1, 2, 3, 4



Tot. N=297: White Male N=141; Female N=108; Minority Male N=41; Unknown Male=7. Asian N=37; URM N=43.
 1 Women, Asian, URM (African American, Hispanic, Native American)
 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
 3 Departments plus multiple appointment indicator (yes/no).
 4 Current rank (assistant or associate vs. full professor); years in current rank.
 Source: UCB Faculty Personnel Records, 12/15/2014.

College of Engineering. Figure 9E indicates that in the College of Engineering, there is a modest positive salary difference for women and for Asian faculty in key submodels 3 and 4. For URM faculty, there was a negative difference of -1.0% or -1.1% in 2014, though the time-series tables indicate that the differences have been positive in all other years going back to 2004 and that there is considerable year-to-year volatility for URM faculty. This is unsurprising, given that there are only 15 URM faculty members in the College.

Figure 9E: Engineering
women vs. white men, Asian vs. white men, URM vs. white men
log salary submodels 1, 2, 3, 4



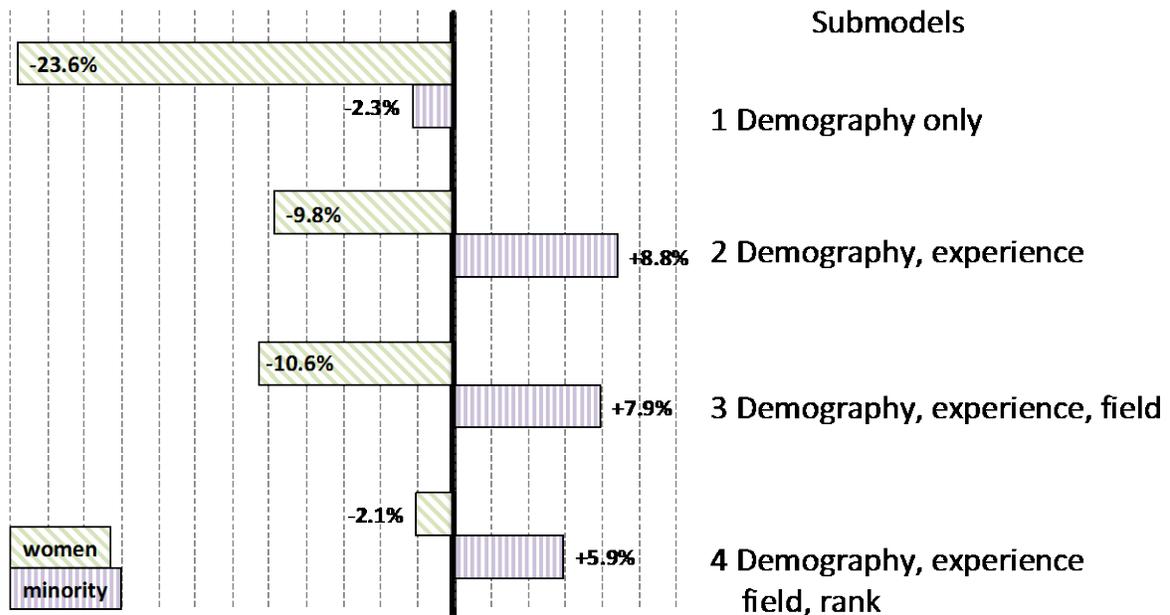
Tot. N=244; White Male N=146; Female N=37; Minority Male N=59; Unknown Male=2. Asian N=55; URM N=15.

- 1 Women; Asian; URM (African American, Hispanic, & Native American).
- 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
- 3 Departments plus multiple appointment indicator (yes/no).
- 4 Current rank (assistant or associate vs. full professor); years in current rank.

Source: UCB Faculty Personnel Records, 12/15/2014.

College of Chemistry. Figure 9F below shows that for women in the College of Chemistry, there is a relatively large negative salary difference of -10.6% in submodel 3. The introduction of rank variables in submodel 4 reduces the negative difference to -2.1%, which is only slightly larger than that for the campus as a whole. Minority faculty members have large positive salary differences relative to white male faculty members, though the time-series slides indicate considerable fluctuation over the years. For women, too, there is considerable year-to-year volatility, though there appears to have been a trend toward larger negative differences. Considerable fluctuation is unsurprising given the fact that there are only 15 women and 14 minority faculty (some of them women) in the College.

**Figure 9F: College of Chemistry
women vs. white men, minority vs. white men
log salary submodels 1, 2, 3, 4**



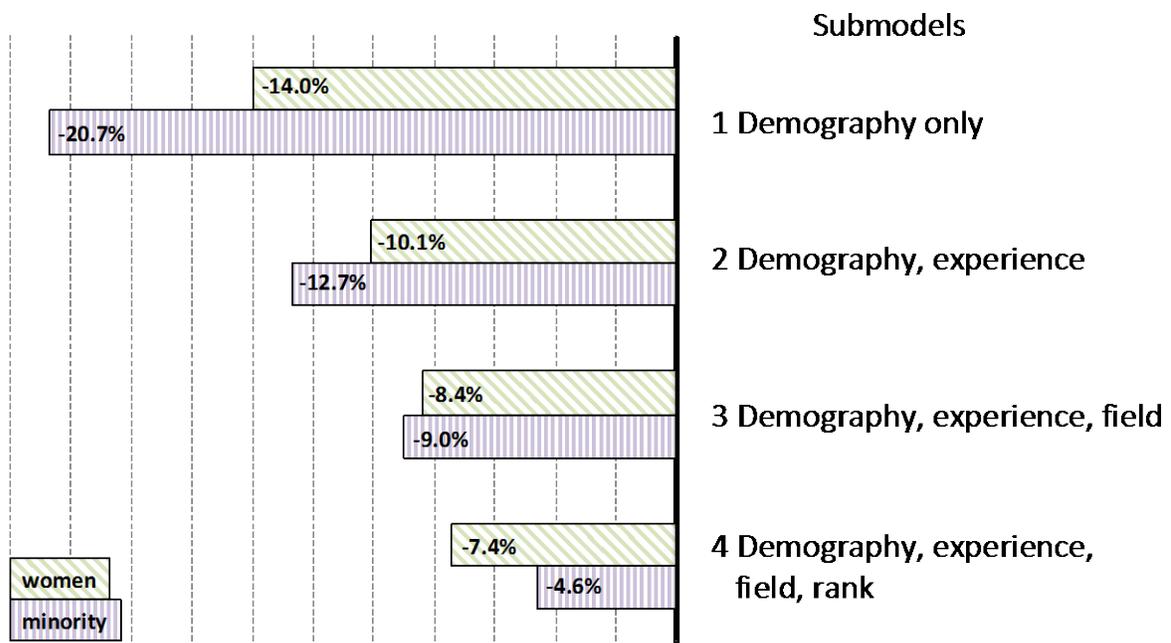
Tot. N=65: White Male N=40; Female N=15; Minority Male N=10; Unknown Male=0. Asian N=9; URM N=5.

Source: UCB Faculty Personnel Records, 12/15/2014.

- 1 Women; Asian plus URM (African American, Hispanic, & Native American).
- 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
- 3 Departments plus multiple appointment indicator (yes/no).
- 4 Current rank (assistant or associate vs. full professor); years in current rank.

College of Natural Resources. Figure 9G shows negative salary differences for women of -8.4% in submodel 3 and -7.4% in submodel 4; both differences are larger than differences found at the campus level. Negative differences for minority faculty are also larger than those found at the campus level. The time-series tables (C7c-d) show an increase in negative salary differences for women in 2006 that has generally persisted since then. Subfield variability within the College’s largest department may contribute to findings for this unit, although the present study has not explored that possibility.

Figure 9G: Natural Resources
women vs. white men, minority vs. white men
log salary submodels 1, 2, 3, 4



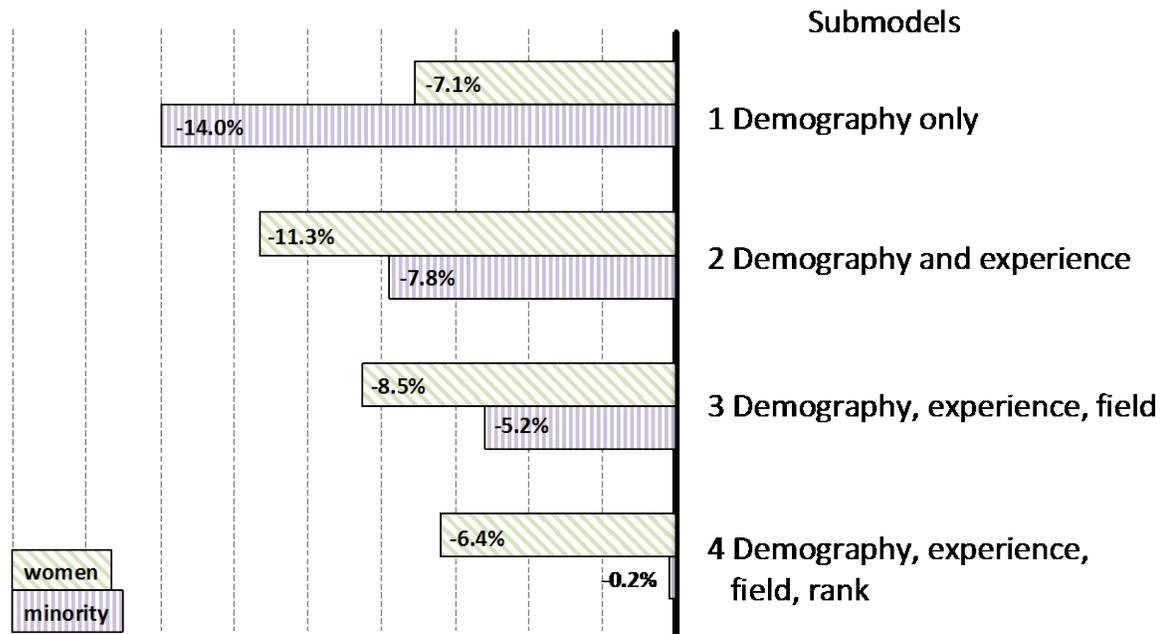
Tot. N=119; White Male N=65; Female N=38; Minority Male N=16; Unknown Male=0. Asian N=17; URM N=7.

Source: UCB Faculty Personnel Records, 12/15/2014.

- 1 Women; Asian plus URM (African Am., Hispanic, & Native Am.).
- 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
- 3 Departments plus multiple appointment indicator (yes/no).
- 4 Current rank (assistant or associate vs. full professor); years in current rank.

Haas School of Business. As Figure 9H shows, negative salary differences for women are -8.5% (submodel 3) and -6.4% (submodel 4), larger than negative differences for women at the campus level. Differences for minority faculty are also negative, although the inclusion of rank variables produces a very small negative difference of -0.2%. Note that Figure 9H displays results that reflect the inclusion of information about the affiliation of each faculty member with a defined research group (accounting, finance, etc.). This is because Haas’s self-funded salary program³⁰ uses national business-school data pegged to these research subfields. Without inclusion of these subfields, negative differences for women are larger.³¹ The time-series tables³² suggest that negative salary differences for women in comparison to white men have increased over time. A sub-study of Haas faculty looking at the impact of citation counts is included in subsection 3G below.

**Figure 9H: Haas School of Business
women vs. white men, minority vs. white men
log salary submodels 1, 2, 3, 4**



Tot. N=85; White Male N=51; Female N=18; Minority Male N=13; Unknown Male=3. Asian N=11; URM N=4.

Source: UCB Faculty Personnel Records, 12/15/2014.

- 1 Women; Asian plus URM (African American, Hispanic, & Native American).
- 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
- 3 Haas subfields plus multiple appointment indicator (yes/no).
- 4 Current rank (assistant or associate vs. full professor); years in current rank.

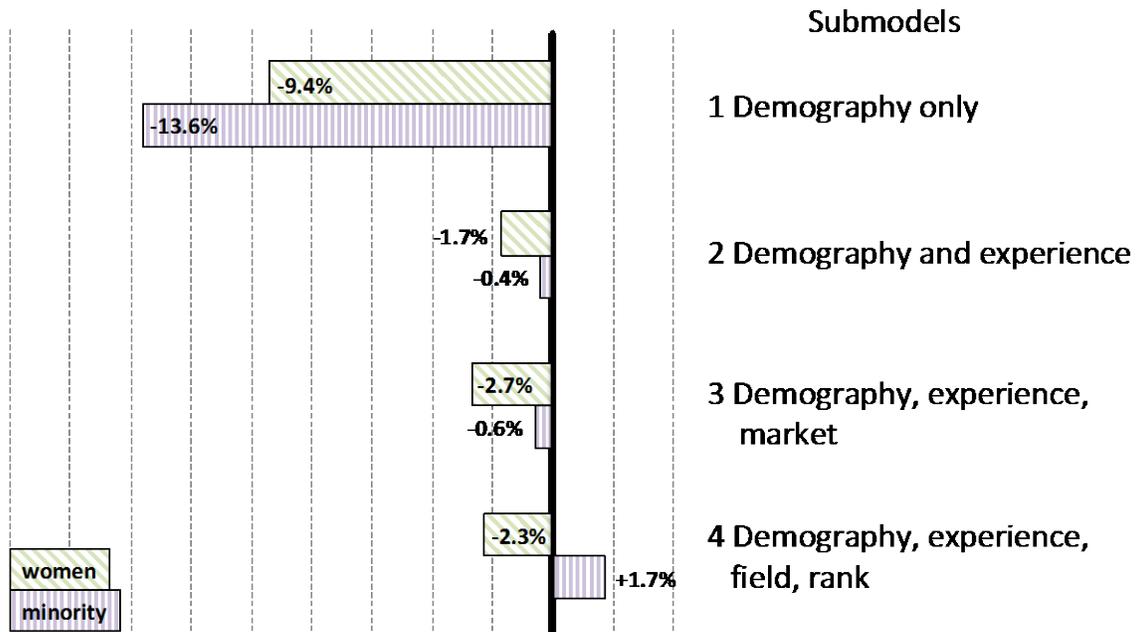
³⁰ The Faculty Excellence Program (FEP) provides merit-based salary increases whose size is calculated for each group based upon national salary data. The FEP program was reviewed and supported by the Senate’s Budget Committee and approved by the central administration; the funding is provided through the School’s revenue-generating programs. Faculty are eligible to benefit from the FEP only if their rank/step advancement is normal. The first version of the FEP was introduced in 2003.

³¹ See C8e and C8a in Appendix C.

³² These are based on log runs without subfields, C8c-d.

Berkeley Law. As shown in Figure 9I, negative salary differences for women are -2.7% in submodel 3 and -2.3% in submodel 4. Salary differences for minority faculty are -0.6% in submodel 3 and +1.7% in submodel 4. Time-series studies show fluctuation, which is unsurprising for a fairly small unit with relatively small subpopulations of women and minority faculty. We note that Law, like the Haas School of Business, has a self-funded salary program for eligible faculty.³³

Figure 9I: Law
women vs. white men, minority vs. white men
log salary submodels 1, 2, 3, 4



Tot. N=69: White Male N=34; Female N=21; Minority Male N=11; Unknown Male=3. Asian N=9; URM N=9.

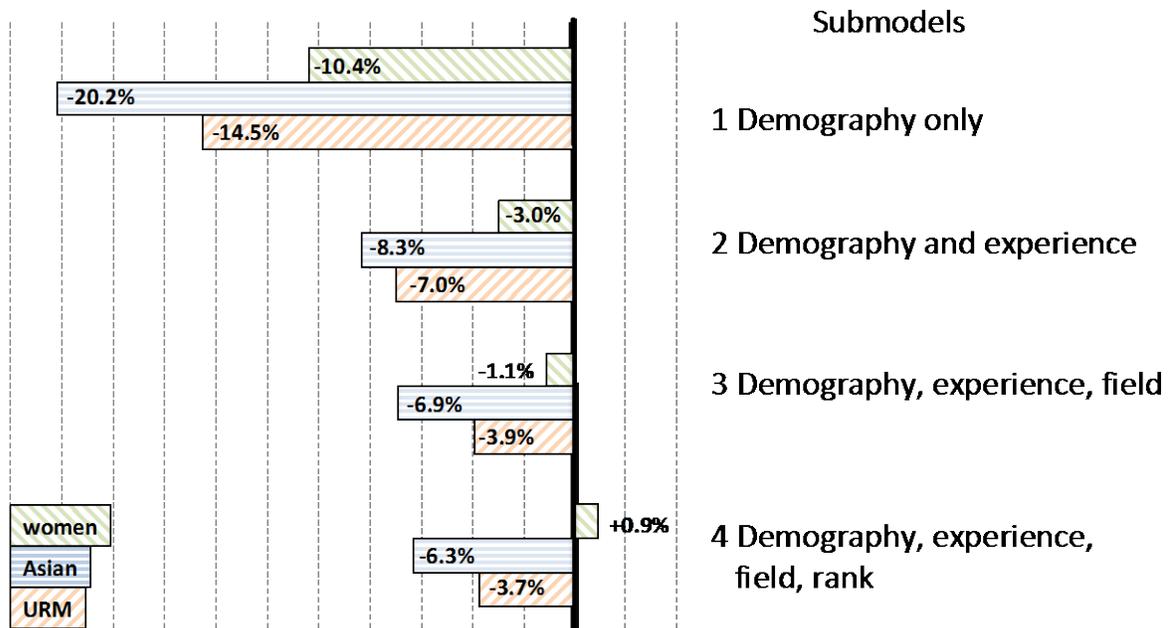
Source: UCB Faculty Personnel Records, 12/15/2014.

- 1 Women, Asian plus URM (African American, Hispanic, & Native American).
- 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
- 3 Multiple appointment indicator (yes/no); AAUDE market factor for mult. appoint.
- 4 Current Rank (assistant or associate vs. full professor); years in current rank.

³³ The Competitive Compensation Initiative (CCI) provides merit-based salary increases on a special scale that is pegged to national salary data for law schools. The CCI was supported by the Senate’s Budget Committee and approved by the central administration; the funding is provided through Law’s revenue-generating programs. The CCI was instituted in 2008.

Other units. As Figure 9J indicates, within this group of small decanal units, salary differences for women are -1.1% in submodel 3 and +0.9% in submodel 4. (We note, however, that submodel 4 in the white-male model shows a negative difference for women of -\$1,688.) Salary differences for Asian and URM faculty are negative and are somewhat larger than the corresponding differences found at the campus level. Time-series studies suggest that negative differences for women have become smaller over the past decade, while negative differences for Asian and URM faculty have become somewhat larger. A separate sub-study in regard to School of Public Health may be relevant to this analysis; it is discussed in subsection 3G below.

Figure 9J: other units*
women vs. white men, Asian vs. white men, URM vs. white men
log salary submodels 1, 2, 3, 4



Tot. N=219: White Male N=102; Female N=89; Minority Male N=24; Unknown Male=4. Asian N=19; URM N=33.

*Coll Env Design, Education, Pub Policy, Information, Journalism, Optometry, Pub Health, Soc Welfare.

Source: UCB Faculty Personnel Records, 12/15/2014.

- 1 Women; Asian; URM (African American, Hispanic, Native American).
- 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
- 3 Departments plus multiple appointment indicator (yes/no).
- 4 Current rank (assistant or associate vs. full professor); years in current rank.

3G: Sub-studies of special topics—citations, rank, and retention

Citation counts. Some studies have suggested that citation counts or other similar measures may be relevant to variation in faculty salaries. Thus the steering committee decided to explore this possibility in selected units. Subsection 4C below discusses the context and limitations of this approach; here we simply present the findings of the sub-studies that were conducted.

Citation data were collected for faculty members in four units: Molecular Cell and Biology (MCB), Sociology, Psychology, and Haas School of Business.³⁴ In addition, an earlier study of faculty in the School of Public Health included information concerning h-indices; those results may be seen in Figure 12B at the end of subsection 3G, below. Please note that in each case, submodels 1 and 2 are constructed in the usual fashion. Submodel 3, however, introduces field variables that differ somewhat from the field variables used in the rest of the study,³⁵ and submodel 3a introduces citation counts rather than rank variables. That is, rank variables are excluded from these sub-studies. In all cases, women but not minority faculty were studied, given the small numbers of minority faculty at most of these unit levels.

Figures 10A to 10D summarize the outcomes of the citation-count sub-studies:

³⁴ These data were collected under the direction of Professor Card using Google Scholar. They were obtained during the summer of 2014, and so the number of faculty included in the regression analyses was reduced. In addition, “clean” data could not be obtained for all faculty in the selected units. Tables for this sub-study may be found in Appendix C, Tables D1-D4.

³⁵ For the Haas School, the subfield variables (discussed in subsection 3F above) were used; for Psychology, a yes/no variable for inclusion in the Helen Will Neuroscience Institute was used; and for MCB and Sociology, market variables based upon AAUDE data were used for faculty members with multiple appointments. The reason for using these variables is that faculty members in higher-paying subfields tend to have higher salaries than other faculty members, even within their unit. Especially when we examine small units, these “market factors” can be useful; a full discussion of these variables may be found in Appendix B.

Figure 10A: citation sub-study for Molecular and Cell Biology
 women vs. white men
 log salary submodels 1, 2, 3, 3a

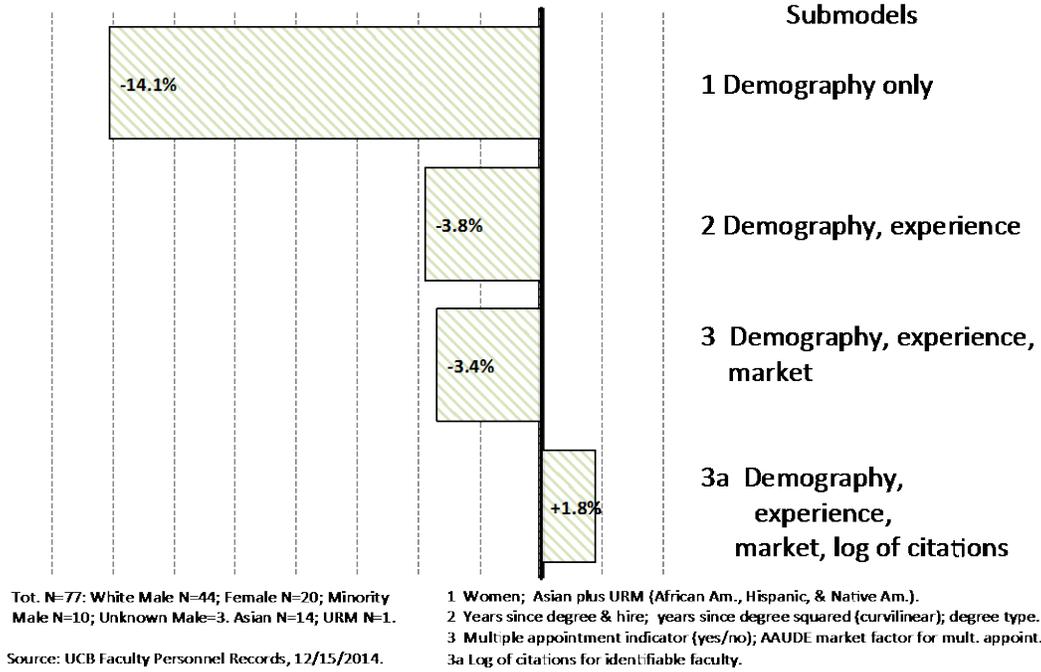
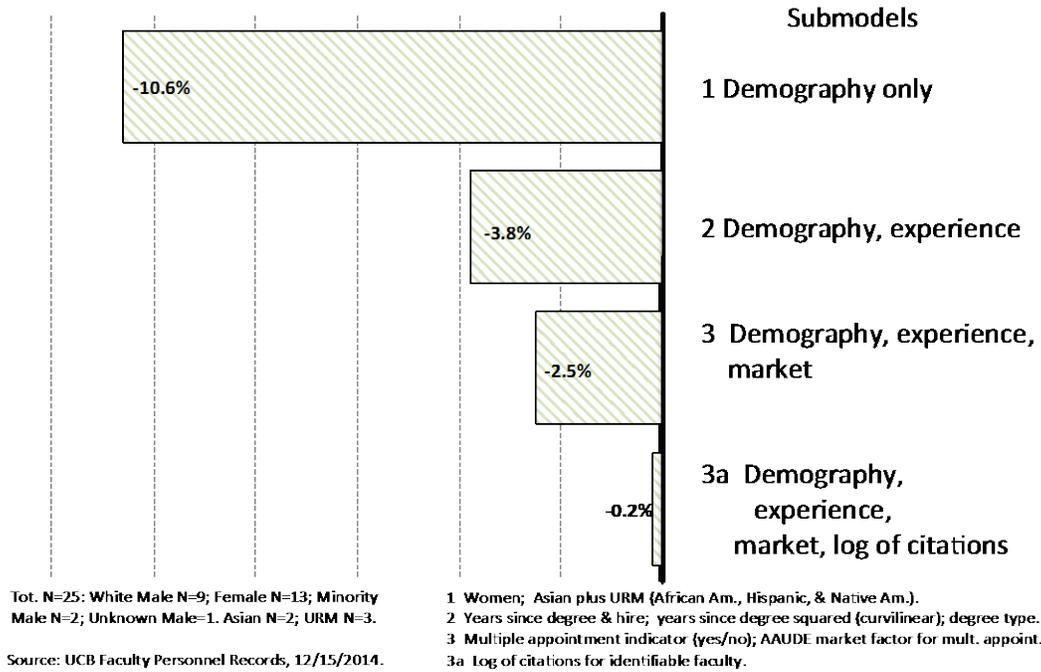
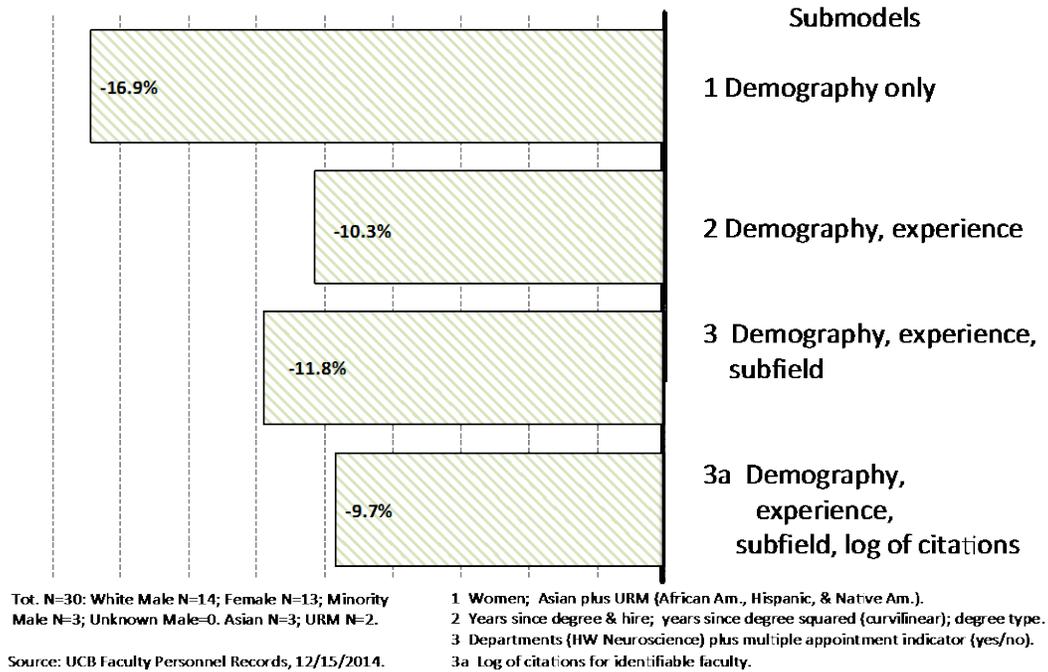


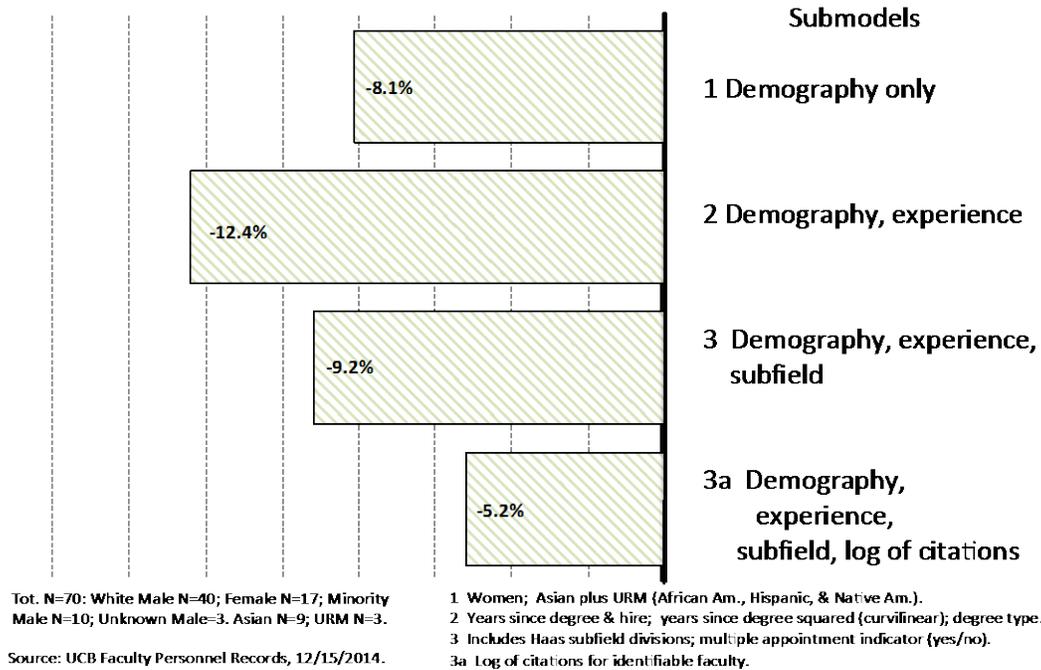
Figure 10B: citation sub-study for Sociology
 women vs. white men
 log salary submodels 1, 2, 3, 3a



**Figure 10C: citation sub-study in Psychology
women vs. white men
log salary submodels 1, 2, 3, 3a**



**Fig. 10D: citation sub-study in Haas School of Business
women vs. white men
log salary submodels 1, 2, 3, 3a**

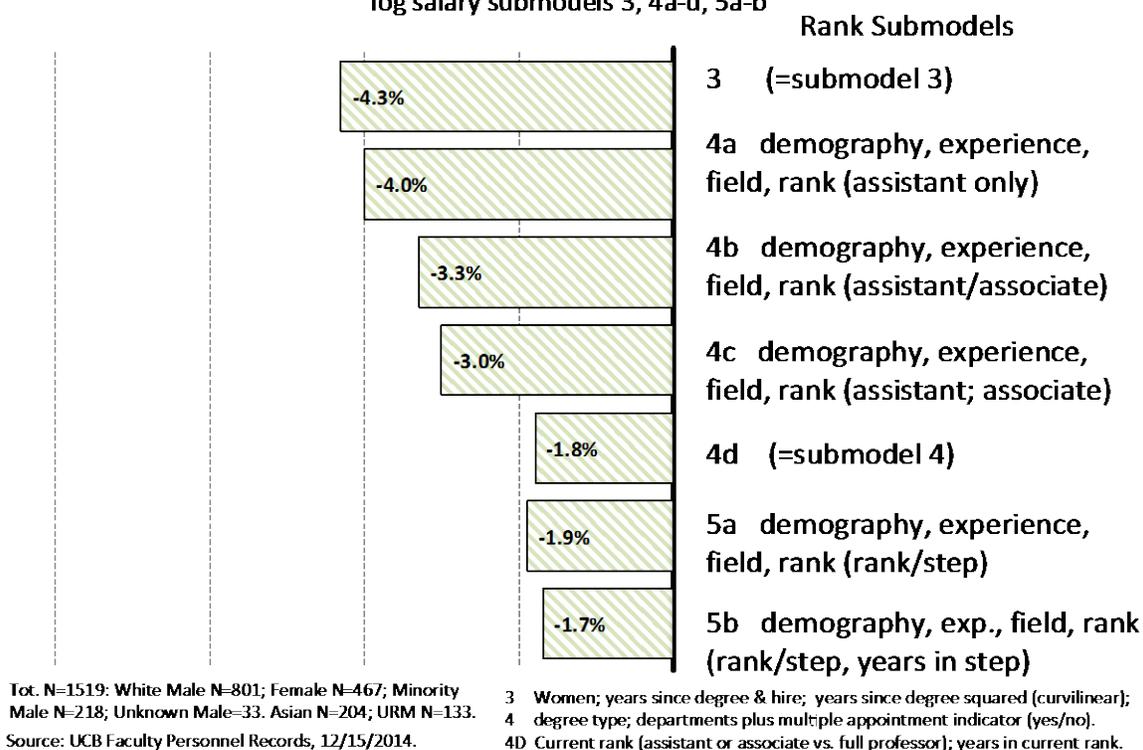


Of course, conducting analysis in small units can increase the impact of outliers, but a consistent pattern emerges across these four units: the submodel including citation variables reduced or eliminated negative salary differences for women, which can be seen by comparing submodel 3 with submodel 3a in each of the figures above. This suggests that Berkeley salaries are associated with how often a scholar's work is cited, and that women's work may be less often cited than men's.

While some additional sub-studies of this kind could be of some value in the future, we note that they are labor-intensive, as the processes for proper data collection and refinement are challenging.

Rank. To explore the effects of introducing rank variables in submodel 4, the steering committee requested that more detailed rank runs should be conducted and discussed in the final report.³⁶ Figure 11 displays some of the findings from this sub-study:

**Figure 11: rank sub-study, campus level
women vs. white men
log salary submodels 3, 4a-d, 5a-b**



This finer-grained approach to rank and step starts with submodel 3, which includes the usual demography, experience, and field variables, but not rank. Here, where results for women are

³⁶ The runs may be found in Appendix C, Tables E1-E6.

presented, we see the negative salary difference of -4.3% for submodel 3 displayed in the top bar. Submodel 4a introduces a single categorical variable for assistant professors (vs. the residual category of associate and full professors), with minimal change. Submodel 4b combines assistants and associates into a single categorical variable, which is run against the residual category of full professor. The results here are more notable, reducing negative salary differences to -3.3%. Submodel 4c includes separate categorical variables for assistants and for associates, running each against full professors; this produces a negative salary difference similar to the one in submodel 4b. Finally, submodel 4d is identical with submodel 4 in the campus level log salary runs, where the negative salary difference for women is -1.8%. (See Figure 4A above.)

What submodel 4d includes that 4a, 4b, and 4c do not is a continuous variable for years in rank.³⁷ It is with the inclusion of this additional time-based variable that the negative salary difference for women decreases to -1.8%.

Submodel 5a takes a different approach, one that has been used in past studies of faculty salaries at Berkeley. It introduces rank and step as categorical variables, and as Figure 11 indicates, this produces results very similar to those obtained by using variables for rank and years in rank, as has been done throughout this study. Finally, submodel 5b goes one step further, including rank-step categorical variables and years at step. The impact is minimal, showing a negative salary difference for women of -1.7%. In submodels 5a and 5b, the negative salary difference for minority faculty relative to white male faculty is small, always less than -0.5% for Asian faculty and slightly positive for URM faculty.

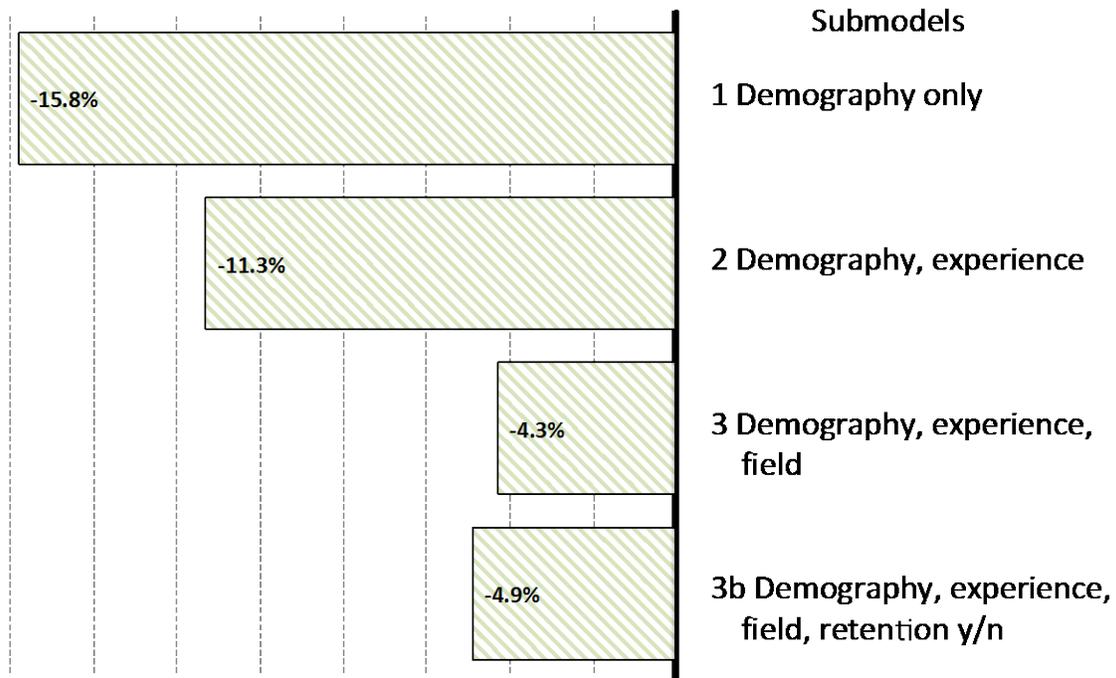
Tables E2-E6 in Appendix C show log salary runs for the campus for individuals in selected rank/step bands: assistant professors, associate professors, full professors below step 6, full professors at steps 6 to 9, and full professors above scale. In aggregate, these runs indicate that negative salary differences for women at assistant rank and professors Above Scale are roughly similar to those for all women; that differences for women associate professors are somewhat less than those for all women; and that women full professors below Above Scale have somewhat larger negative differences than those seen for all women. Because the number of Asian and URM faculty in each of these rank-step bands is small, the observed salary differences are volatile, moving from negative to positive and back again in no easily discernable pattern.

Retention. There can be no question that salary increases provided by Berkeley in response to outside offers create salary disparities between equally accomplished faculty members within the same discipline. This does not, however, settle the question whether these disparities disproportionately affect women or members of minority groups.

³⁷ This is suggested by Haignere in *Paychecks*.

The campus records that are currently available permit only a fairly crude approach to answering this important question.³⁸ Figure 12A shows the results of introducing a single categorical variable (yes/no) indicating whether a particular current faculty member has ever, since 1998, been a “retention case.”³⁹ This variable is introduced in turn after the usual demography, experience, and field variables; rank variables are not introduced here.

**Figure 12A: retention sub-study, campus level
women vs. white men
log salary submodels 1, 2, 3, 3b**



Tot. N=1519; White Male N=801; Female N=467; Minority Male N=218; Unknown Male=33. Asian N=204; URM N=133.

Source: UCB Faculty Personnel Records, 12/15/2014.

- 1 Women, Asian, URM (African American, Hispanic, Native American), Unk. Eth.
- 2 Years since degree & hire; years since degree squared (curvilinear); degree type.
- 3 Departments plus multiple appointment indicators.
- 3B Any outside job offer/retention case since 1998

Introducing this retention variable increases the negative salary difference for women from -4.3% to -4.9%; similarly, differences for Asian faculty increase from -1.7% to -2.3% and for URM faculty from -1.2% to -1.9%. While these changes are not dramatic, their direction suggests that this area of inquiry calls for additional investigation.

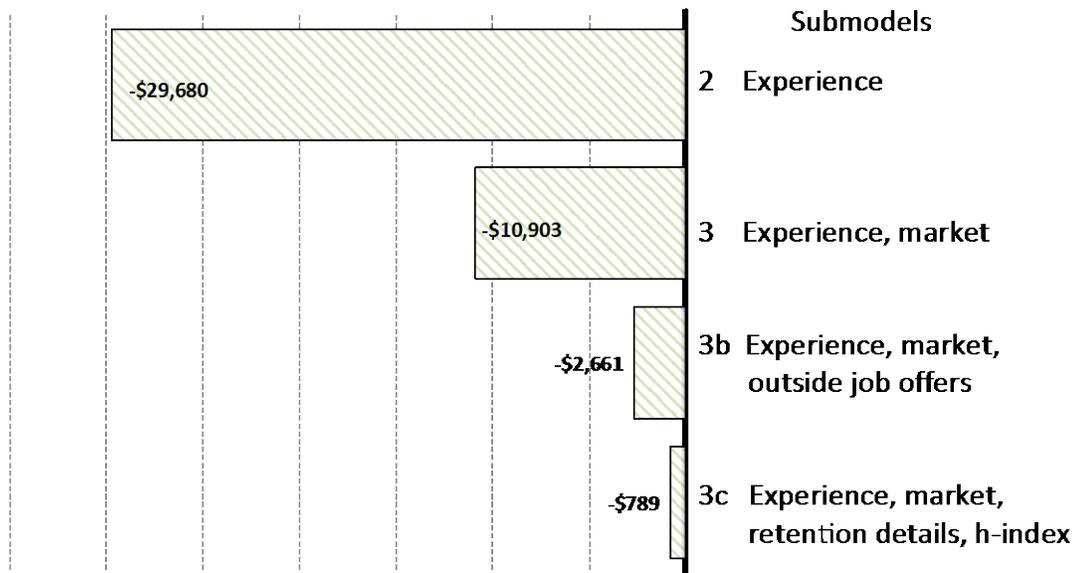
Some further light can be shed on retention issues by a study first conducted in the spring of 2014 concerning salaries in the School of Public Health. (The present study uses December 2014 personnel data, however.) Because earlier studies conducted within the School had used

³⁸ Tables for the retention sub-studies may be found in Appendix C, Tables F1-F3.

³⁹ The designation draws upon records kept by Vice Provost for the Faculty (formerly Vice Provost for Academic Affairs & Faculty Welfare).

the white-male model, that model was used here, and variables concerning retention and h-indices were introduced.⁴⁰ Rank was not used as a variable here. Figure 12B displays results from this sub-study.

**Figure 12B: retention, h-index sub-study, Public Health
women vs. white men
white male submodels 2, 3, 3b, 3c**



Tot. N=55: White Male N=26; Female N=25;
Minority Male=4. Total Minority=12.

Source: UCB Faculty Personnel Records, 12/15/2014.

2 Years since degree & hire; years since degree squared (curvilinear); degree type
3 Multiple appointment indicator (yes/no); AAUDE market factor for mult. appoint
3b Top-10 outside job offer; other offers; salary boost if offer matched
3c H-index of Google citations for identifiable faculty.

Because this unit is of small size, it was possible to collect additional information about outside job offers and retention responses. Each outside offer was coded for whether it did or did not come from a top-ten program as rated by *US News and World Report*. Data were also included concerning the amount of the outside offer and the salary of the faculty member at Berkeley at the time the offer was made. Submodel 3b includes this additional retention information, and it shows a decrease in the average negative salary residual for women from -\$10,903 to -\$2,661. Google H-Indexes were then introduced in submodel 3c, reducing the average negative residual to -\$789.

⁴⁰ This sub-study was conducted at a time when field/market variables based upon AAUDE data were favored for the campus study. Those data appeared to be especially useful in considering salaries within small units. Because the AAUDE data are protected by a confidentiality agreement to a considerable extent, however, the steering committee ultimately decided not to use them broadly, in order to serve the interests of transparency. For more information about the limited use of AAUDE data, see Appendix B.

4. Interpretation

At the campus level, negative salary differences for women lie somewhere between -1.8% and -4.3%; for members of minority groups they lie somewhere between -1.0% and -1.8%. The average salary difference between white males and female faculty members is equivalent to about 1 to 4 years of career experience, and the difference between white males and minority faculty members is equivalent to about 1 to 2 years of career experience.

Results at the levels of schools, divisions, and colleges are variable. Some of these units show larger negative differences for women and ethnic minority-group members than those for the campus as a whole; some show no negative differences; and a few show positive differences.

While the study establishes the presence of differences, it cannot by itself establish what the causes of those differences are. Below we discuss several kinds of causes that *could* be at work, bringing in features of Berkeley and of academia, as well as some potentially relevant social-science findings. In the final section of this report, we draw upon the findings of the study and these interpretative discussions to make a series of recommendations.

4A: Interpreting the results of introducing rank as a variable

Rank is commonly regarded as a measure of an institution's assessment of faculty members' levels of achievement; this, plus the fact that information about it is universally and readily available, means that most studies of faculty salaries include rank as a variable. The present study finds that introducing variables for rank and for time in rank generally reduces negative salary differences by gender and ethnicity. Some would conclude from this that differences in Berkeley's assessment of faculty members' achievement play some role in such salary differences.

Others would argue, however, that rank variables are what statisticians would call "tainted." Rank, like salary is under the employer's control. If salary decisions reflected bias, then rank decisions would, it is argued, probably also reflect that same bias. Thus, some would conclude, rank variables should not be used in studies of salary equity, particularly if the studies also control for experience.

To take account of these two perspectives, this study presents findings both with and without controls for rank. The findings concerning rank presented in subsection 3G above suggest that time in rank may be an important reason why rank variables reduce salary differences by gender and ethnicity at Berkeley. (This would be true whether time in rank reflected bias or not.) In what follows, we explore aspects of campus salary practices, descriptive data, and the UC rank/step system to understand time in rank more fully.

Time off the tenure clock. Normative time in rank for assistant professors is six years from the time of initial appointment, but “time off the clock” can extend the normative time to a period of up to eight years. Most time off the clock is provided for mothers and fathers who are providing substantial care for a newly born or adopted child. Because time off the clock allows for delays in merit reviews, which increase salaries through step advancement, its use could affect salaries differentially if different faculty populations used the option in differing proportions. In addition, a longer period in assistant rank delays faculty members’ access to possible “market adjustments” at the time of tenure (see below).

The potential significance of these timing factors is underlined by the observation, in subsection 3C above, that the average salary difference between white males and female faculty members is equivalent to about 1 to 4 years of career experience.

Market adjustment at tenure. Since 2008, promotion to tenure at Berkeley has entitled faculty members to be considered for a “market adjustment.”⁴¹ A market adjustment would constitute a salary increase beyond the increase associated with rank/step advancement. Thus the elapsed time between initial appointment in assistant rank and promotion to tenure may have some bearing upon salary, because it would affect the time at which faculty members were eligible for market adjustments.

As noted above, this elapsed time may be lengthened by time off the clock. In addition, it may be shortened when departments consider faculty members for early promotion. If the incidences of shortened or lengthened elapsed time to tenure are different for different faculty subgroups, then this, given the “market adjustment” at the point of tenure, could in part explain why the introduction of the rank variables reduces negative salary differences by group.

Associate professors. Because the associate rank is a tenured rank, an individual can stay at the associate rank indefinitely. Step advancement within rank results in salary increases, but there is an upper bound to such advancement. The UC step system is designed so that after advancement to Associate Professor, Step V, faculty members are to advance no further until they can be promoted to the rank of Professor. Berkeley has created a “shadow” step above Step V (called Step V.9), but after that point, further advancement—and thus further merit-based salary increases—would require meeting the criteria for promotion to Professor. Faculty members who can advance no further without crossing a threshold—here, promotion to Professor—are sometimes said to have run out of “headroom.”

Most faculty members who are at Associate Professor, Step V.9, have been in step for more than the normative three years, which probably indicates that their merit-based advancement is being delayed by their lack of headroom. The majority of those faculty members are in

⁴¹ Whether a market adjustment is called for, and if it is, how large it should be, are questions whose answers are based upon a formula that is relative to discipline. The provision and size of an adjustment are not discretionary.

“book-based” disciplines, that is, the disciplines at Berkeley in which the senior faculty have determined that a second book, or its equivalent, is expected for promotion to Professor. Faculty members in these disciplines who have advanced to Associate Professor, Step V.9, but who have not completed a second book or its equivalent, may thus have salaries that lag behind those of others on campus who have been promoted to Professor without encountering a headroom problem in the rank of associate professor.

In addition, there are associate professors whose step is below Step V.9 and who have been in rank for ten or more years. These faculty members have not run out of advancement “headroom” within the rank of associate professor; instead, in most instances their rate of step-advancement within rank appears to have been slower than the normative rate. Again, a substantial number of these faculty members are in book-based disciplines.

There is no question that slow advancement and loss of headroom affect the salaries of faculty members, or that significant numbers of the affected faculty members are from book-based disciplines. We also know that book-based disciplines tend to have higher proportions of women and minority faculty compared with other segments of the faculty population. What is not obvious, however, is what conclusions could be drawn from these observations. We offer a tentative interpretation here.

If slow advancement and headroom problems affected all demographic subpopulations of associate professors in the same way, then it would be unlikely that these difficulties are relevant to explaining negative salary differences by gender or ethnicity. Inspection of faculty staffing lists suggests, however, that women and ethnic minority-group members are disproportionately represented among those who encounter these difficulties. Thus part of the reason why the introduction of rank variables reduces negative salary differences for women and minority group members may be that as associate professors, these faculty members disproportionately experience slowed advancement within rank or the loss of headroom.

This then invites the question why women and minority group members in associate rank advance more slowly or run out of headroom more often, especially in book-based disciplines. (We note that while bias in assessment of achievement could operate in slowing advancement, it would not operate directly in headroom problems where completion of a book is awaited.) Several of the social-science theories discussed below may be pertinent; in addition, a notable finding in the 2011 faculty climate survey was that associate professors are far more likely than their colleagues to state that heavy service loads slowed their advancement.⁴² It is not clear whether this is an accurate perception or whether, if it is accurate, it is connected with rank-related advancement and salary issues. Still, there can be no doubt that it is important to understand whether service and teaching loads are distributed equitably or not, especially as Berkeley considers the trajectories of associate professors.

⁴² UC Berkeley Faculty Climate Survey, 2011, Appendix, Figure 13.

Professors. The UC rank/step scales do not provide any special salary increase for associate professors who are being promoted to the rank of Professor. For example, the salary increase entailed by moving from Associate Professor, Step IV, to Associate Professor, Step V, is only \$100 less than the salary increase entailed by a one-step promotion to Professor, Step II.

Appendix C, Tables E4, E5, and E6 look at faculty in the Professor rank who are below Step VI, between Step VI and Above Scale, and within Above Scale status. Salary differences for women and faculty in minority groups are generally largest for those who are below Step VI. This may in part reflect a “headroom” problem for faculty at Step V.9; the majority of faculty members at that step have been in step for more than three years; similarly for those at Step V.5. The salaries of faculty members at the Professor rank who are below Step VI may also reflect cumulative effects from advancement patterns in the Associate rank, especially if headroom problems delayed promotion to Professor. In this rank/step band, however, there is not as clear an association between experiencing decelerated advancement and being in a book-based discipline.

4B: Implicit associations in academic reviews

Like all UC faculty, Berkeley’s ladder faculty are each assigned either to a rank and step or to Above Scale status. Initial rank and step are to be assigned in accordance with previous experience and accomplishment; subsequent step-wise advancement is recommended and approved with the aim of providing an appropriate reward for each faculty member’s accomplishments in teaching, research, professional activity, and service. Cases for appointment and advancement are assessed at departmental and decanal levels, and they are assessed centrally by the Budget Committee of the Academic Senate and by appropriate academic administrators.

This system of advancement is merit-based. Recommendations and decisions about advancement are based upon evidence that is presented periodically in academic personnel cases, but there is no mechanical process for translating the evidence into an outcome. That means that everyone involved in the review process must exercise judgment.

Judgments of merit are as vulnerable to positive and negative implicit associations as any other kind of judgment, and a large social-science literature demonstrates that such associations are commonly triggered by such factors as gender or ethnicity.⁴³ This is a good reason for taking

⁴³ V. Valian, *Why So Slow? The Advancement of Women* (MIT Press, 1997) provides an extended discussion of gender “schemas,” including the ways in which relatively small imbalances can produce significant cumulative results. A broad discussion of unconscious bias may be found in M. R. Banaji, A. G. Greenwald, *Blindspot: Hidden Biases of Good People* (Delacorte Press, 2013). Some recent literature in the field of implicit social cognition may be found at <https://www.projectimplicit.net/about.html>.

seriously the possibility that the operation of implicit associations within the minds of the individuals involved in the review process plays some role in creating salary differences by gender and ethnicity.

At Berkeley, several practices are intended to counterbalance effects of any implicit associations that may be at work. These include the multi-layered nature of review, which allows for differing perspectives to be offered on each case; review of appointment cases, threshold cases and decelerations⁴⁴ by the Associate Vice Provost for the Faculty, whose charge it is to flag potential issues of equitable treatment of faculty members in the review process; and numerous opportunities for candidates to read, contribute to, and comment upon their review files. It is not possible, however, to conclude whether these practices do counterbalance any implicit associations that may be at work in the review process.

The variability of gender and ethnicity salary differences across units—pronounced in some units and non-existent in others—combined with centralized Senate and Administration review, generally suggests that if there are positive or negative effects of implicit association by gender or ethnicity at work in reviews, these effects do not fully saturate the review system. We caution, however, against placing too much weight on unit-level results, especially for smaller units. Some results may depend, for example, upon the timing of a small number of hires, promotions, merit reviews, or separations for members of subgroups. Results in such circumstances will not support general conclusions about whether implicit associations are or are not at work in those units.

4C: Interpreting sub-studies concerning citation rates

Citation sub-studies in four units (Figures 10A-D and 12B, discussed in subsection 3G above) show that introducing citation-data variables reduces or eliminates negative differences for women. Studies in selected disciplines at other universities have produced similar findings.⁴⁵

Of course, in many disciplines citation data are not appropriate measures to use in assessment of research achievement. In some disciplines, however, they are among the indices that are presented as meaningful in assessments of research impact. The fact that advancement and salaries are centrally reviewed and approved at Berkeley may allow for some generalization from disciplines in which citation rates are more likely to be used to those in which they are not used at all. So the citation sub-studies may provide a basis for hypothesizing that different levels of external recognition of research achievement play some role in explaining salary differences at Berkeley.

⁴⁴ Threshold cases are promotions, advancement to Professor, Step VI, and advancement to Above Scale. Decelerated advancement is advancement at a rate of less than one step per normal period of review.

⁴⁵ C. E. Hilmer, M. J. Hilmer, M. R. Ransom, “Fame and the Fortune of Academic Economists: How the Market Rewards Influential Economists” (IZA, October 2012). The authors extend their investigation to several other disciplines in a paper not yet available for citation.

We note, however, that data like citation counts must be treated with caution, even in disciplines where they are commonly used. First, they may fail to indicate the originality or importance of scholarly work, especially when it has been recently published or is a contribution to an emerging field, and they may produce high numbers for work that is cited as exemplifying research shortcomings. Second, in connection with questions about salary, it is important to keep in mind that merit-based salary increases take teaching and service into account, not just research. So even if citation rates could in some disciplines be relevant metrics, achievement in teaching and service would remain unassessed. Third, in the present context it is important to note that at least one study indicates that men cite each other's work proportionally more often than that of women.⁴⁶

In addition, even if citation data do point toward somewhat different levels of external recognition for research achievement, and even if that in turn explains some salary differences, the deeper question would be what accounted for differences in recognition. Several of the phenomena described in subsections 4D and 4E below would be reasonable candidates for further exploration in response to that deeper question.

4D: Possible social and psychosocial factors at work in academic life

A number of social-science studies indicate that the experiences of women and minority faculty members can differ systematically from those of their colleagues in a variety of ways. While it is not possible to determine the extent to which the phenomena these studies describe are at work in the lives of faculty members at Berkeley, much less the extent to which they may influence salary, the studies are important ones and should prompt serious reflection on the ways in which Berkeley can take the findings of these studies into account.

Deficits theory. This theory states that lack of access to dominant social networks is a significant factor in the lack of parity between faculty subgroups. Studies focused on women and men in STEM fields⁴⁷ conclude that such networks help those whom they include to gain access to opportunities to collaborate, to exchange ideas, and to have access to such resources as grants, lab space, and opportunities to exert leadership and influence. (See also the discussion of external resources below.) These opportunities then support career advancement of those who have access to them; lack of access may slow career progress.⁴⁸

⁴⁶ D. Maliniak, R. Powers, B. F. Walter, "The Gender Citation Gap in International Relations" (*International Organization*, October 2013).

⁴⁷ For studies that focus upon women in the sciences, see G. Sonnert, G. Holton, G. , "Career Patterns of Women and Men in the Sciences" (*American Scientist*, 1996). The 1999 report on the status of women in MIT's School of Science (<http://web.mit.edu/fnl/women/women.html>) provides pertinent findings.

⁴⁸ I. H. Settles, L. M. Cortina, J. Malley, A. J. Stewart, "The Climate for Women in Academic Science: The Good, the Bad, and the Changeable" (*Psychology of Women Quarterly*, 2006).

Thus within departments, it may be that white men are more likely than women or minority faculty to receive mentorship, support, advice, and assistance from senior colleagues. They may be more likely to have their work read and cited by senior colleagues. They may receive more advantageous committee assignments, more introductions to influential colleagues at other universities, or more psychosocial support.

Work/family issues. These have been frequently studied in the wake of Professor Emerita Arlie Russell Hochschild's influential work.⁴⁹ Studies suggest that on average women spend more time than men do on household work and childcare, even when they participate equally in the workforce. The demands of childbirth and breast-feeding certainly fall unevenly on women and men, but other differences appear to be at work as well. It is notable that Berkeley's 2011 faculty climate survey asked respondents who had advanced slowly what they thought the reasons were, and "family/personal reasons" was among the reasons selected by 64% of women as compared with 39% of men.⁵⁰ It is possible that negative salary differences for women are in part explained by the effects of disparities in the demands of family life, although negative salary differences for ethnic minority-group faculty would not in any obvious way be explained in similar fashion.

Stereotype threat. Some research, including pioneering work by EVCP Claude Steele, points toward a phenomenon called "stereotype threat," said to be experienced by members of a group when they fear confirming, or being seen to confirm, a negative stereotype about their group.⁵¹ When performance of a task triggers this anxiety, findings suggest that individuals tend to perform less well. It has been reported that the effect is heightened when few other members of the social group are present. It is possible that within departments, some women or minority faculty experience such effects, which can be subtle as well as overt, and it is also possible that some affected faculty do not perform as well as they otherwise would. Such differentials might in turn be reflected in salary.

Imposter phenomenon, confidence gap. Some social-science literature identifies a distinctive internal state, along with resulting behavior, found in high-performing individuals who persist in feeling themselves to be over-rated by those around them and instead attribute manifestations of their success to other factors, such as luck.⁵² Some gender-focused studies suggest that the

⁴⁹ A. R. Hochschild, A. Machung, *The Second Shift: Working Families and the Revolution at Home* (Viking Penguin, 1989; updated and reissued 2012).

⁵⁰ An earlier 2002–2003 Work and Family Survey indicated that women faculty aged 30 to 50 with children spent an average of more than 100 hours per week in the combined work/family activities, compared to about 90 hours per week for men faculty with children and 80 hours per week for both men and women faculty without children.

⁵¹ An extensive bibliography may be found here: <http://www.reducingstereotypethreat.org/bibliography.html>

⁵² P. R. Clance, S. A. Imes, "The Impostor Phenomenon in High Achieving Women: Dynamics and Therapeutic Intervention" (*Psychotherapy: Theory, Research, and Practice*, 1978). An extensive bibliography of subsequent work on the topic is available here: <http://www.paulineroseclance.com/pdf/IP%20Ref%20List-MOST%20RECENT-8-2-13.doc>. For an engaging essay on the subject, see M. Klawe, "Impostoritis: A Lifelong, but Treatable, Condition" (*Slate Magazine*, March 24, 2014).

phenomenon is especially prevalent among women; others suggest instead that while it is equally prevalent in men, women are more likely than men to be limited in their success by this cluster of phenomena. Some evidence also suggests that there is a “confidence gap” between men and women, and that men may also be generally readier than women to take intellectual risks or broader strategic risks.⁵³ It is possible that differences in these areas may contribute to somewhat slower rates of advancement for those who are affected by them. We note that the view that confidence, risk-taking, and competitiveness are qualities that are important ingredients of academic success may itself call for critical examination.

4E: Market–related factors and other external factors

In several areas, external factors may have direct or indirect effects on faculty salaries at Berkeley, and in some cases there may be reason to hypothesize that the effects are different for women and minorities than for white men.

National disciplinary and sub-disciplinary markets. The disciplines in which Berkeley has the strongest representation of women and members of ethnic minority groups tend also to be the disciplines in which salaries are lowest nationwide. This is consistent with broader findings that when the proportion of women in trades and professions increases over time, compensation in those areas declines.⁵⁴

Like most universities in the United States, Berkeley accepts disciplinary salary differences as a fact of academic life. As discussed in subsection 2C above, equity is itself now conceived as limited in its domain for an individual to other individuals in the same discipline. Thus, for example, we do not attempt to pay distinguished faculty members in the Department of Linguistics as much as we pay similarly distinguished faculty members in the Department of Economics.

By including field variables in submodels 3 and 4, the study to some extent takes these national market differences into account, but the steering committee wishes to note here that these differences may themselves be viewed as structural disadvantages to women and members of ethnic minority groups—disadvantages that may reflect deep structural issues in academia along with other sectors of employment.

In addition, it may be pertinent to note that subfields within a field or discipline may have different national markets. For example, as noted in subsection 3F above, the Haas School of

⁵³ K. Kay and C. Shipman report on the evidence for a “confidence gap” in an article by that name in *The Atlantic* (May 2014). Concerning risk, see J. P. Byrnes, D. C. Miller, W. D. Schafer, “Gender Differences in Risk Taking: A Meta-analysis” (*Psychological Bulletin*, May 1999).

⁵⁴ A. Levanon, P. England, P. Allison, “Occupational Feminization and Pay: Assessing Causal Dynamics Using 1950-2000 U.S. Census Data” (*Social Forces*, 2009).

Business collects national salary data for the subfields into which its faculty members are organized. These data clearly indicate that the subfields have different national markets, and the unit-level study of the School finds that taking these subfields into account reduces negative salary differences for women. In general, such structural issues become especially pointed when they entail higher salaries within a single department in the sub-disciplines in which women and members of ethnic minority groups are less well represented.

More broadly, there are departments in which such distinctions may increasingly be emerging in several ways: qualitative versus quantitative methods; social-science versus bench-science methods; or sociological versus economic analysis. On the one hand, our acceptance of differences in disciplinary markets might suggest that we should, for similar reasons, accept differences in sub-disciplinary markets. On the other hand, we must consider the potential for increasing internal differences as we weigh our priorities for hiring in various subfields.

External resources. Some studies have suggested that there are differences by gender and ethnicity in faculty members' access to support for academic success that is provided externally. These might include the award of research grants or acceptance of work for publication by leading journals and presses.⁵⁵ A recent study of Hubble-related research grants provides some reason to think that women were less likely than men to have their grant applications approved.⁵⁶ A 2011 study of grants made by the National Institutes of Health suggested that scientists in ethnic minority groups were less likely than white scientists to have their grant applications approved.⁵⁷ Reduced access to such support for women or ethnic minority-group members might result in somewhat reduced levels of research achievement, and those might in turn be reflected in salary differences.

Retention. Retention practices raise many questions concerning faculty salaries, but we focus here on the possible effects of retention practices on salary differences for women and members of ethnic minorities. As subsection 3G above notes, introducing a yes/no retention variable produces increases in negative salary differences for women and members of ethnic minority groups. Although those increases are fairly modest—between 0.5% and 0.8%—they deserve attention.

Some Berkeley faculty members believe that men receive a disproportionate number of outside offers compared to women. If this were true, it would suggest one way in which the practice of making retention offers would affect salary differences between men and women. As campus

⁵⁵ L. Bornmann, R. Mutz, H.-D. Daniel, "Gender differences in grant peer review: A meta-analysis" (*Journal of Informetrics*, July 2007); A. E. Budden, T. Tregenza, L. W. Aarssen, J. Koricheva, R. Leimu, C. J. Lortie, "Double-Blind Review Favours Increased Representation of Female Authors" (*Trends in Ecology & Evolution*, 2008).

⁵⁶ I. N. Reid, "Gender-Correlated Systematics in HST Proposal Selection" (*Publications of the Astronomical Society of the Pacific*, 2014).

⁵⁷ D. K. Ginther, W. T. Schaffer, J. Schnell, B. Masimore, F. Liu, L. L. Haak, R. Kington, "Race, Ethnicity, and NIH Research Awards" (*Science*, 2011).

records show, however, over time, the proportion of women and minority faculty among those receiving outside offers has somewhat exceeded their proportions within the total campus faculty population.⁵⁸

The variable used in the retention sub-study indicates only whether each faculty member has or has not been a retention case at some time since 1998. It does not include information about factors that are important in Berkeley's salary responses to outside offers. These include the standing of the institution or program making the offer and the size of the outside offer. In addition, these data include only those who decided to stay at Berkeley, i.e., those who found their retention offers acceptable. For these reasons, relatively little weight can be given to this particular sub-study.

As discussed at the end of subsection 3G above, a sub-study in one professional school includes an additional variable indicating whether the outside offer did or did not come from a highly-ranked program, along with additional data concerning the size of the salary increase offered by the outside institution and the size of the faculty member's pre-retention Berkeley salary. Because Berkeley generally offers larger retention-based salary increases in response to offers from highly-ranked programs, these data help to gauge the extent to which institutional standing and the size of outside offers might explain the findings concerning retention. The sub-study suggests that these may be significant factors, though additional studies would be required before any conclusions could be drawn concerning the campus as a whole.

Finally, if offers to Berkeley faculty members reflect salary differences by gender or ethnicity at the offering institutions, we note that Berkeley's retention practices would be a channel through which such differences would be imported from external sources.

⁵⁸ It would be valuable to investigate proportionality further by examining it within the cohorts receiving outside offers.

5. Recommendations

Although the findings of our study do not allow us to identify the best explanations of salary differences by gender or ethnicity, we nonetheless believe that the study enables us to offer a number of recommendations that should help Berkeley to advance toward its ideals for faculty salaries, including the salaries of women and members of ethnic minority groups.

5A: Additional studies and data-collection

This salary equity study has underlined several additional ways in which Berkeley could learn more about issues that may be connected with faculty salaries differences by gender or ethnicity:

Regular updates of this study. Annual updates of this study should be prepared by the office of the Vice Provost for the Faculty, and the updates, along with reports on the results, should be circulated to the faculty. These updates should be used to foster continuing awareness of the issues and to assess the effectiveness of the interventions recommended below.

Retention data. For each retention case that involves a retention-based salary increase, we recommend that data be collected by the Academic Personnel Office concerning the amount of the outside offer, the amount of Berkeley's response that is attributable to retention (rather than to a simultaneous merit increase), and (where possible) the standing of the program or institution making the offer.

Advancement studies. Additional studies of advancement rates and of "headroom" issues should be conducted to determine whether Berkeley's way of using the step system enables accomplished faculty in all disciplines to advance at similar rates. Particular attention should be given to understanding rates of advancement in the "book-based" disciplines.

Leave and "clock" data. Leave data are not currently collected centrally for faculty across the campus; neither are data about time off the tenure clock for new parents. It would be helpful to collect these data and to analyze them by gender and ethnicity. This could help Berkeley determine whether current "family-friendly" policies are equally helpful to all eligible faculty.

Faculty climate survey. The last climate survey focused on UC Berkeley faculty was concluded in May of 2011. We recommend that an updated survey be conducted within the next one to two years, with the survey questions informed by this report, the 2014 UC climate survey, and other pertinent studies.

5B: Salary enhancement programs

We recommend three programs that would help Berkeley to reduce salary differences between equally accomplished faculty members within the same discipline. These programs would thus advance Berkeley closer to its current equity ideal. In implementing these programs, particular attention should be given to the subgroup of women faculty members who are also members of ethnic minority groups, because their negative salary differences appear to be larger than those for white women and larger than those for men who are members of ethnic minority groups.

Immediate reviews for some faculty. Using a suitable statistical metric, the office of the Associate Vice Provost for the Faculty should identify all individuals who are negative salary “outliers.” The AVP should undertake an immediate review of the records of those faculty members to determine whether their contributions in research, teaching, and service have been assessed fairly in accordance with Berkeley’s policies. If they have not, then remedial action should be proposed by the AVP, reviewed by the Budget Committee, and, if approved by the Vice Provost for the Faculty, implemented effective July 1, 2015.

Revision to the Career Equity Review (CER) guidelines. Currently, the guidelines include this:

For faculty whose salaries are decoupled, a CER resulting in step advancement may not cause the salary to rise. Instead, the decoupled portion of his/her salary will decrease.

Effective immediately, this should be modified to read:

For faculty members whose salaries are decoupled, a CER resulting in step advancement may result in a salary increase under certain circumstances: the decoupled increment will be preserved and not reduced when the decoupling had been provided before the introduction of inequity into the faculty member’s advancement history.

The AVP should review all past CERs, identifying those in which this policy revision would have made a difference to the outcome. In all such cases, remedial action should be proposed by the AVP, reviewed by the Budget Committee, and, if approved by the Vice Provost for the Faculty, implemented effective July 1, 2015.

A new Target Decoupling Initiative. The 2012-14 TDI program stated its goal this way:

The goal of the initiative is to compensate more adequately our most accomplished faculty who currently do not have salaries that reflect the market rates established by our peer institutions. By meeting this goal, the initiative will reduce the disparities that arise from our practices in recruitment and retention, and it will reduce reliance upon the mechanism of retention to reward our most accomplished faculty.

This was a good goal, focused in the first instance on external markets but anticipating a reduction in internal salary differences.

We recommend that in determining the goals and funding level for a new, three-year program, the campus draw upon the findings of the present study, as well as further analysis of the impact of the 2012-14 program. The details of the new program should be designed through consultation among the Senate's Budget Committee, its Committee on Diversity, Equity, and Campus Climate, the Associate Vice Provost for the Faculty, and the Vice Provost for the Faculty. Approval of the program would rest with the Executive Vice Chancellor and Provost. Design of the program should be completed before the end of the spring semester of 2015 so that it can be launched with merit reviews conducted during 2015-16 (with effective dates of July 1, 2016). In addition to using the analyses and information made available by this study, the program guidelines should provide mechanisms to ensure that all eligible women and ethnic minority-group members are appropriately identified for consideration.

5C: Additional programs

Finally, we recommend sustaining and strengthening practices and programs that help to provide equal access for all faculty members to the requisites of academic success and to ensure that all faculty members are advanced appropriately. Such practices and programs are especially strongly recommended in light of the wide range of social-science studies referenced in section 4. In implementing these recommendations, the particular circumstances of women faculty who are members of ethnic minority groups should be considered with care.

(a) It is vital to sustain and enhance Berkeley's family-friendly policies, child-care initiatives, and back-up care program. Professor Emerita Mary Ann Mason, Dr. Marc Goulden (director of faculty data initiatives at Berkeley), and their co-author Nicholas Wolfinger have identified "family-friendly" policies concerning dependent care, dual careers, and childbirth and parenting as among the measures that are especially important in supporting women faculty in academia.⁵⁹ Berkeley is among the institutions that offer new parents time off the "tenure clock" and modification of duties as entitlements, along with paid childbearing leave for birth mothers. Berkeley also now offers back-up care services to help faculty members care for family members, and the campus's Early Childhood Education programs have some slots for infant and preschool care and education for the children of faculty members.

These measures support decisions about life/work balance; at the same time, if they are used differently by men and women, then they may result in some differences in rates of

⁵⁹ M. A. Mason, N. H. Wolfinger, M. Goulden, *Do Babies Matter?: Gender and Family in the Ivory Tower* (Rutgers University Press, 2013).

advancement during family formation. Thus these options may need to be considered further in light of newly gathered data about how they are used.

(b) Each year, workshops are offered for assistant professors and associate professors to help them understand relevant academic review processes, general campus expectations for promotion, and ways to prepare effective presentations of their accomplishments. While these should certainly be continued, they must be supplemented through close and effective mentoring⁶⁰ at the department level.

Berkeley's Vice Chancellor for Equity and Inclusion has been piloting a program aimed at developing such mentoring efforts. All faculty members can benefit from effective mentoring, and as the discussion in subsection 4D suggests, the needs of women and members of ethnic minority groups, who may have fewer points of entry into valuable networks of information and support, should be considered with care.

Particular attention should be given to the question how to support faculty members who are working toward the completion of a book project. The campus has supported the development of writing groups, which offer peer support, and the campus is also funding participation in an on-line peer support program for those who choose that option. The effectiveness of those measures should be carefully tracked, and additional measures should be developed in consultation with book-writing faculty members, along with cognizant deans and chairs.

(c) Berkeley has long offered chairs and deans workshops concerning the preparation of academic personnel cases. Information and recommendations from this study should be presented to the participants at these workshops, and all participants should be asked to read this report.

(d) In the fall of 2013, Berkeley began offering new department chairs a series of "seminars" to help them provide effective leadership. Chairs can have positive and lasting effects on their departments through fostering inclusive climates for faculty, students, and staff, by ensuring that faculty members receive appropriate mentoring, and by helping departments to develop and follow explicit policies about internal governance. Future new-chair seminar series should include background reading and practical advice for chairs so that they can succeed in this broad arena.

(e) As additional data shed further light on patterns of advancement and promotion, candidates, chairs, and deans should focus carefully on ensuring that all faculty members are reviewed in a timely fashion and are recommended for appropriate merit increases. The

⁶⁰ Ying, C., Ross, N., Kulashekar, M., Maisel, M., Webb, E., & Crosby, F. J. (2011). *A bibliography of the empirically-driven literature on mentoring. Technical report #7*. This can be obtained from Crosby at fjcroby@ucsc.edu.

cumulative salary effects over time of several decelerations can be significant. All faculty members should be encouraged and supported in coming forward for timely review; in light of some social-science findings, this may be especially beneficial to women and members of ethnic minority groups.

(f) In assigning service, chairs should check to make sure that assignments are distributed appropriately and equitably. Chairs should bear in mind that faculty members are expected to make greater service contributions as they advance through the rank/step system. Assistant professors should have opportunities to gain service experience, but they should also be able to dedicate most of their time to developing their research and teaching records. Full professors are expected to contribute more service than associate professors, and expectations are highest for Above Scale faculty. Service assignments for faculty members who do large amounts of valuable but unassigned mentoring should be calibrated with particular care.

(g) Transparency can help to assure all concerned that the burdens of teaching and service are fairly distributed. Written policies concerning teaching load should be created if they do not already exist, and they should be discussed by the entire faculty. The development and use of appropriate metrics may help to ensure clarity and fairness. Chairs are responsible for the department's adherence to such policies. Chairs should provide all faculty members with information about course and service assignments, and they should also be advised to consult regularly with the departmental equity advisor about course and service assignments.

(h) This report should provide a springboard for debate and discussion in many arenas, including departmental meetings, Senate committees, and administrative policy-making. The Vice Provost for the Faculty, the Associate Vice Provost for the Faculty, and the Director of Data Initiatives should make themselves available in a variety of forums across the campus to discuss the study and the report. The fruits of campus dialogue should be harvested in as many ways as possible.