ANALYSIS OF UC PAY EQUITY BY SEX AND, AMONG MEN, ETHNICITY, 2009-10

Pauline Yahr, Professor Emerita
Department of Neurobiology and Behavior, UCI

In Fall 2007, UCAAD discussed the value of UC doing a pay equity study in regard to sex and ethnicity to determine if UC practices were meeting regulations such as Title IX. In 2008, Vice Provost (VP) Nick Jewell (UCB, Biostatistics and Statistics) reported that UCOP would do such a study and that the Chancellors had chosen a method based on recommendations in *Paychecks: A Guide to Conducting Salary-Equity Studies for Higher Education Faculty* (2002, L. Haignere), an American Association of University Professors (AAUP) publication, as adapted by UCI. VP Jewell and UCAAD discussed ways to present the results and to test statistical significance. The project did not proceed after VP Jewell left UCOP, so, at UCAAD's request, Academic Council appointed me to pursue it.

Materials and Methods (see also FAQs)

AAUP method. This method uses information on the education (highest degree) and professional experience (years since degree) of the white men in a unit to identify a relationship between those factors and pay. The UCI adaptation adds years at UC. For degree, VP Jewell and UCAAD chose only to distinguish doctoral/professional degrees from others (coded 1 vs. 0).

The relationship between pay and the other factors is identified by linear regression. The regression process identifies four numbers, X, Y, Z and C, to be used in an equation of the form: pay = X times degree code + Y times years since degree + Z times years at UC + C, a constant. If all the white men in a unit have the same degree code, degree drops out of the equation. The regression process determines what values X, Y, Z and C must have for the equation to do the best job of fitting, or predicting, the white men's actual pay. One can use the equation to predict each white man's pay by entering his degree code, years since degree and years at UC. One can then compute his pay deviation by subtracting his predicted pay from his actual pay. That result may be positive or negative since he may be paid more or less than predicted, but the average deviation for the white men in the unit will be zero, because that is how the best fit is defined.

When the relationship between the white men's predicted and actual pay is graphed, the best-fit equation gives a straight line. Each man's data can be shown as a dot. How well the line fits the scattered dots (its goodness of fit) can be assessed statistically to determine how likely it is that the fit obtained would occur by chance. VP Jewell provided scatter plots and goodness-of-fit results when he showed preliminary results to UCAAD, and UCAAD found them useful for addressing questions as to whether 2-3 factors could predict faculty pay.

The white men's equation is then used to predict pay for each woman or minority man by entering their degree codes, years since degree and years at UC. Absent discrimination, their average pay deviation (actual minus predicted pay) would be expected to be close to zero and to be no more likely to be below zero than above it, just as a fair coin comes up tails half the time.

Current study. UCOP provided 7,879 nameless records. They did not include Lecturers, Health Sciences faculty, Deans, Provosts, VPs, etc. They did include Associate Deans and department chairs, but the pay information provided (appointment pay rate) did not include administrative stipends, summer salary, or other supplements. It did include off-step pay.

UCAAD and VP Jewell agreed that the units by which pay data should be analyzed were academic units headed by deans to maintain the integrity of the paths followed by academic personnel reviews.   Using campus websites, 72 such units were identified.

Four cases were dropped because the unit to which they belonged could not be identified. Another 395 cases, to which UCOP was alerted, were dropped because information on degree and/or years since degree was missing (see Table 1); they included all ranks and times at UC. To keep units comparable, 115 cases with Acting titles or titles outside the Professor series (e.g., in the 3000 or 2100 appointment series) were dropped. Then, as a logic check, years since degree was subtracted from age to get age at degree. Seven cases with implausible results (i.e., PhD at age 19, 5 or before birth, or at age 58-67 after many years at UC) were dropped. That left 7,358 cases. The number of white (code WH) men ranged from 4 to 159 per unit (see Table 2).

Using Stata software, a best-fit, pay-prediction equation was computed for the white men in each unit, and the results were graphed and evaluated for goodness of fit. The equation was then used to predict pay for each woman and minority man (code AS, BL, HI or IN) in the unit, and their pay deviations were averaged. To assess the overall effect of sex on pay, the number of units in which women's average pay deviation was below zero was compared to the likelihood that a fair coin comes up tails that often when tossed (2-tailed cumulative binomial probability). The overall effect of ethnicity on men's pay was assessed the same way. These, and all, results were considered statistically significant when the probability (p) that they would occur by chance was less than (<) 5 in 100 (p < 0.05).

 Since sex differences in pay in units with Economics (Econ) departments are often claimed to reflect different percentages of women and different pay scales in Econ vs. other departments, a second equation was computed for each unit with an Econ department after white men in that department were excluded. This equation was used to predict pay for women in non-Econ departments to determine if any sex difference seen in the unit as a whole would change when faculty in the Econ department were excluded.

To assess effects of sex on pay within units, two pairs of regressions were done per unit. One pair used data for women and white men. The first regression of this pair predicted their pay based on years of professional experience, years at UC and degree. The second added sex as a factor, and its interactions with the other factors. A likelihood-ratio test was used to determine if the prediction model that included sex predicted pay better than the one that did not. If a statistically significant effect of sex was found, the p value is shown on the women's pay deviations graph. The second pair of regressions, one with, one without sex as a variable, was done using *all* men in the unit. Then, for units with Econ departments, this entire process was repeated without the Econ faculty.

To assess effects of minority status on pay among men within units, a pair of regressions for white and minority men was done for each unit. One predicted their pay based on years of experience, years at UC and degree. The other added ethnicity as a factor (WH vs. AS, BL, HI or IN) and its interactions with other factors. If the likelihood-ratio test showed that the model with ethnicity predicted pay better than the one without, the p value is shown on the minority men's pay deviations graph.

Results

Predicting white men's pay. Figure 1 shows how the pay of the white men related to the prediction factors of years of professional experience, years at UC and, in some units, degree. The portion of the white men's pay variation accounted for by the prediction factors is shown for each unit as the adjusted R^2 (e.g., .60 = 60%). Associated p values are shown as well. These p values were computed to only four decimal places, so p = 0.0000 means that p < 0.0001.

Most units (58/72) showed a statistically significant relationship between white men's predicted and actual pay. For these units, the prediction factors accounted for anywhere from 12% (UCSD Biological Sciences) to 96% (UCM Natural Sciences) of white men's pay variation. For units with Econ departments, 7-25% more variance was accounted for after white men in that department were excluded. Nine of the 14 units not showing a significant relationship between white men's actual and predicted pay were small (9-33 faculty) with relatively few (4-14) white men. It is more difficult to obtain statistically significant results when few individuals are involved. The other five units were Schools of Business, Management or Law.

Overall effects of sex. Figure 2 shows average dollar amounts by which women's pay deviated from that predicted by the pay of the white men. The result for each unit is shown as a bar extending above or below zero to indicate whether, on average, the women were paid more or less than predicted. The line inside the bar provides an estimate of the variability of the pay deviations (standard error of the mean, SEM). Women were paid less than predicted in 75% of units (54/72). When Econ departments were excluded, women's pay deviations decreased (see last graph of Fig. 2) but remained below zero in 53 units. The probability (p) of getting a pattern that skewed (54 tails in 72 tosses) in either direction by chance with a fair coin is 26 in a million (p = 0.000026; without Econ, p = 0.000076).

Overall effects of ethnicity. Figure 3 shows average dollar amounts by which minority men's pay deviated from that predicted by the pay of the white men. Minority men were paid less than predicted in 58% (42/72) of units. The probability of getting a pattern that skewed (42 tails in 72 tosses) in either direction with a fair coin does not differ significantly from chance (p = 0.19).

Effects of sex within units. Ten units (two at UCD, UCI, UCSD; one at UCB, UCM, UCR, UCSC) showed significantly more accurate pay prediction for women and white men when sex was included as a predictor than when it was not (see p values on bars of Fig. 2). In nine of those units, women were paid less than predicted by the pay of the white men. At UCD, UCI and UCSC, the sex effects persisted when women were studied with all men; at UCM, UCR and UCSD, they did not. Two other UCD units (Law; Math/Physical Sci) showed an effect of sex *only when* women were studied with all men. Four units showing a significant sex effect for women and white men have Econ departments (UCB, UCSD, two at UCD). In three of those units (UCB, UCD), the sex effect persisted after the Econ department was excluded, though the effect at UCB did disappear when the Econ department was excluded *and* the remaining women were studied with *all* of the remaining men. In contrast, excluding the Econ department revealed an effect of sex on pay prediction for women and white men in a UCM unit that had not shown one when the Econ department was included.

Effects of ethnicity within units. Eight units (three at UCI, UCLA, one at UCB, UCM) showed significantly more accurate pay prediction for white and minority men when ethnicity was included as a predictor than when it was not (see p values on bars of Fig. 3). In two of those units, minority men were paid less than predicted by the pay of the white men. Only UCI Law showed a within-unit effect of both sex and ethnicity on pay prediction.

Discussion

Predicting white men's pay. The results obtained here show that, for most UC units, years of professional experience, years at UC and degree produce a statistically significant fit to white men's pay, as UCI has seen for years (see Fig. 4). Thus, downplaying group differences identified with the method by deriding its use of only a few predictors is inconsistent with the evidence that those predictors account for significant, albeit varying, portions of the variance in the white men's pay. This may be one of the reasons why the Chancellors chose this method.

Identifying group differences. The method used does not include subjective assessments of merit. Such assessments are used when departments, chairs, deans and CAPs evaluate individuals to advise campus administrators on rank, step, and sometimes pay. Campus administrators use that advice and their own subjective assessments to decide on rank, step and the extent to which pay will be dissociated from them. Any of these reviewers may argue that one person, say a woman, is less meritorious than another, say a white man. But it is unlikely that they would argue that women, as a group, are less meritorious than white men. Yet because subjective assessments can be affected by biases, preferences and even familiar practices, they can, inadvertently, produce group differences. The strength of multiple regression lies in identifying group differences. This may be another reason why the Chancellors chose this method.

Snap-shots vs. patterns. Since the present results are snap-shot (albeit of a scene that changes only once a year), questions may arise as to whether they reflect long-term patterns. UCI's longitudinal data suggest that they do. Figure 5 shows pay equity patterns for three UCI units and its general campus as a whole. One unit, Business, is among the minority of UC units for which white men's '09-10 pay was not related to experience, time at UC and degree. It has shown large pay equity swings over time. The other two, Biological Sciences and Humanities, are among the majority of UC units for which white men's '09-10 pay was related to experience, time at UC and degree. Those two units have shown persistent inequity for 10-13 years. Across the general campus as a whole, pay inequity for women increased 6- to 7-fold over the last 13 years, going from about $700/woman in '98-99 to about $4,500/woman in 2010-11. Since UCI's '09-10 data resemble those for other UC campuses *and* its own long-term patterns, a hypothesis that the '09-10 data do not reflect long-term patterns contradicts the available evidence.

Sex vs. ethnicity. The results obtained here also show that sex and ethnicity affect pay differently. Within units, pay prediction improves more often when sex is included as a predictor than when ethnicity is included as a predictor among men. Sex also affects pay in a more consistent direction. Positive/negative patterns of pay deviation related to ethnicity among men do not differ from what is expected by chance. Sex-related patterns do. Thus, pay equity patterns for women are not consistent with what is expected in the absence of discrimination.

Figure 1

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)

BK - Arts and Humanities

adjusted R^2 = .56
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

BK - Biological Sciences

adjusted R^2 = .39
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

BK - Business

adjusted R^2 = .02
p = 0.258, not signficant

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

BK - Education

adjusted R^2 = .52
p = 0.0144

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
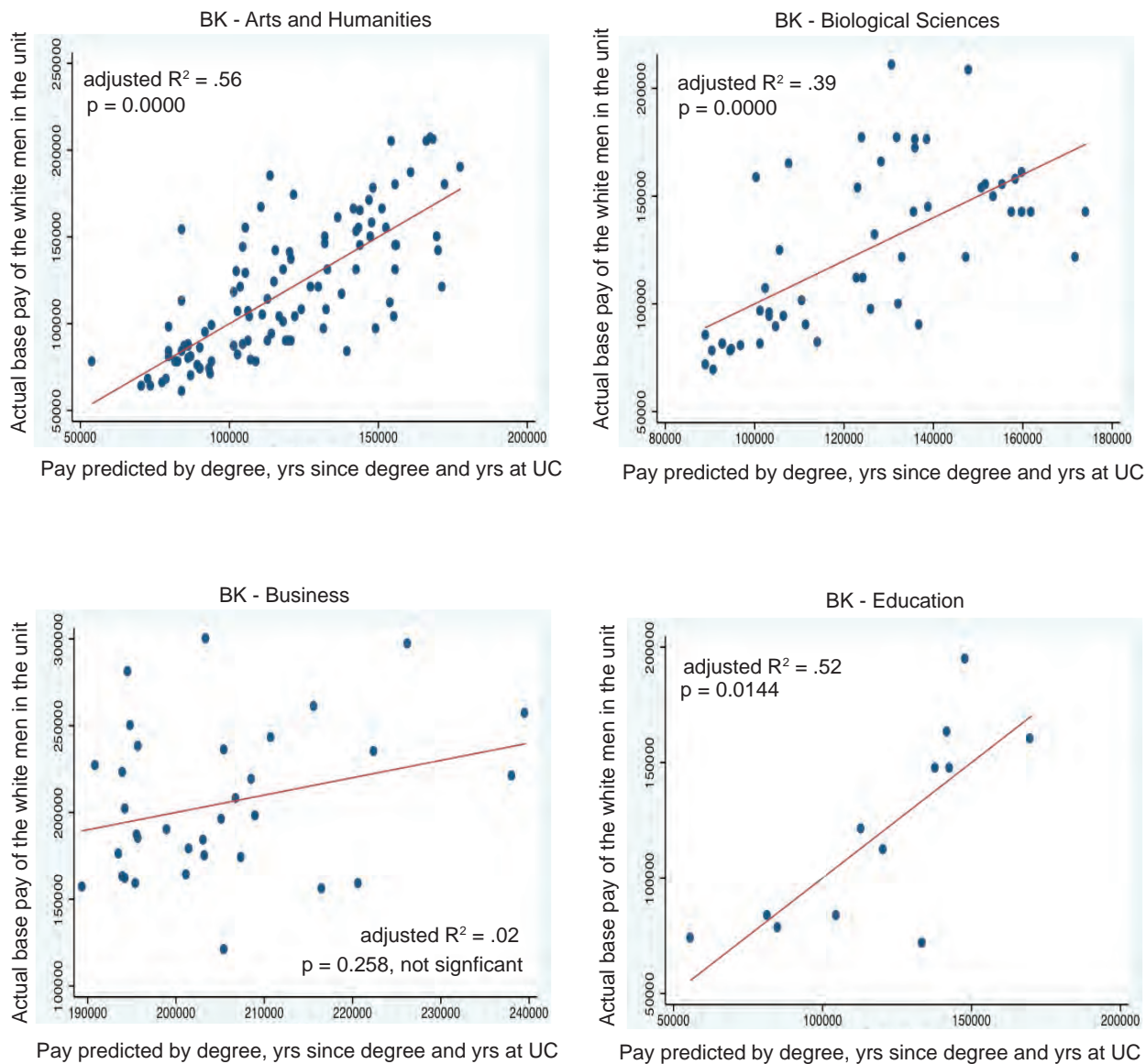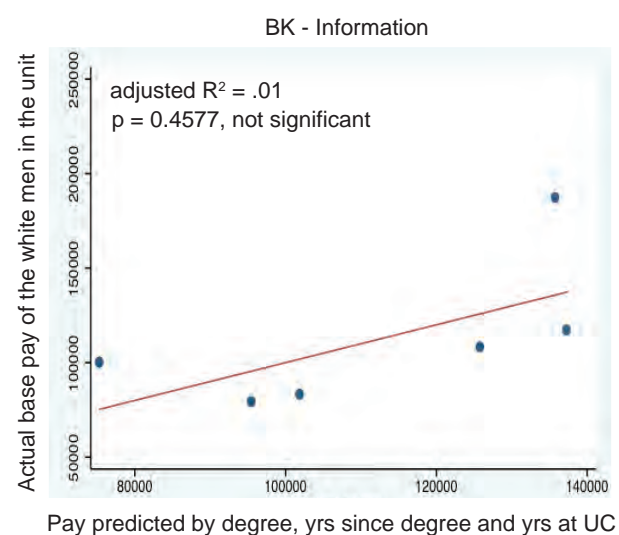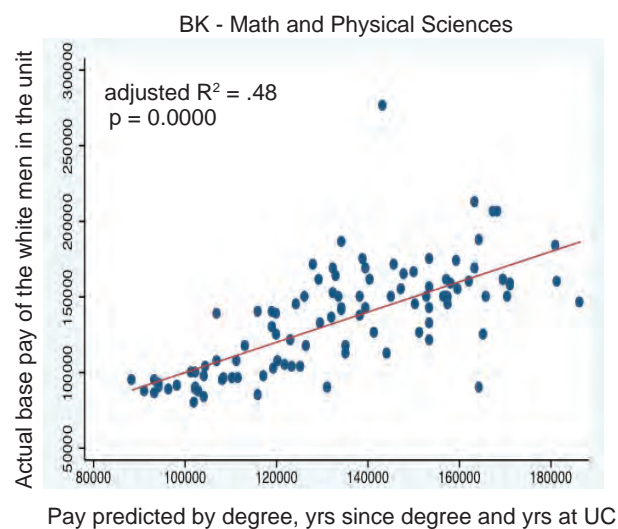
BK - Chemistry and Chemical Engineering

adjusted R^2 = .38
p = 0.0003

BK - Engineering

adjusted R^2 = .52
p = 0.0000

BK - Math and Physical Sciences

adjusted R^2 = .48
p = 0.0000

BK - Information

adjusted R^2 = .01
p = 0.4577, not significant

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
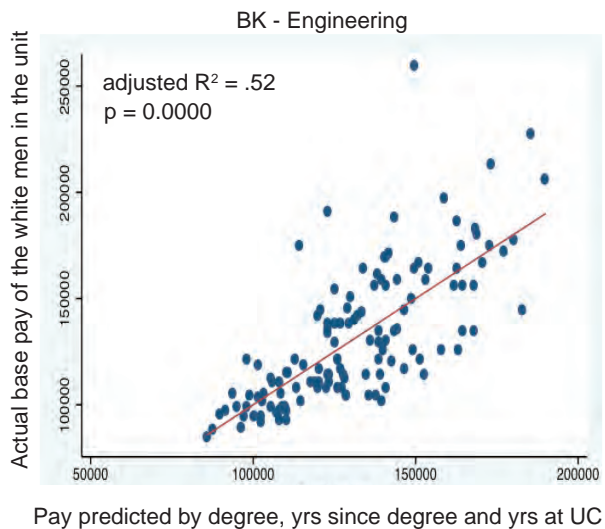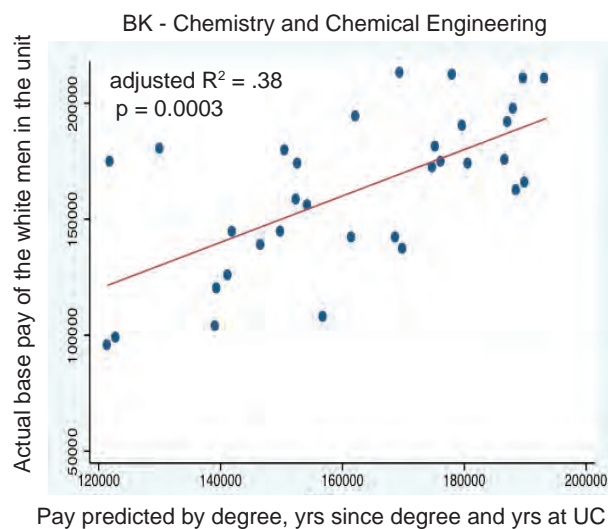

BK - Environmental Design

adjusted R^2 = .55
p = 0.0007

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

BK - Law

adjusted R^2 = .39
p = 0.0013

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

BK - Natural Resources

adjusted R^2 = .60
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

BK - Public Policy

adjusted R^2 = -.14
p = 0.58, not significant

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
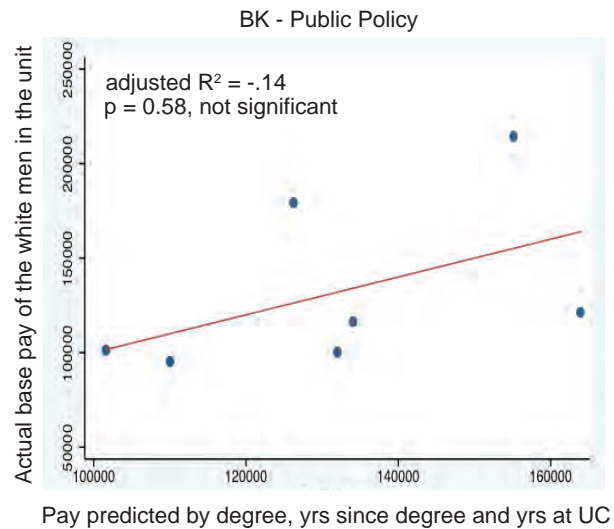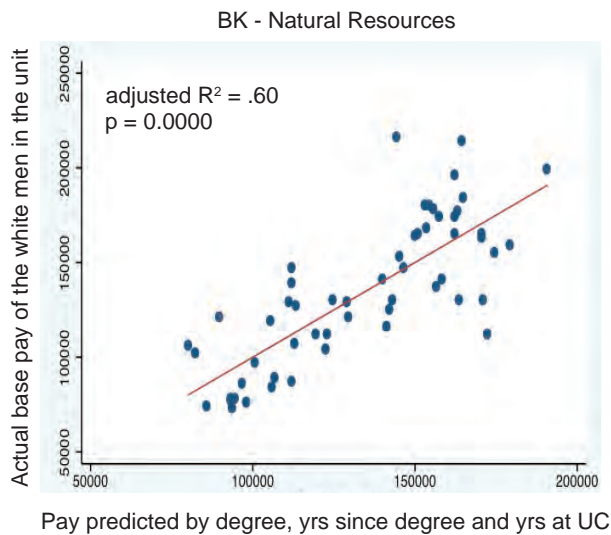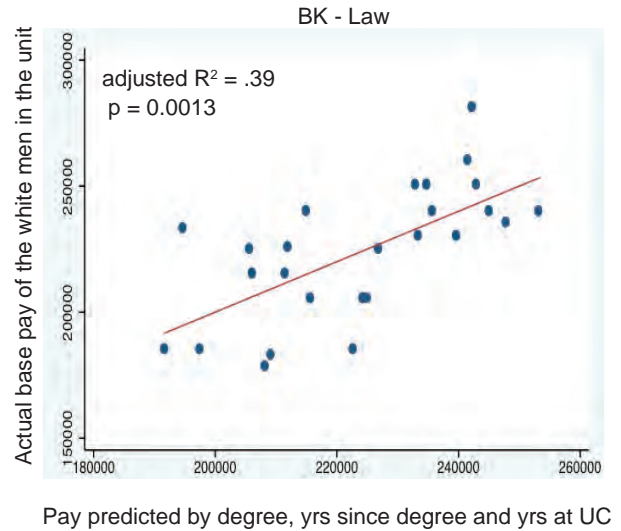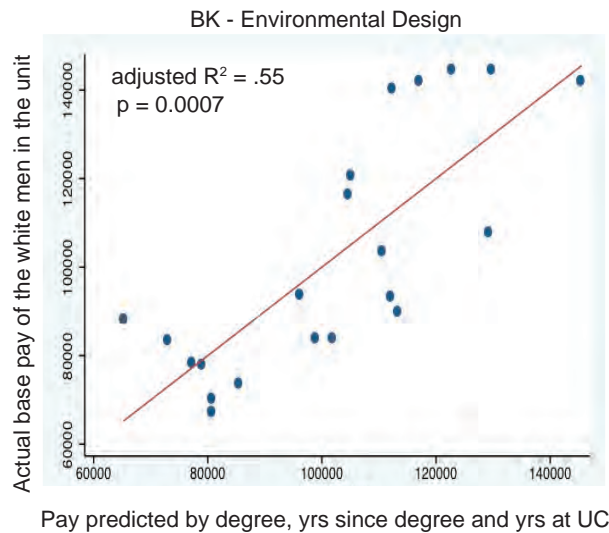
BK - Social Science

adjusted R^2 = .23
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

BK - Social Science, excluding Econ

adjusted R^2 = .47
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

BK - Social Welfare

adjusted R^2 = .33
p = 0.26, not significant

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
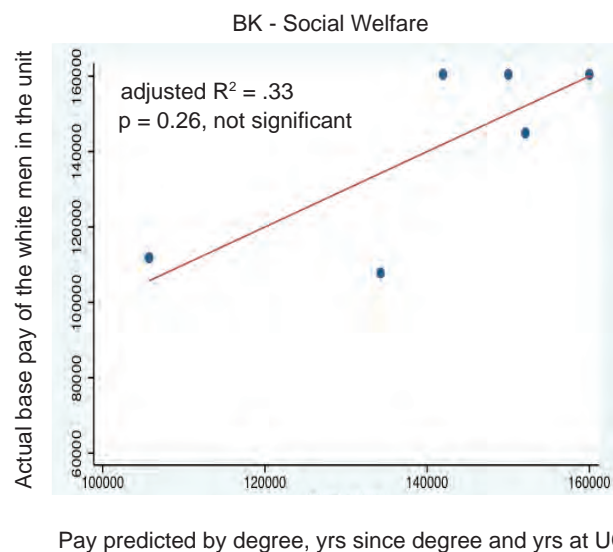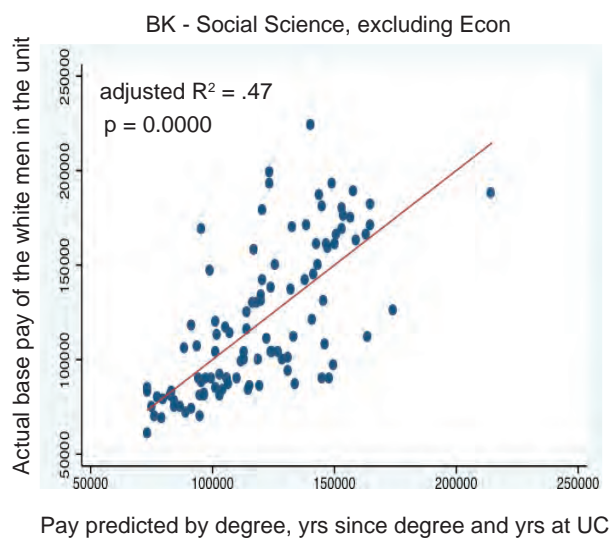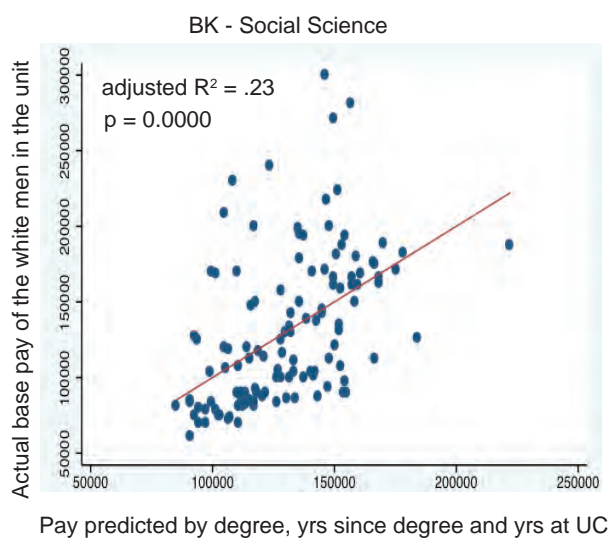
DV - Ag and Environmental Science

adjusted R^2 = .52

p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

DV - Ag and Envir Sci, excluding Econ

adjusted R^2 = .55

p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

DV - Social Science

adjusted R^2 = .50
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

DV - Social Science, excluding Econ

adjusted R^2 = .66
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
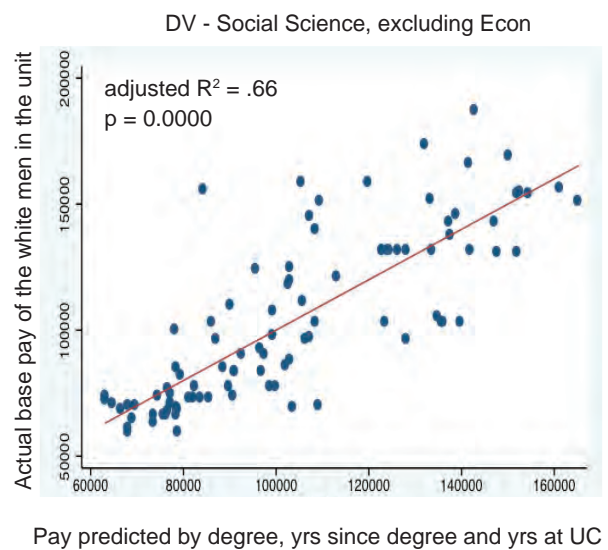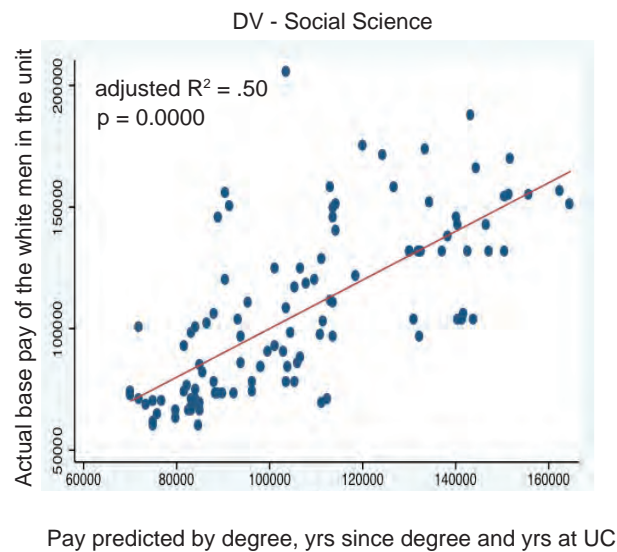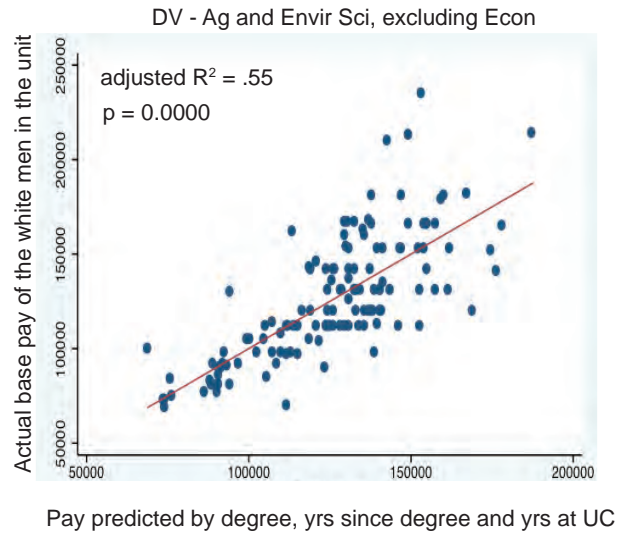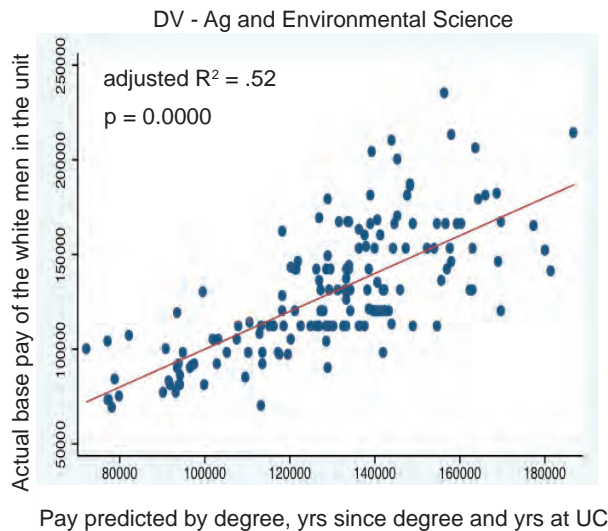
DV - Biological Science

adjusted R^2 = .67
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

DV - Education

adjusted R^2 = .52
p = 0.045

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

DV - Engineering

adjusted R^2 = .62
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

DV - Humanities, Arts, Cultural Studies

adjusted R^2 = .70
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
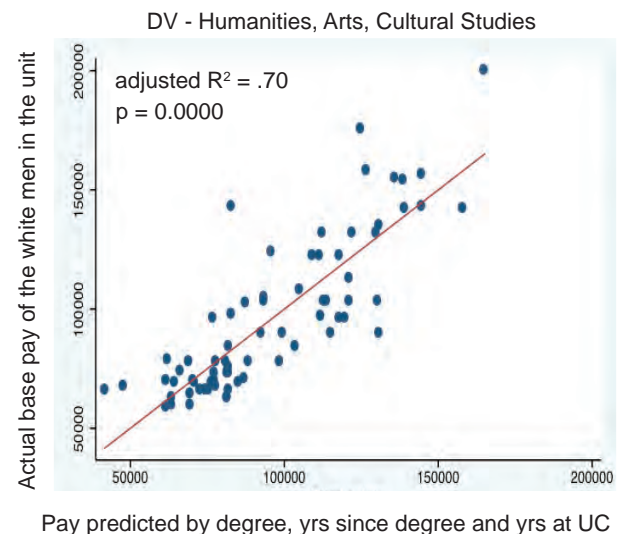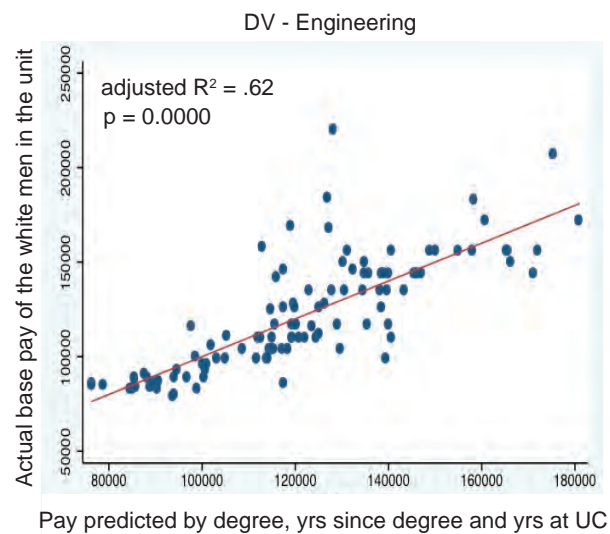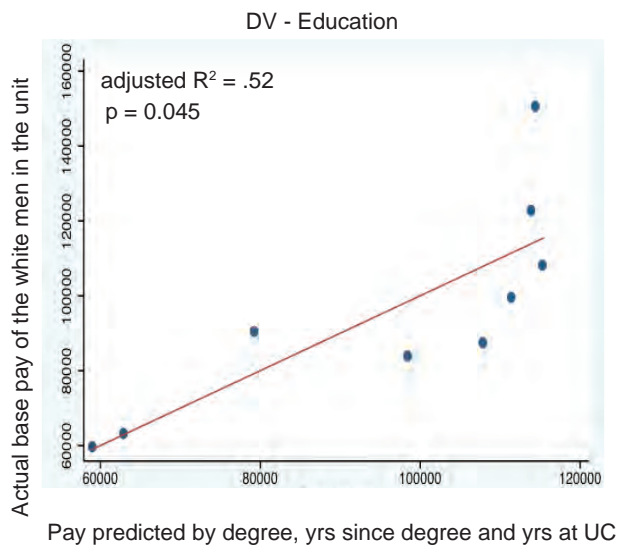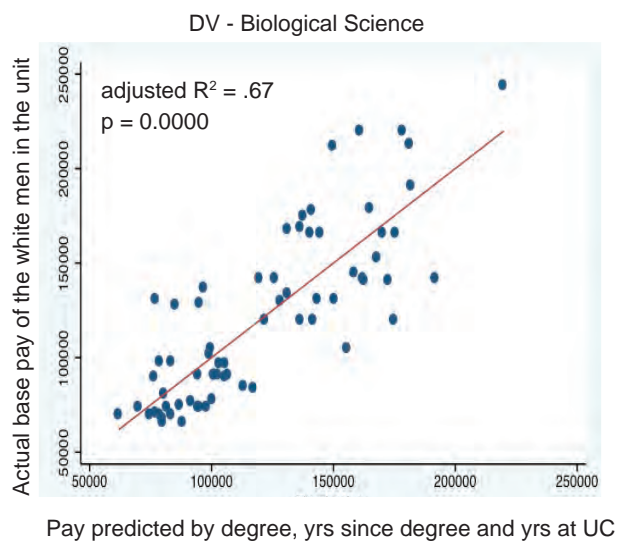
DV - Law

adjusted R^2 = .42
p = .11, not significant

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

DV - Management

adjusted R^2 = .31
p = .11, not significant

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

DV - Math and Physical Sciences

adjusted R^2 = .50
p = 0.0000

Actual base pay of the white men in the unit
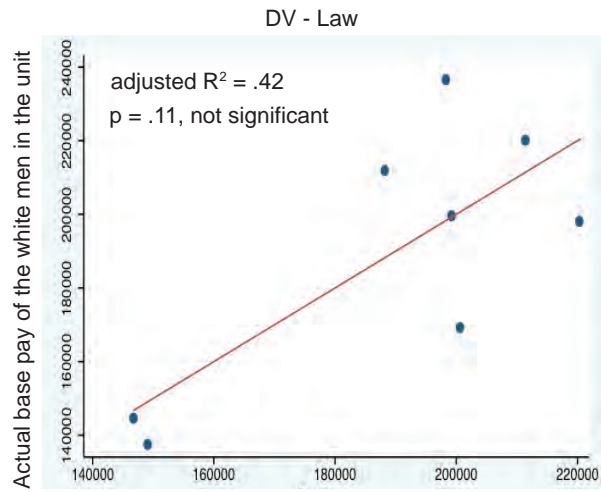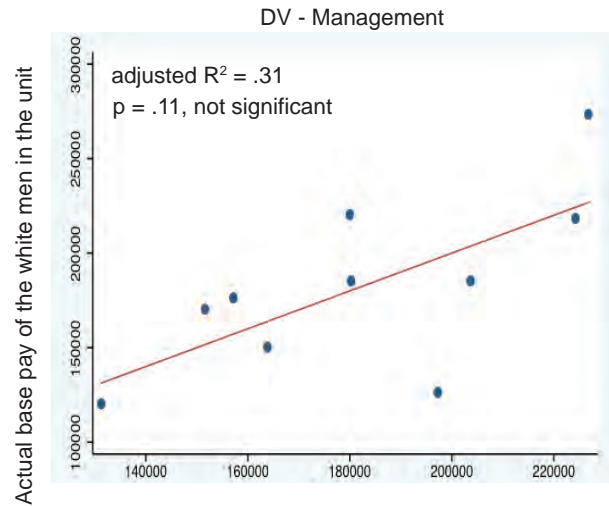
Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC
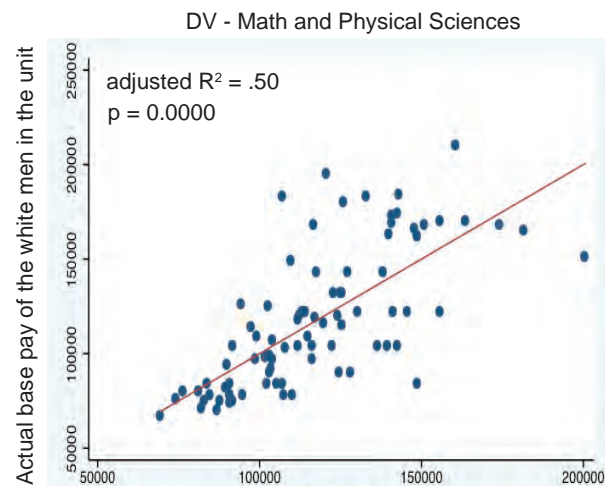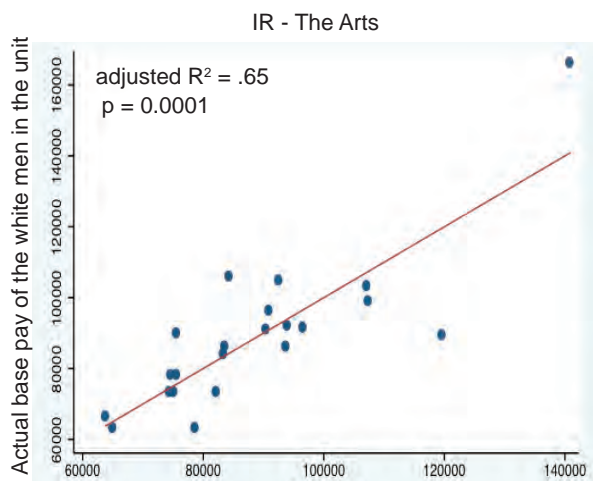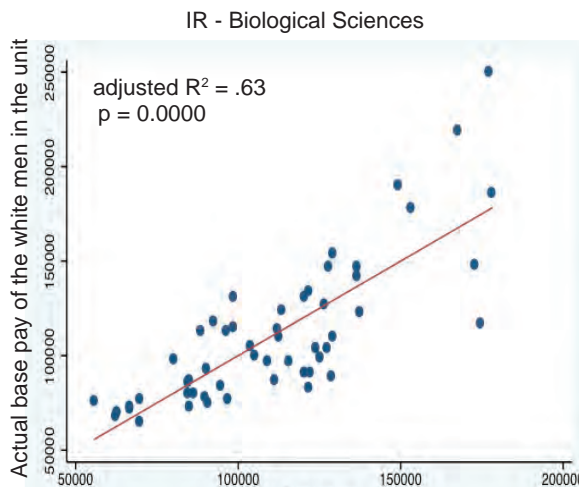
(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)

IR - The Arts

adjusted R^2 = .65
p = 0.0001

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

IR - Biological Sciences

adjusted R^2 = .63
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

IR - Merage School of Business

adjusted R^2 = .10
p = 0.219, not signficant

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

IR - Education

adjusted R^2 = .64
p = 0.178, not signficant

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Table 1

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC
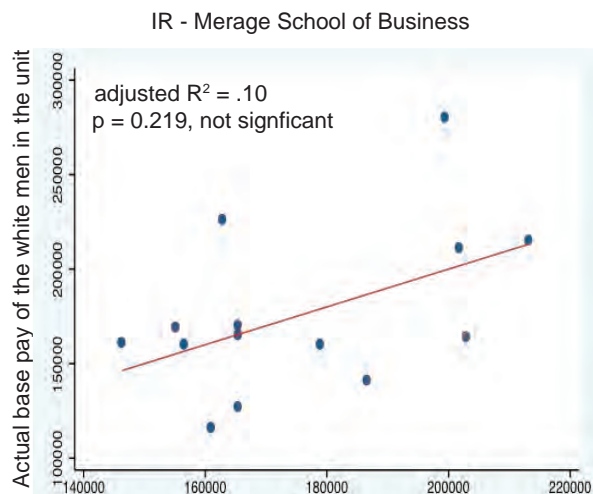
(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
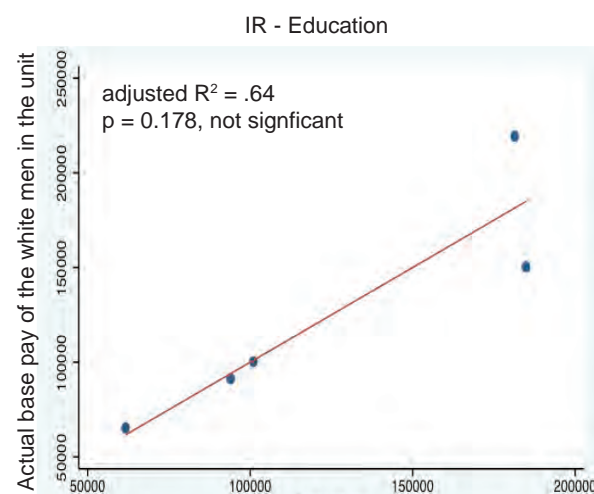
IR - Engineering

adjusted R^2 = .74
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

IR - Humanities

adjusted R^2 = .62
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

IR - ICS (Information and Computer Sci)

adjusted R^2 = .57
p = 0.000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

IR - Law

adjusted R^2 = .84
p = 0.233, not signficant

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

IR - Physical Sciences

adjusted R^2 = .58
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

IR - Social Ecology

adjusted R^2 = .51
p = 0.0004

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

IR - Social Sciences

adjusted R^2 = .67
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

IR - Social Sciences, excluding Econ

adjusted R^2 = .74
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
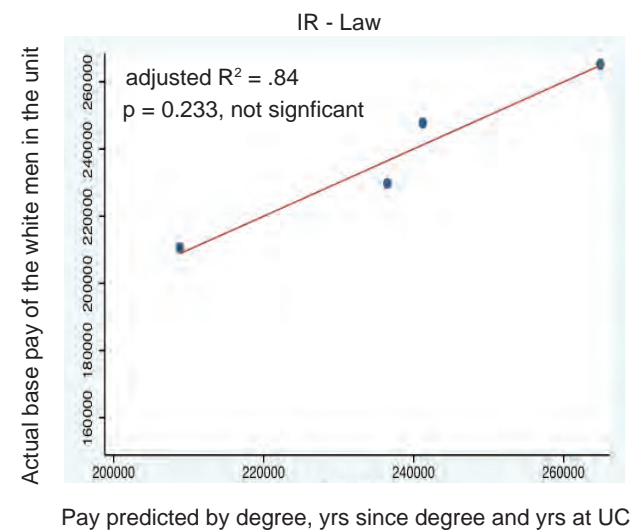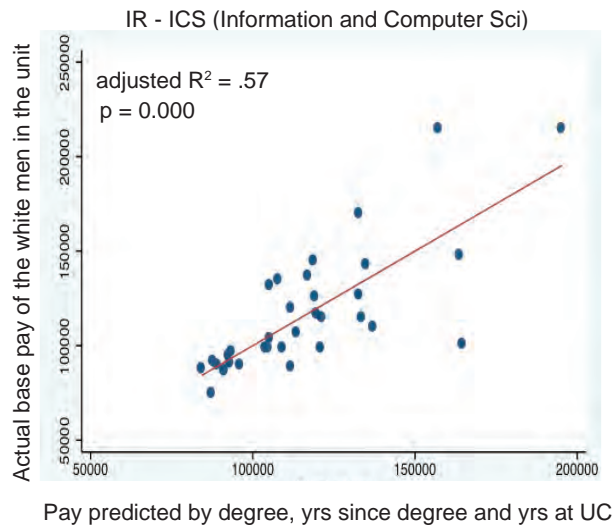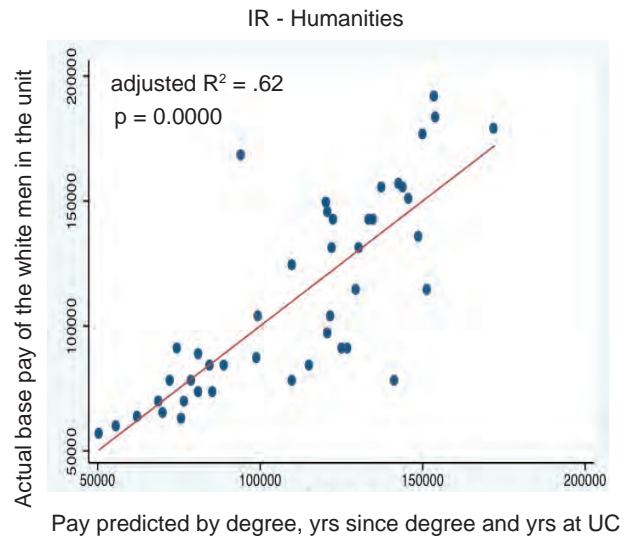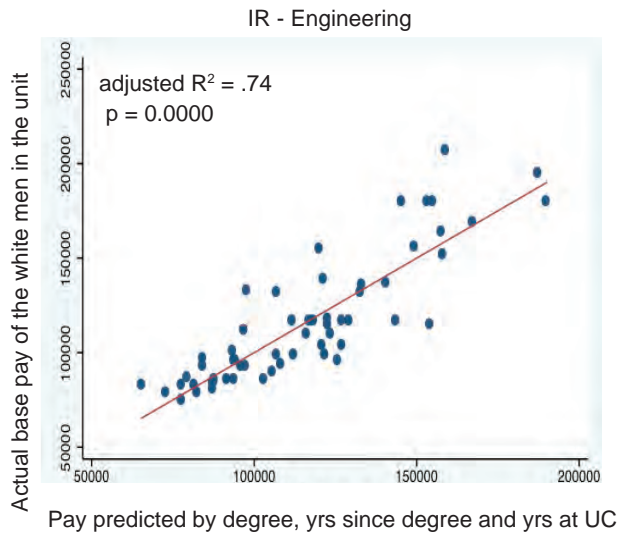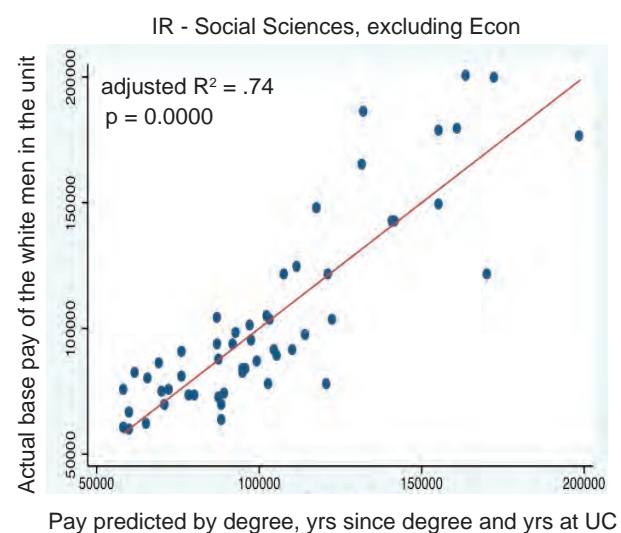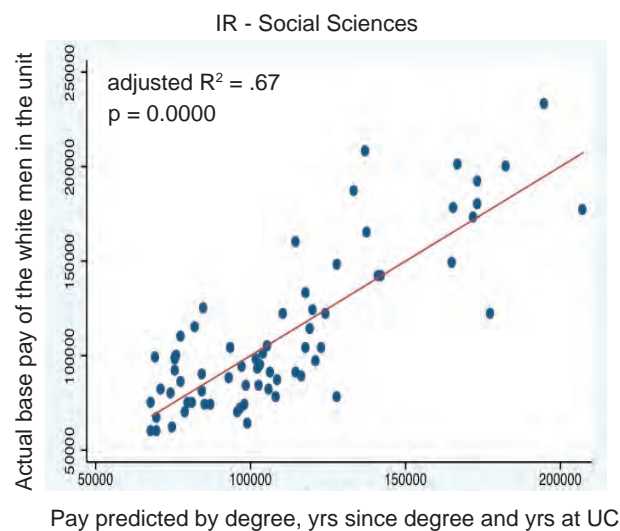

LA - Arts and Architecture

adjusted R^2 = .48
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

LA - Film, Theater and TV

adjusted R^2 = .00
p = 0.45, not significant

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

LA - Anderson School of Management

adjusted R^2 = .02
p = 0.22, not significant

Actual base pay of the white men in the unit

Fitted values

Pay predicted by degree, yrs since degree and yrs at UC

LA - Public Affairs

adjusted R^2 = .64
p = 0.0014

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC
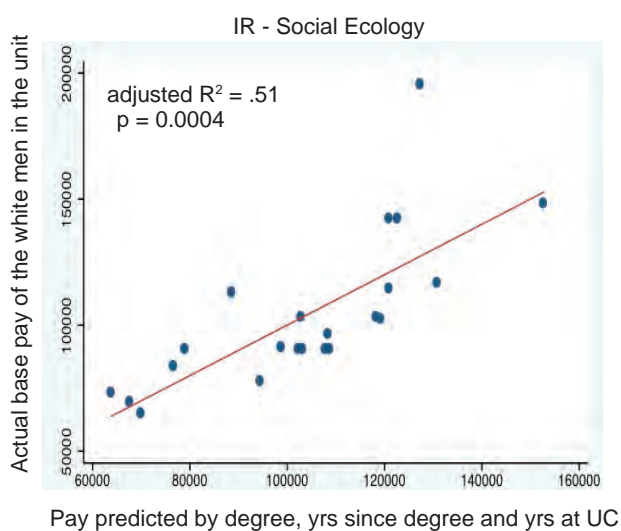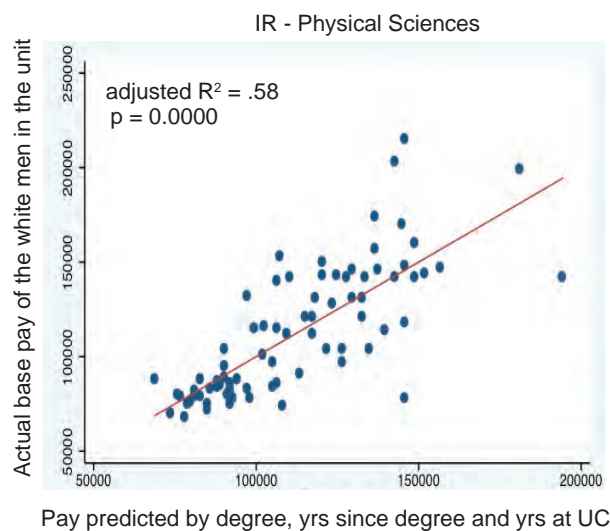
(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
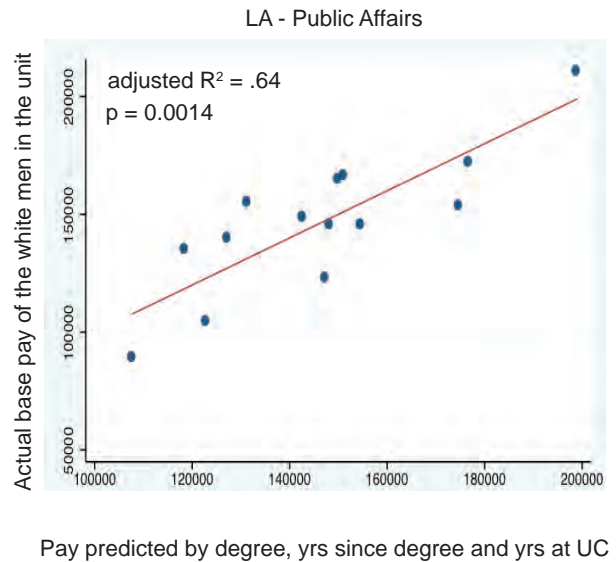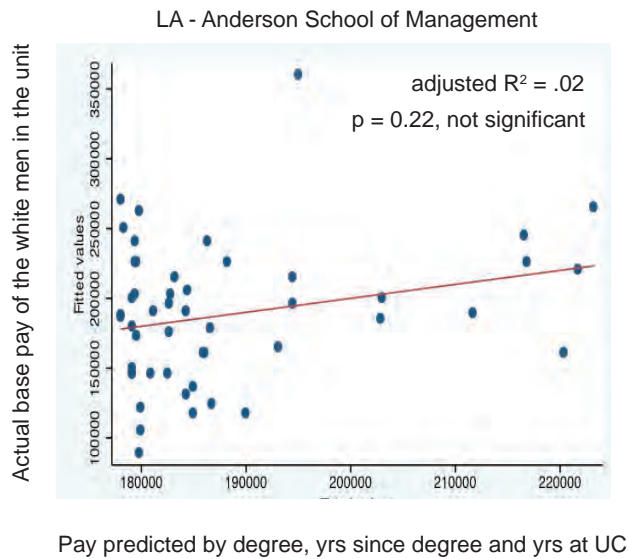

LA - Education and Information Science

adjusted R^2 = .77
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

LA - Engineering

adjusted R^2 = .57
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

LA - Humanities

adjusted R^2 = .41
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

LA - Law

adjusted R^2 = -.01
p = .45, not significant

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
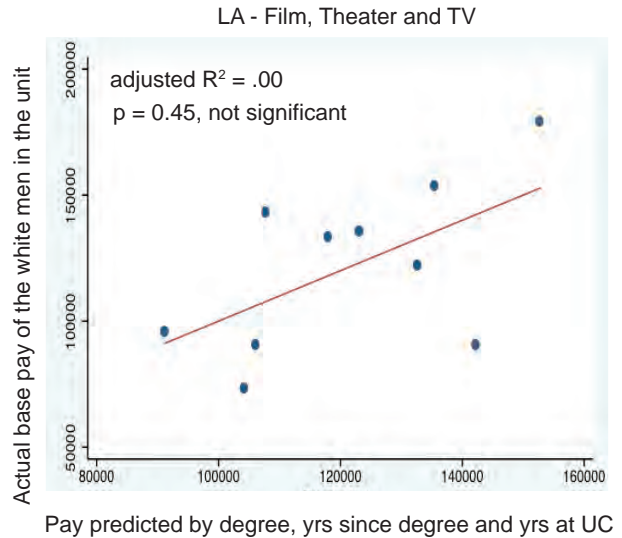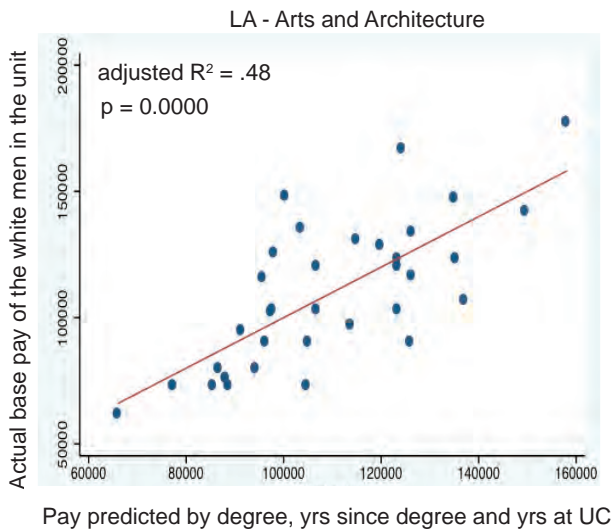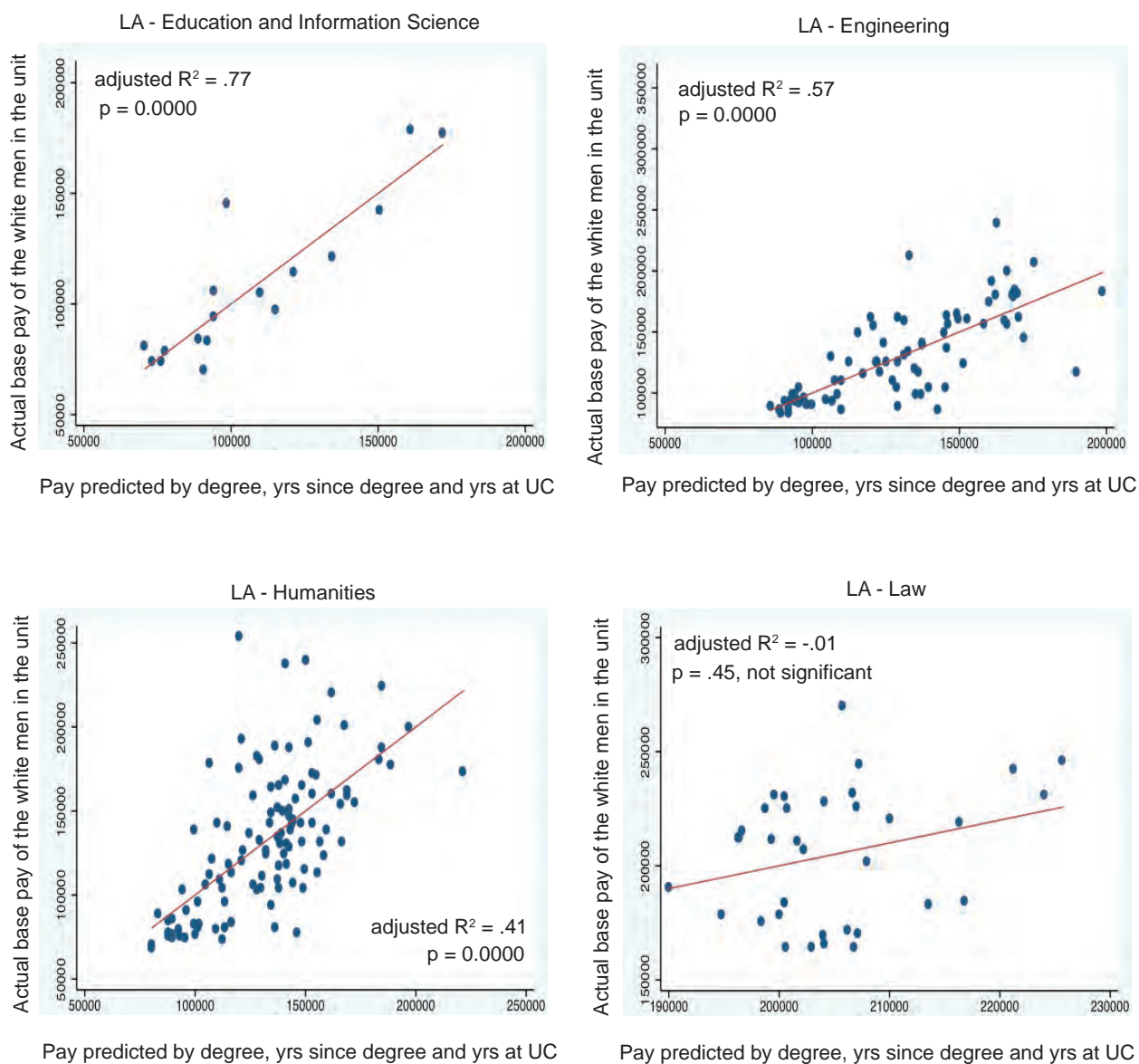

LA - Life Sciences

adjusted R^2 = .55
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

LA - Physical Sciences

adjusted R^2 = .47
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

LA - Social Sciences

adjusted R^2 = .22
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

LA -Social Sciences, excluding Econ

adjusted R^2 = .39
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
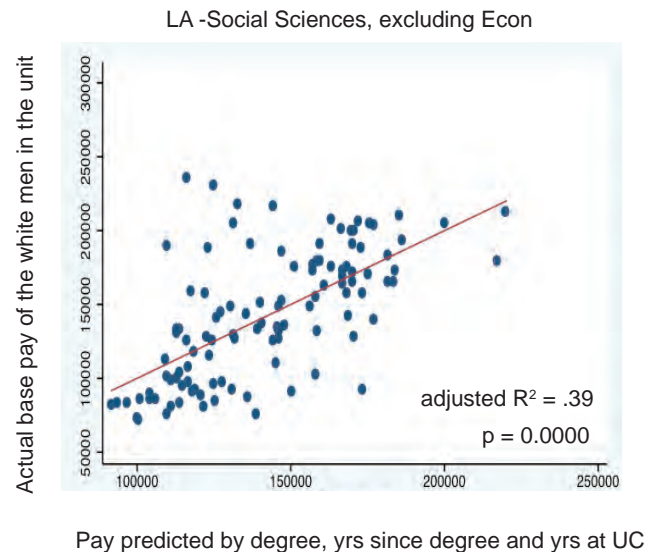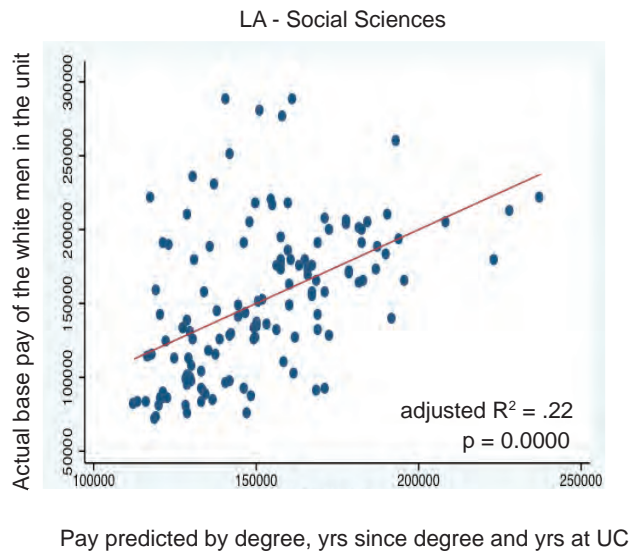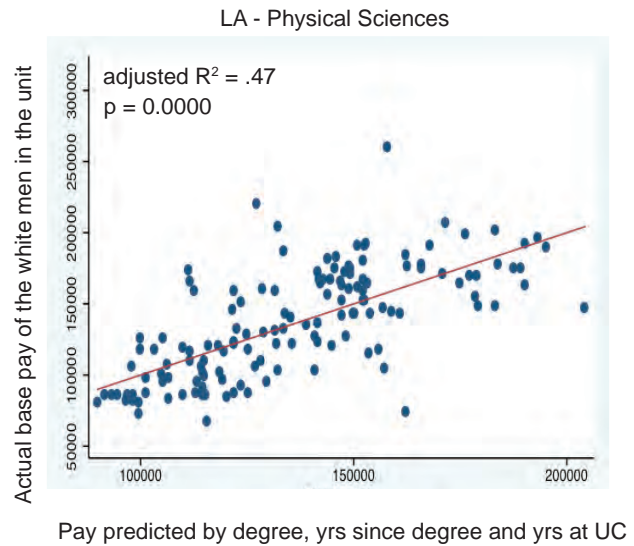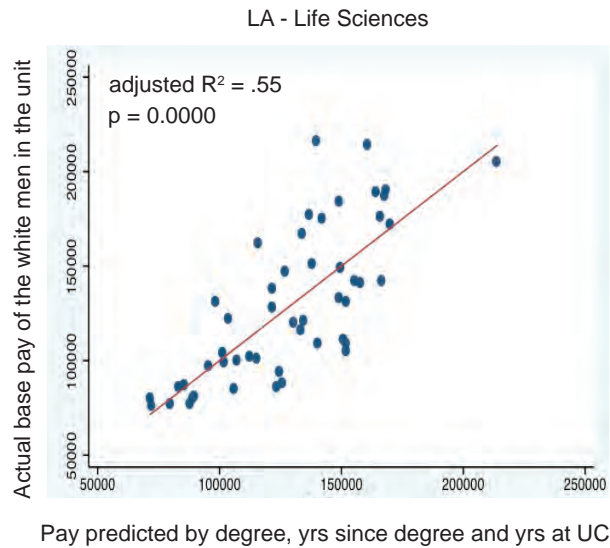

MC - Engineering
adjusted R^2 = .78
p = 0.0010

MC - Natural Sciences
adjusted R^2 = .96
p = 0.0000

MC - Social Sciences
adjusted R^2 = .54
p = 0.0002

MC - Social Sciences, excluding Econ
adjusted R^2 = .73
p = 0.0000

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
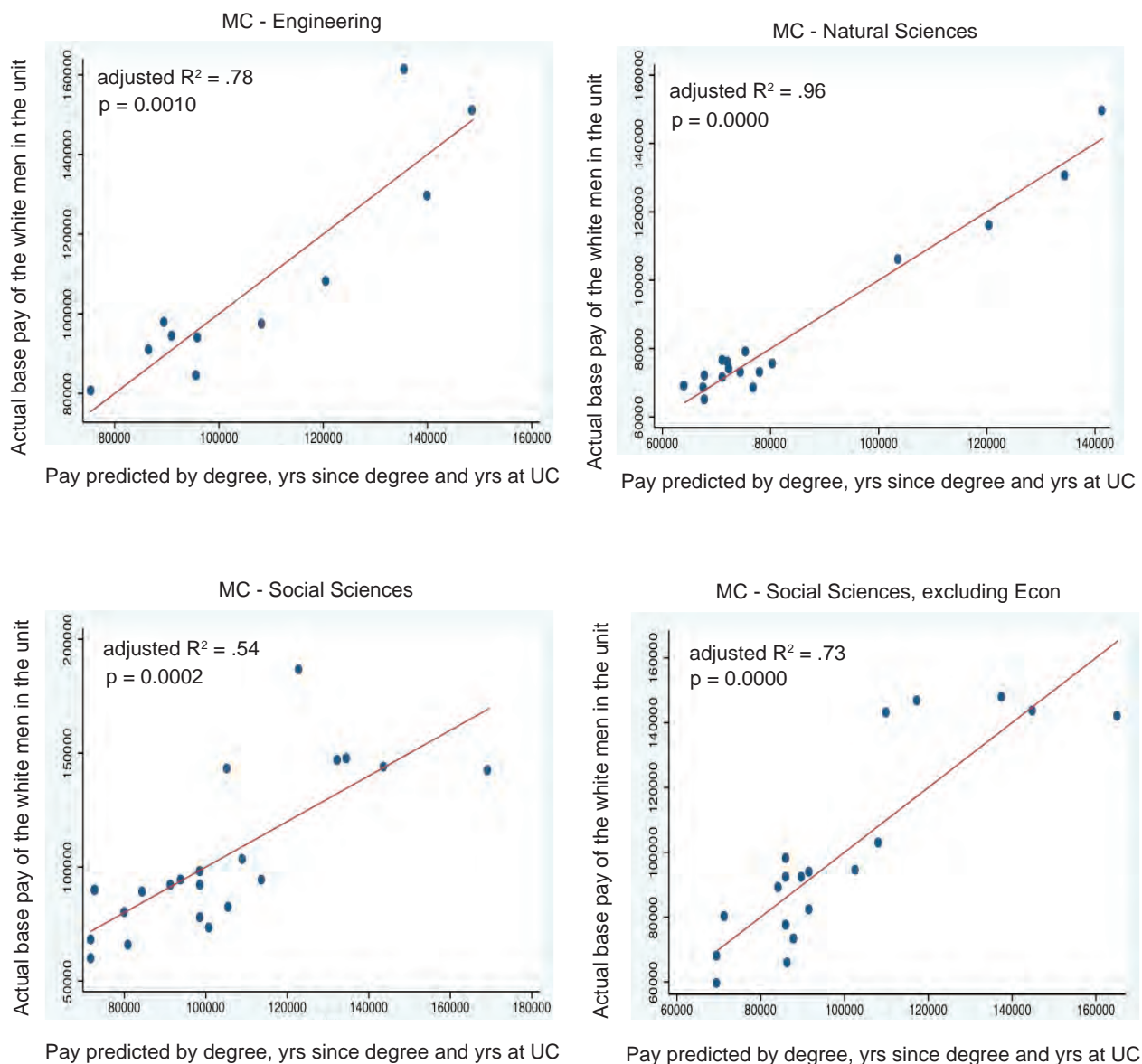

RV - Humanities, Arts, Social Sciences

adjusted R^2 = .49
p = 0.0000

RV - Humanities, Arts, Social Sciences, excluding Econ

adjusted R^2 = .56
p = 0.0000

RV - Business

adjusted R^2 = .74
p = 0.0039

RV - Education

adjusted R^2 = .78
p = 0.0209

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
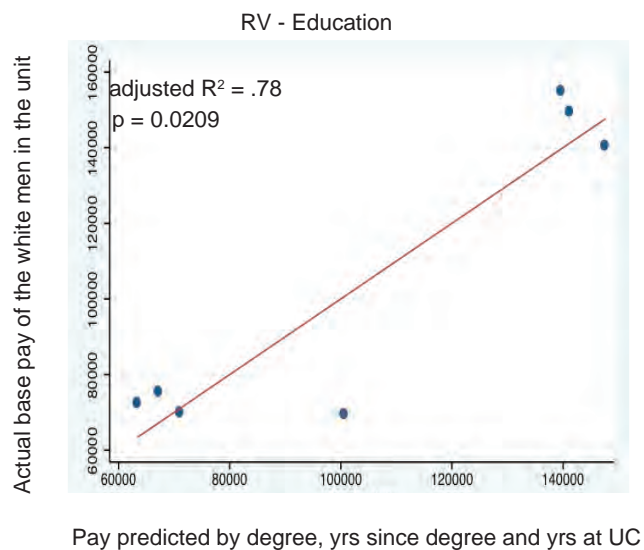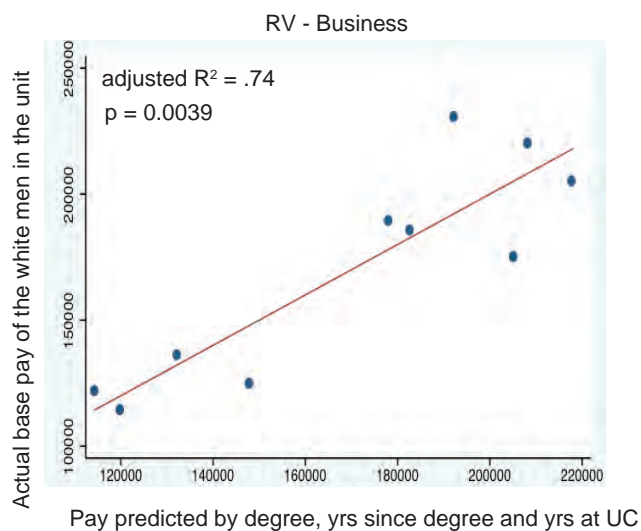

RV - Engineering

adjusted R^2 = .73
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

RV - Natural and Ag Sciences

adjusted R^2 = .58
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
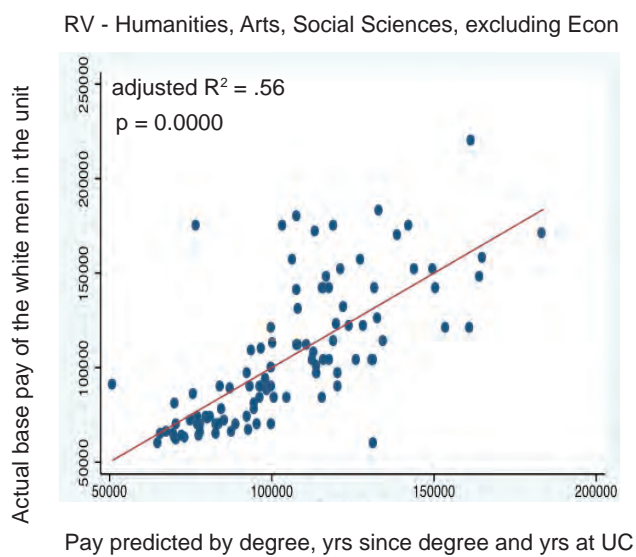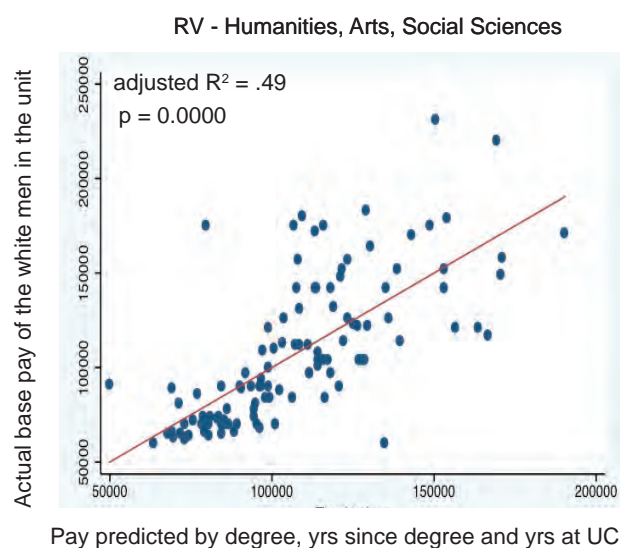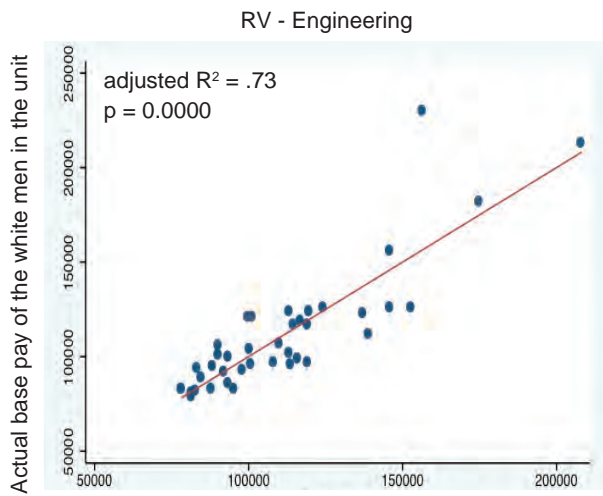
SB - Education

adjusted R^2 = .79
p = 0.0008

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

SB - Engineering

adjusted R^2 = .70
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

SB - Environmental Studies and Management

adjusted R^2 = .61
p = 0.0159

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

SB - Humanities and Fine Arts

adjusted R^2 = .60
p = 0.0000

Actual base pay of the white men in the unit

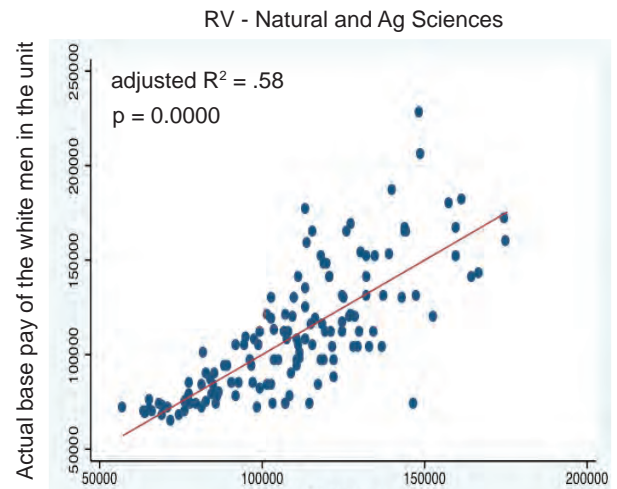Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
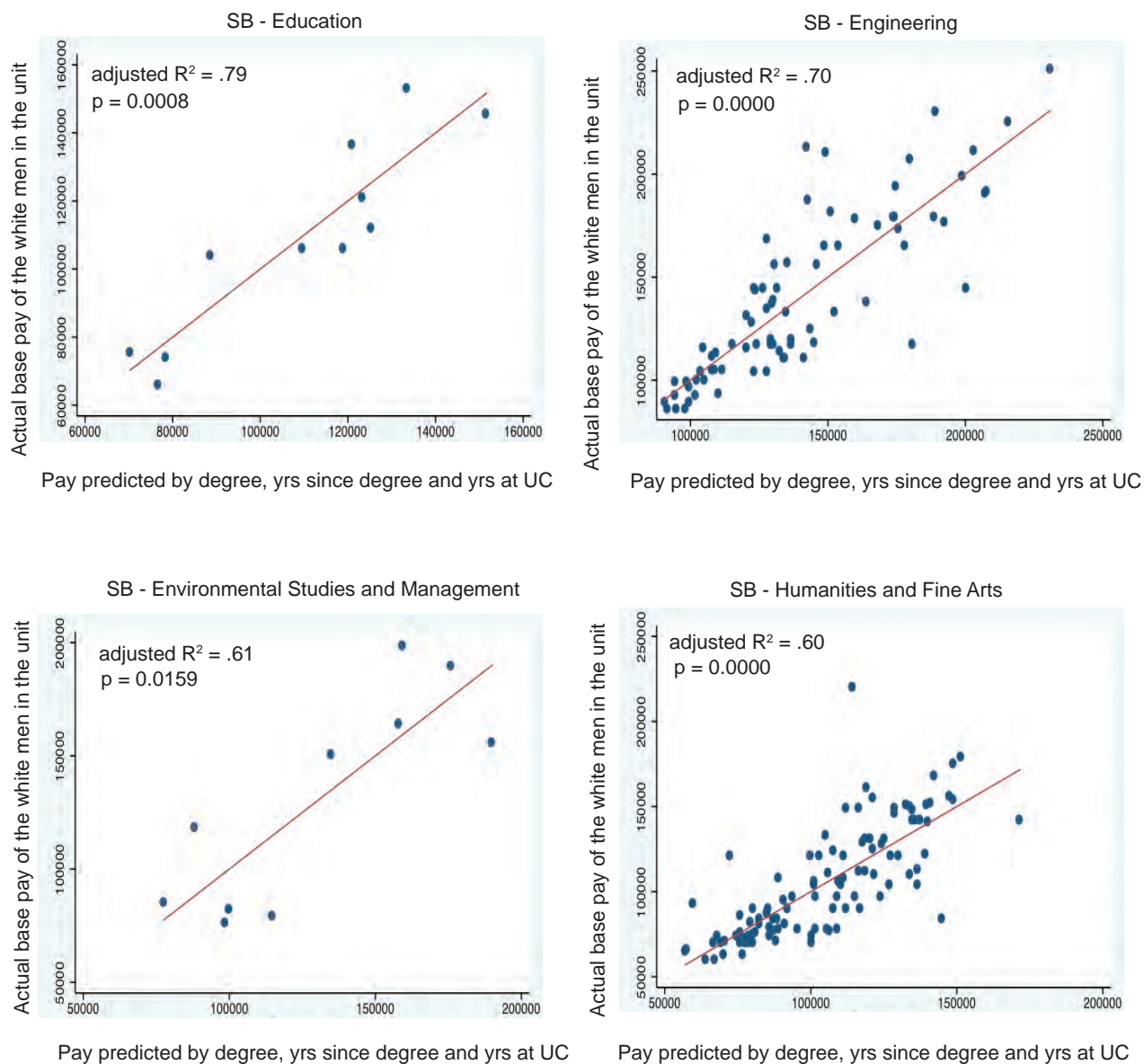

SB - Math, Life and Physical Sciences

adjusted R^2 = .57
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

SB - Social Sciences

adjusted R^2 = .56
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

SB - Social Sciences, excluding Econ

adjusted R^2 = .65
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
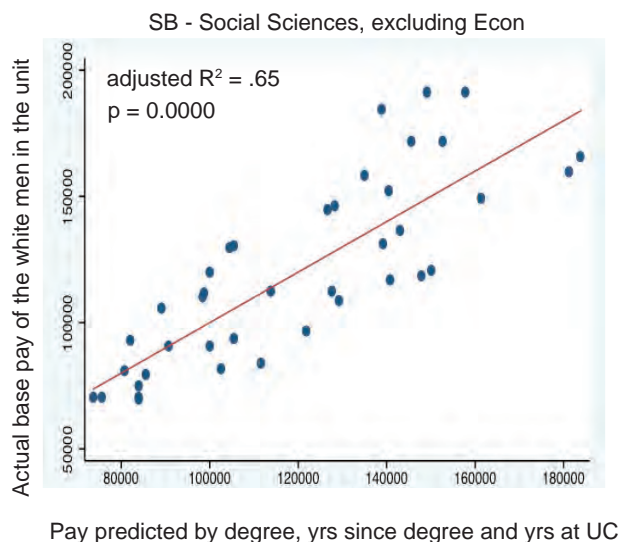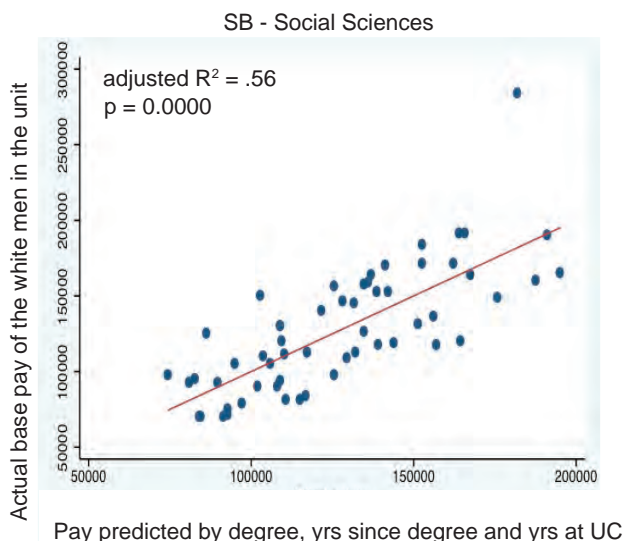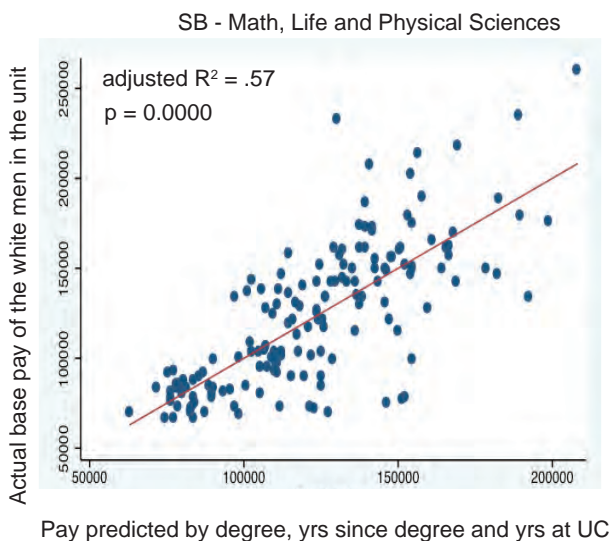

SC - Arts

adjusted R^2 = .83
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

SC - Engineering

adjusted R^2 = .70
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

SC - Humanities

adjusted R^2 = .73
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

SC - Physical Sciences

adjusted R^2 = .70
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
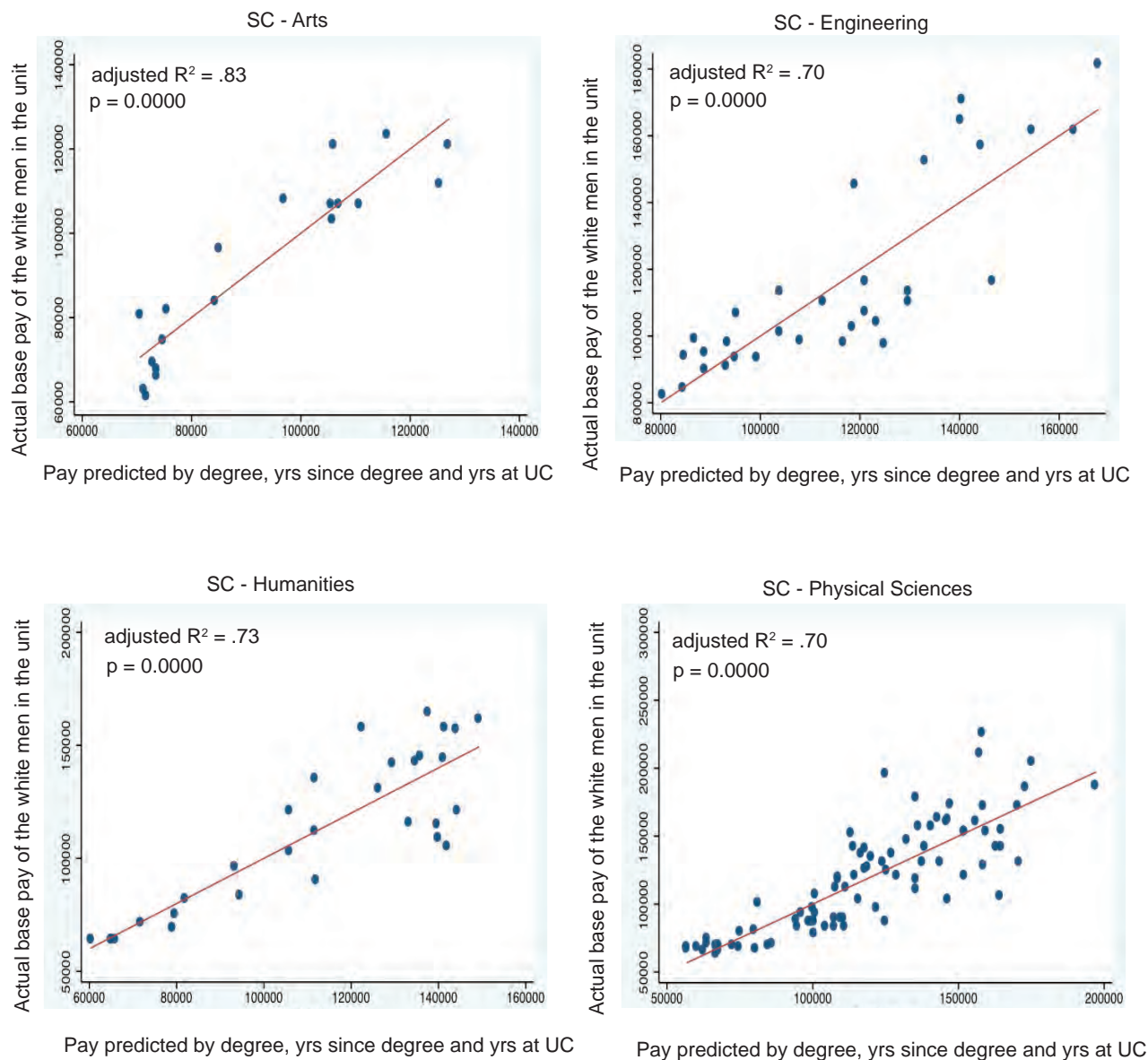

SC - Social Sciences

adjusted R^2 = .53
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

SC - Social Sciences, no Econ

adjusted R^2 = .78
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
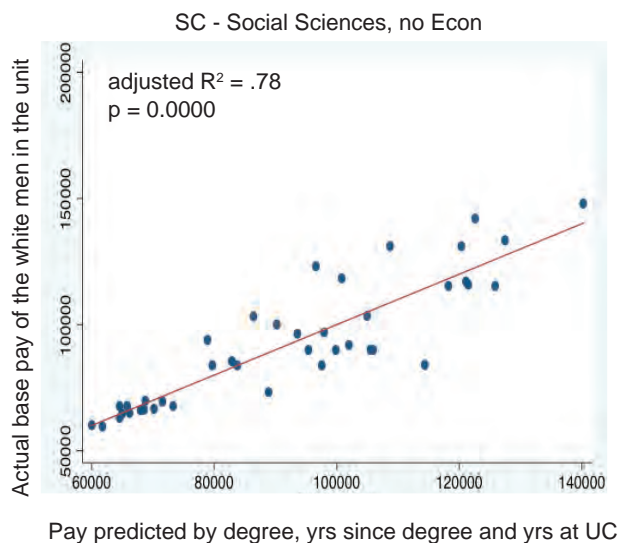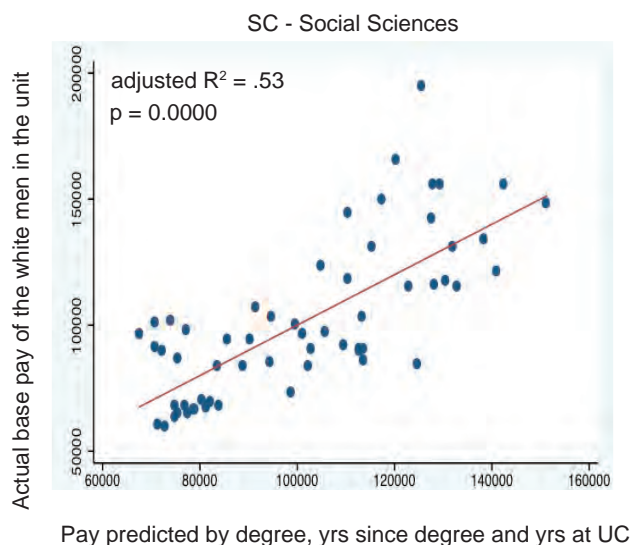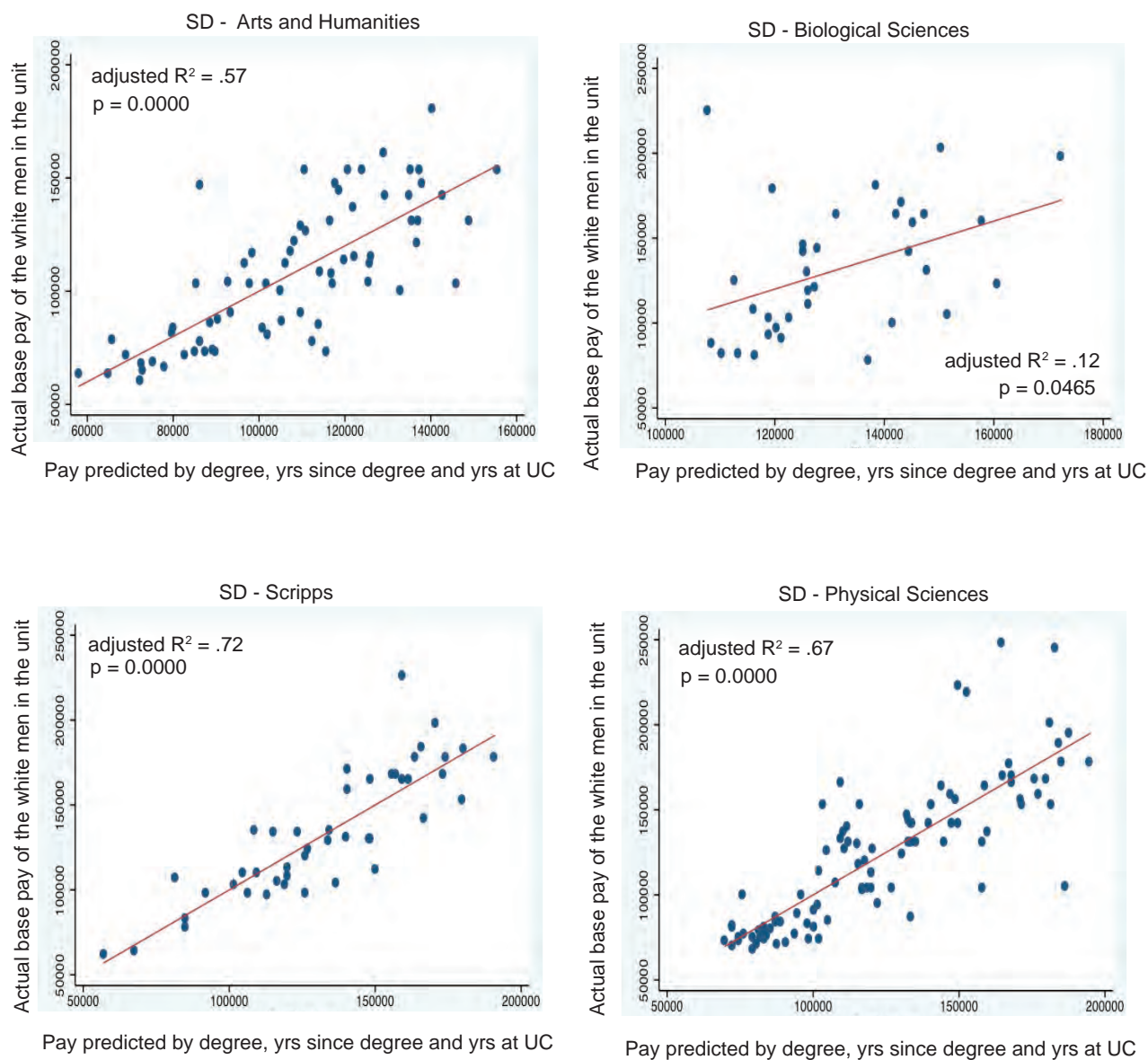
SD - Arts and Humanities

adjusted R^2 = .57
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

SD - Biological Sciences

adjusted R^2 = .12
p = 0.0465

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

SD - Scripps

adjusted R^2 = .72
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

SD - Physical Sciences

adjusted R^2 = .67
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
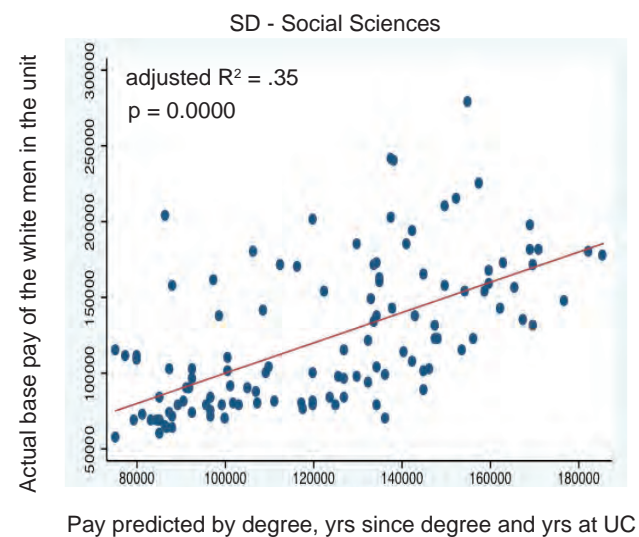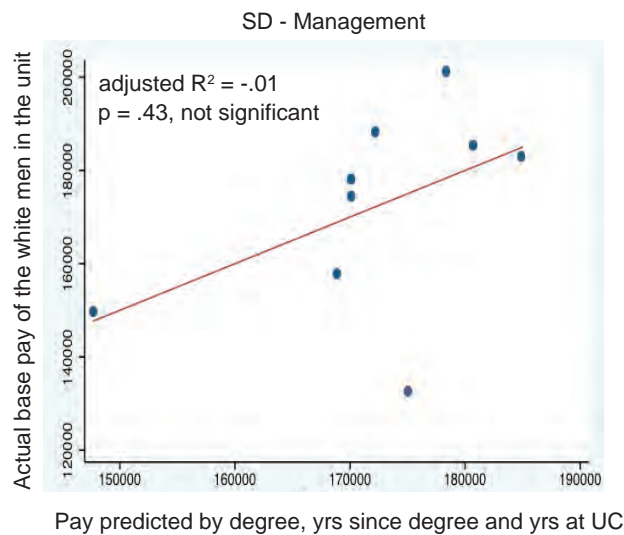

SD - Engineering

adjusted R^2 = .54
p = 0.0000

SD - International Relations/Pacific Studies

adjusted R^2 = .15
p = 0.164, not significant

SD - Management

adjusted R^2 = -.01
p = .43, not significant

SD - Social Sciences

adjusted R^2 = .35
p = 0.0000

Figure 1 (continued)

Correlations between the pay of the white men in each unit and the pay predicted based on their highest degree, years of professional experience (yrs since degree) and years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
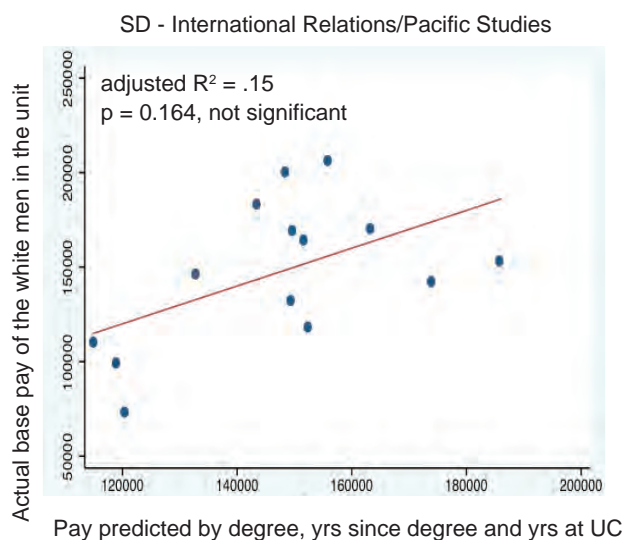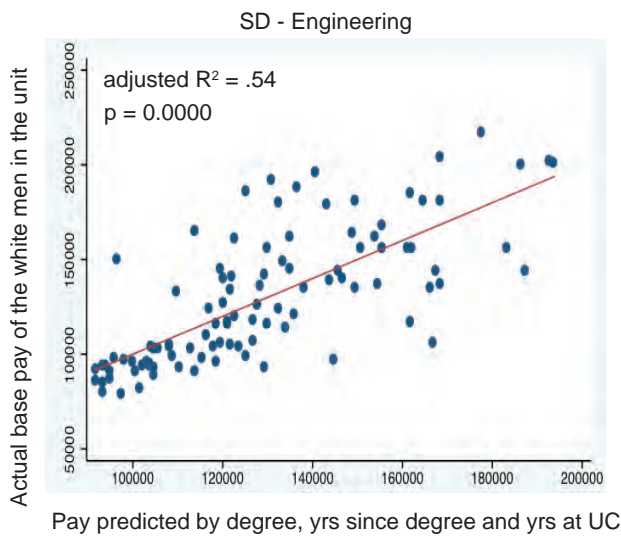
SD - Social Sciences, excluding Econ

adjusted R^2 = .48
p = 0.0000

Actual base pay of the white men in the unit

Pay predicted by degree, yrs since degree and yrs at UC

Figure 2

Average (-SEM) Difference between the Annual Pay of a Faculty Woman and Her Predicted Pay Based on the Pay of the White Men in Her Unit with the Same Degree, Same Years of Experience and Same Years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
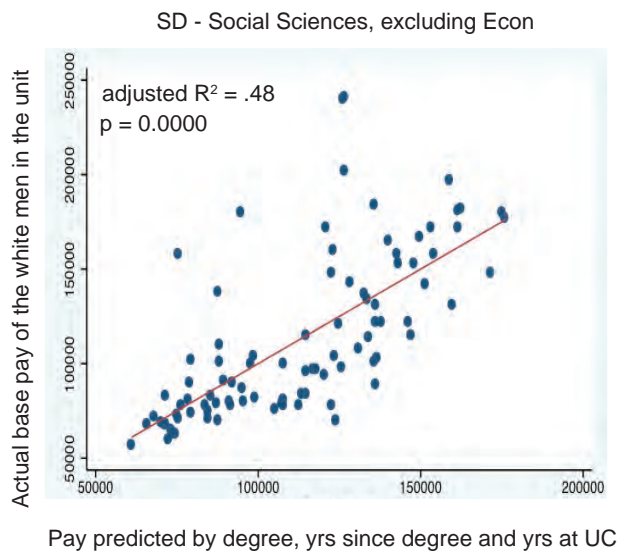

UC Berkeley 2009

UC Riverside 2009

Figure 2 (continued)

Average (-SEM) Difference between the Annual Pay of a Faculty Woman and Her Predicted Pay Based on the Pay of the White Men in Her Unit with the Same Degree, Same Years of Experience and Same Years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
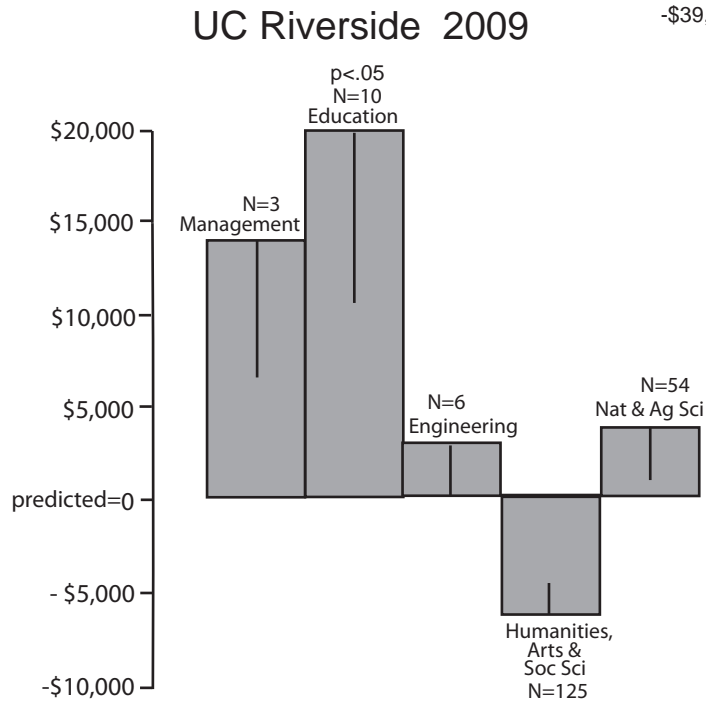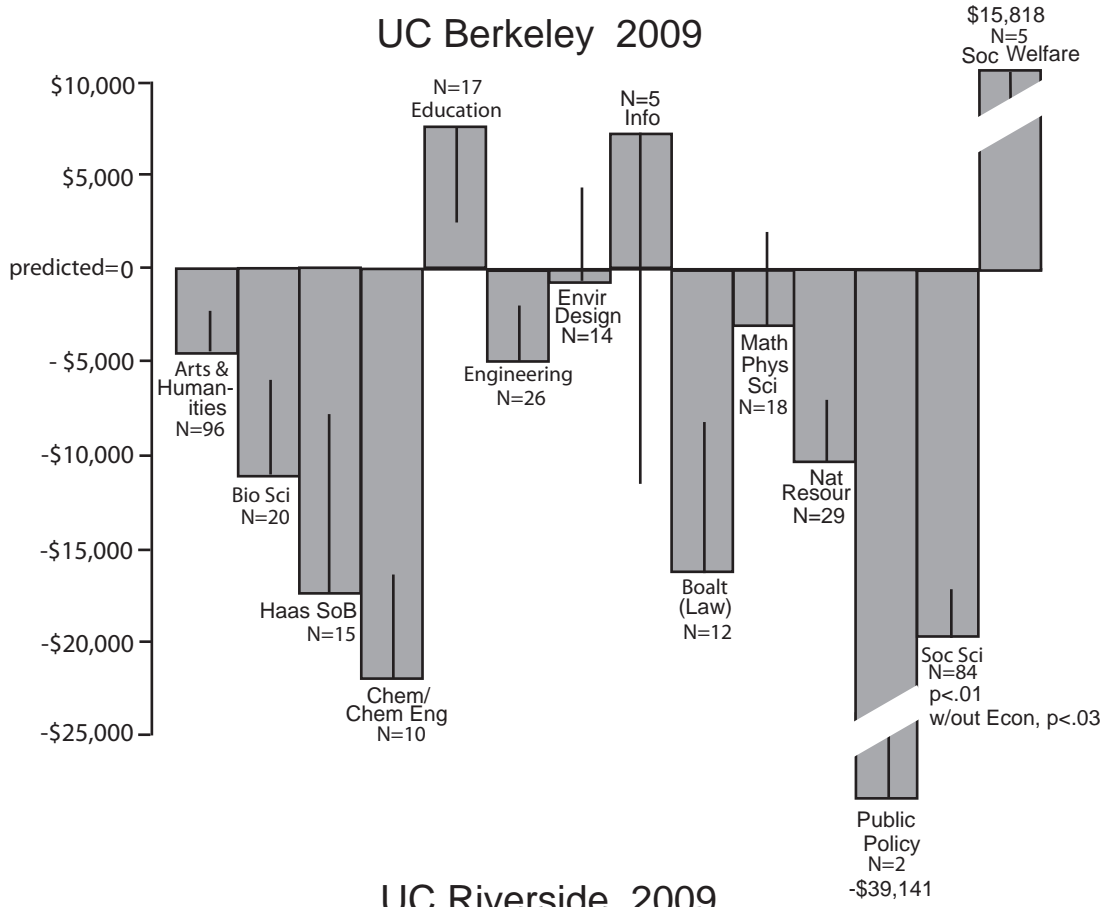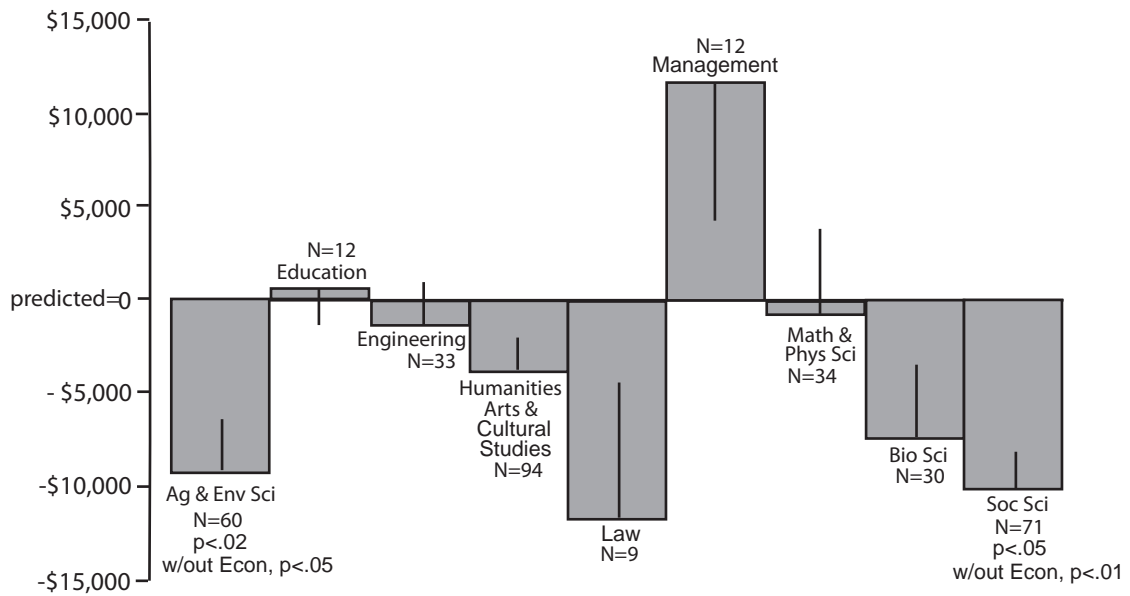
UC Davis 2009

$15,000 —
$10,000 —
$5,000 —
predicted=0
- $5,000 —
-$10,000 —
-$15,000 —

N=12
Management

N=12
Education

Engineering
N=33

Humanities
Arts &
Cultural
Studies
N=94

Math &
Phys Sci
N=34

Bio Sci
N=30

Ag & Env Sci
N=60
p<.02
w/out Econ, p<.05

Law
N=9

Soc Sci
N=71
p<.05
w/out Econ, p<.01

UC Los Angeles 2009

$10,000 —
$5,000 —
predicted=0
- $5,000 —
-$10,000 —
-$15,000 —
-$20,000 —

N=22
Education
& Info Sci

N=25
Arts &
Architect

Engineering
& Applied Sci
N=18

Humanities
N=75

Law
N=13

Life Sci
N=38

Phys Sci
N=27

Anderson
Grad School of
Management
N=13

Public
Affairs
N=16
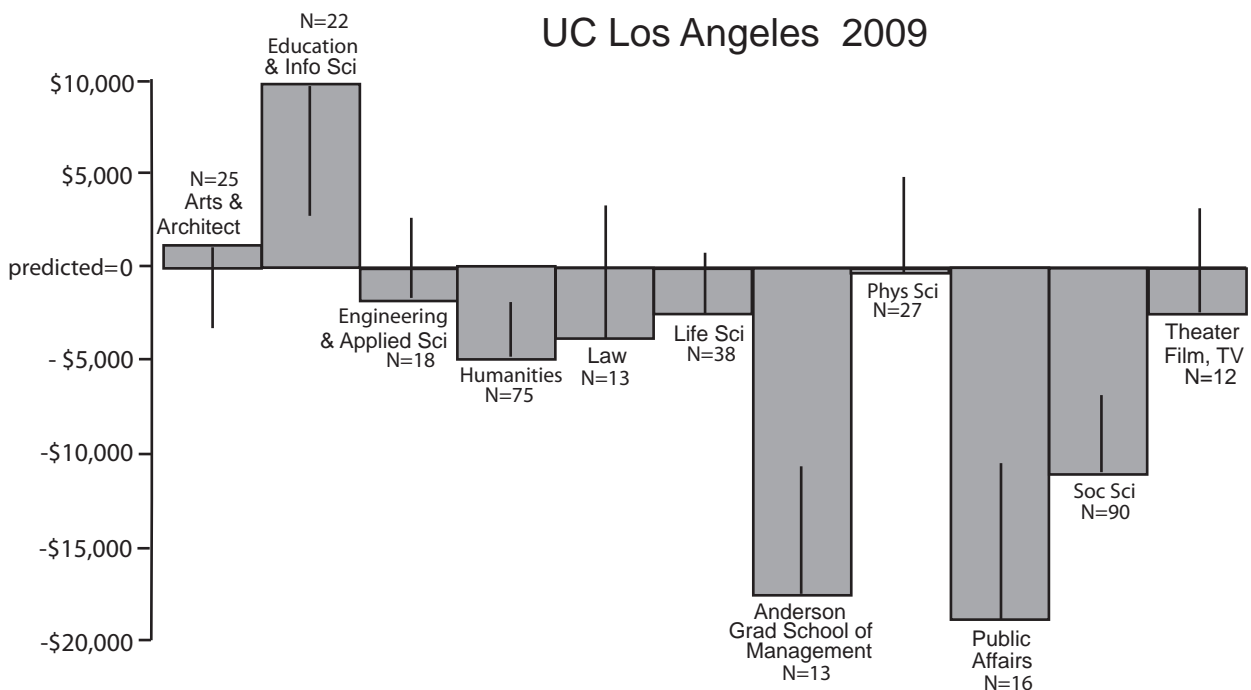
Soc Sci
N=90

Theater
Film, TV
N=12

Figure 2 (continued)

Average (-SEM) Difference between the Annual Pay of a Faculty Woman and Her Predicted Pay Based on the Pay of the White Men in Her Unit with the Same Degree, Same Years of Experience and Same Years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)

UC Irvine 2009

UC San Diego 2009

Figure 2 (continued)

Average (-SEM) Difference between the Annual Pay of a Faculty Woman and Her Predicted Pay Based on the Pay of the White Men in Her Unit with the Same Degree, Same Years of Experience and Same Years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
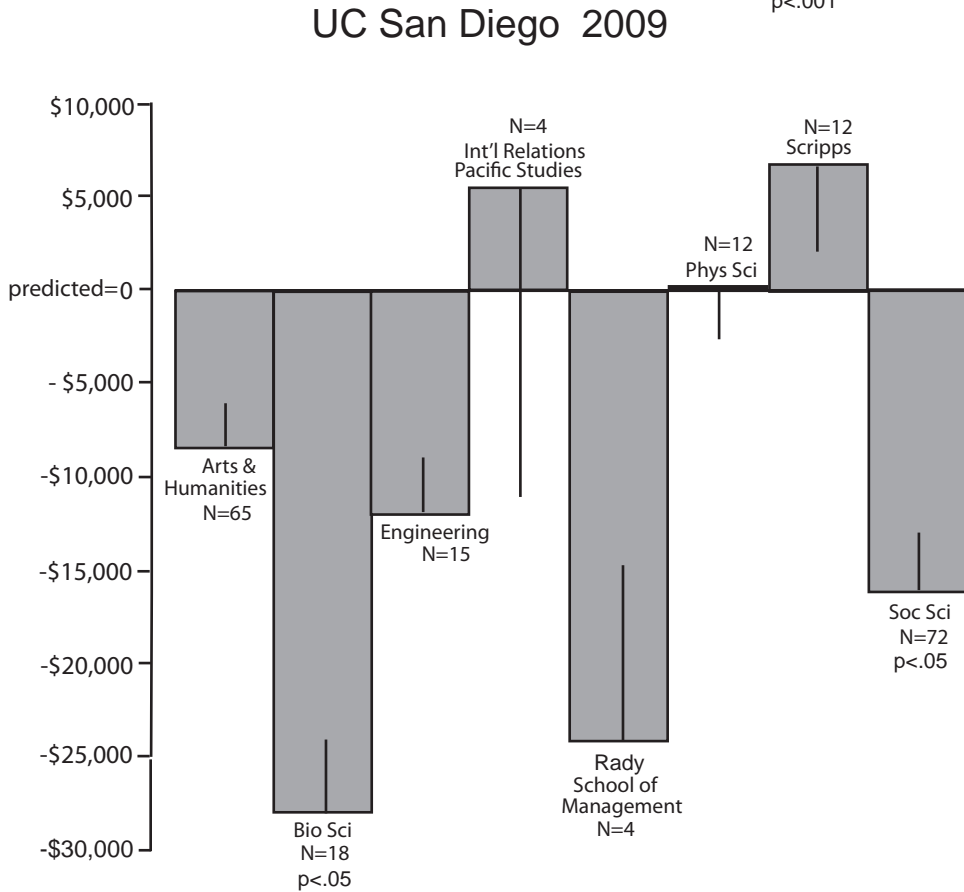

UC Santa Barbara 2009

UC Santa Cruz 2009

UC Merced 2009

Figure 2 (continued)

Average (-SEM) Difference between the Annual Pay of a Faculty Woman and Her Predicted Pay Based on the Pay of the White Men in Her Unit with the Same Degree, Same Years of Experience and Same Years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
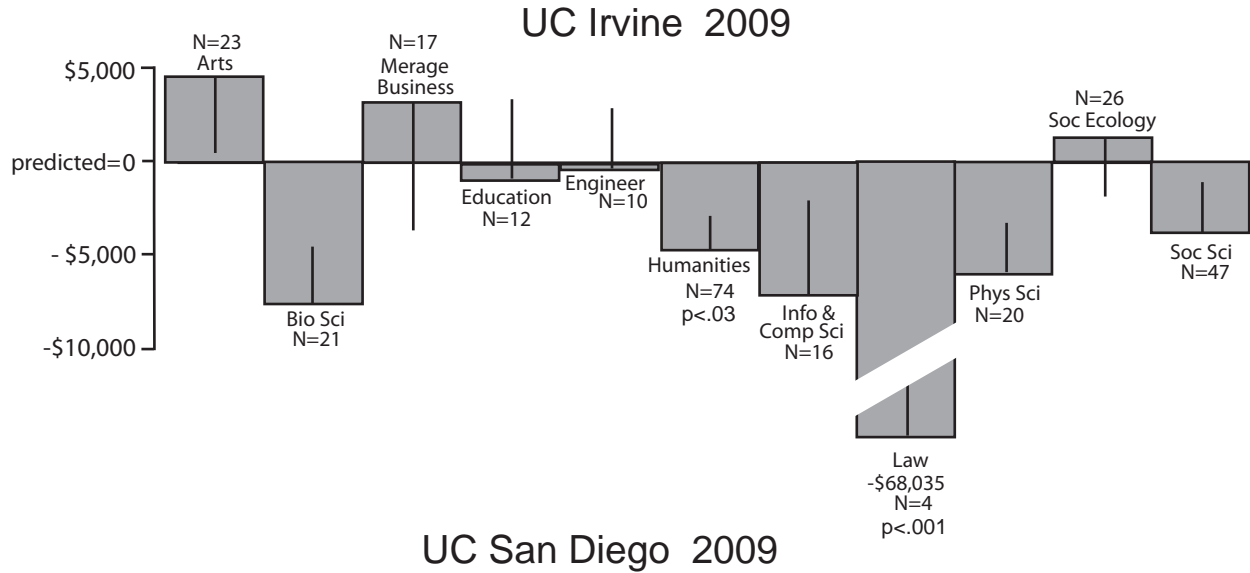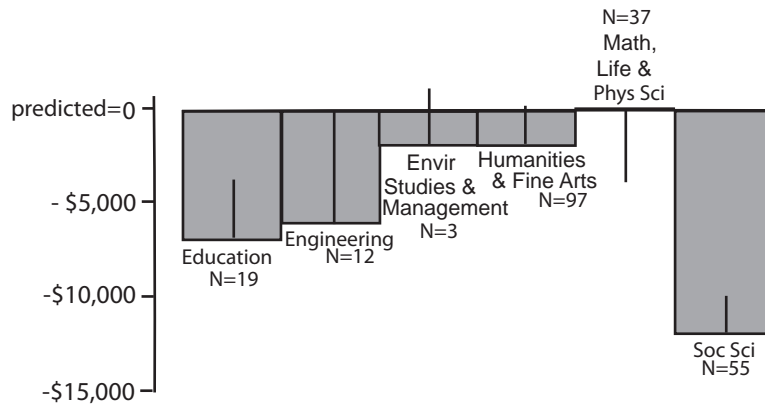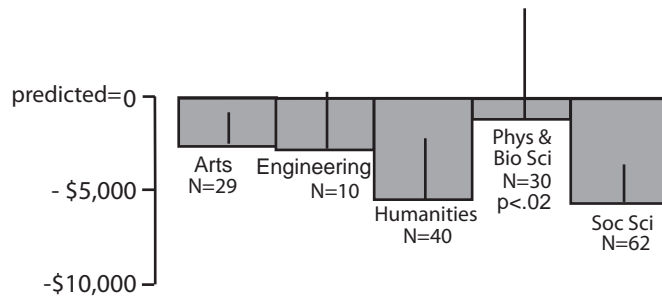
UC Academic Units with Econ departments 2009

predicted = 0

- $5,000

-$10,000

-$15,000

-$20,000

IR
N=47

DV
N=71
p<.05

LA
N=90

MC
N=15

RV
N=125

SD
N=72
p<.05

SB
N=55

SC
N=62

BK
N=84
p<.02

UC Academic Units with Econ departments 2009 after Econ department faculty are excluded

N=42
IR

N=59
SC

predicted = 0

- $5,000

-$10,000

-$15,000

LA
N=82

DV
N=64
p<.02

RV
N=121

SD
N=64

SB
N=54

BK
N=81
p<.03

MC
N=14
p<.02

Figure 3

Average (-SEM) Difference between the Annual Pay of an AS, HI, BK or IN Man and His Predicted Pay Based on the Pay of the WH Men in His Unit with the Same Degree, Same Years of Experience and Same Years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)

UC Berkeley 2009

UC Riverside 2009

Figure 3 (continued)

Average (-SEM) Difference between the Annual Pay of an AS, HI, BK or IN Man and His Predicted Pay Based on the Pay of the WH Men in His Unit with the Same Degree, Same Years of Experience and Same Years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
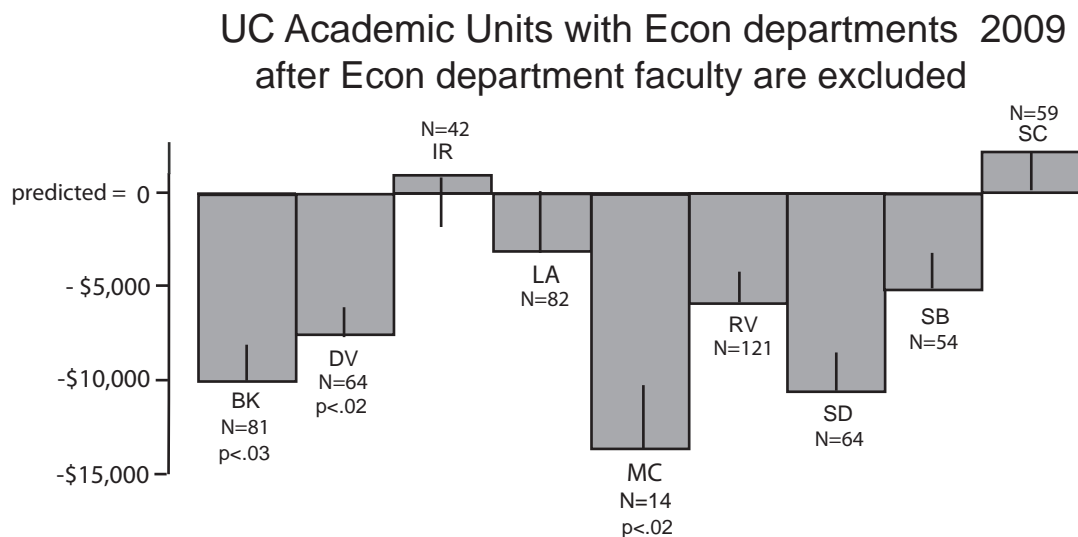

UC Davis 2009

UC Los Angeles 2009

Figure 3 (continued)

Average (-SEM) Difference between the Annual Pay of an AS, HI, BK or IN Man and His Predicted Pay Based on the Pay of the WH Men in His Unit with the Same Degree, Same Years of Experience and Same Years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
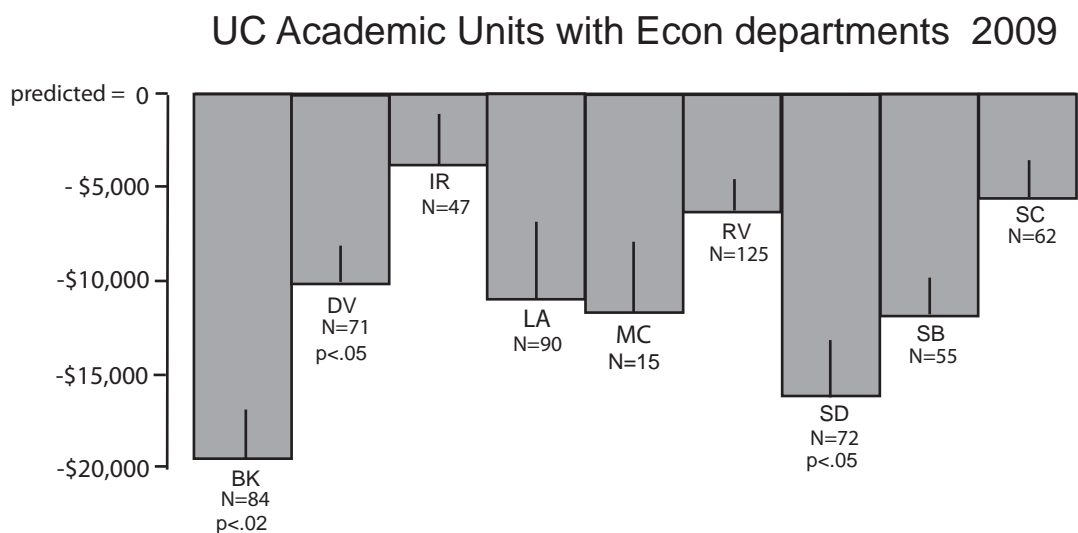

UC Irvine 2009

UC San Diego 2009

Figure 3 (continued)

Average (-SEM) Difference between the Annual Pay of an AS, HI, BK or IN Man and His Predicted Pay Based on the Pay of the WH Men in His Unit with the Same Degree, Same Years of Experience and Same Years at UC

(excluding deans, campus central administration, acting titles, lecturers (P)SOE and using only base pay for associate deans, etc.; see methods)
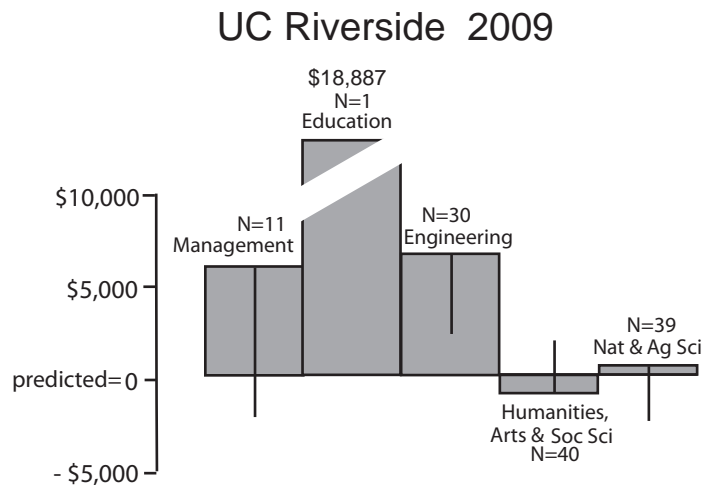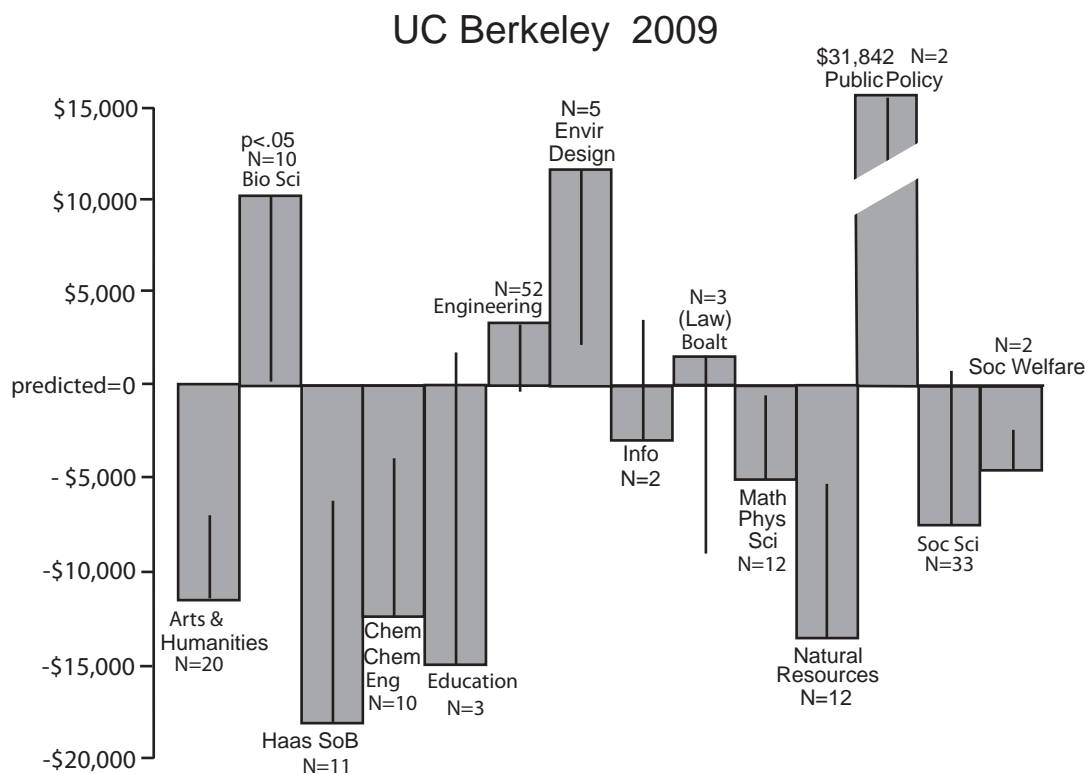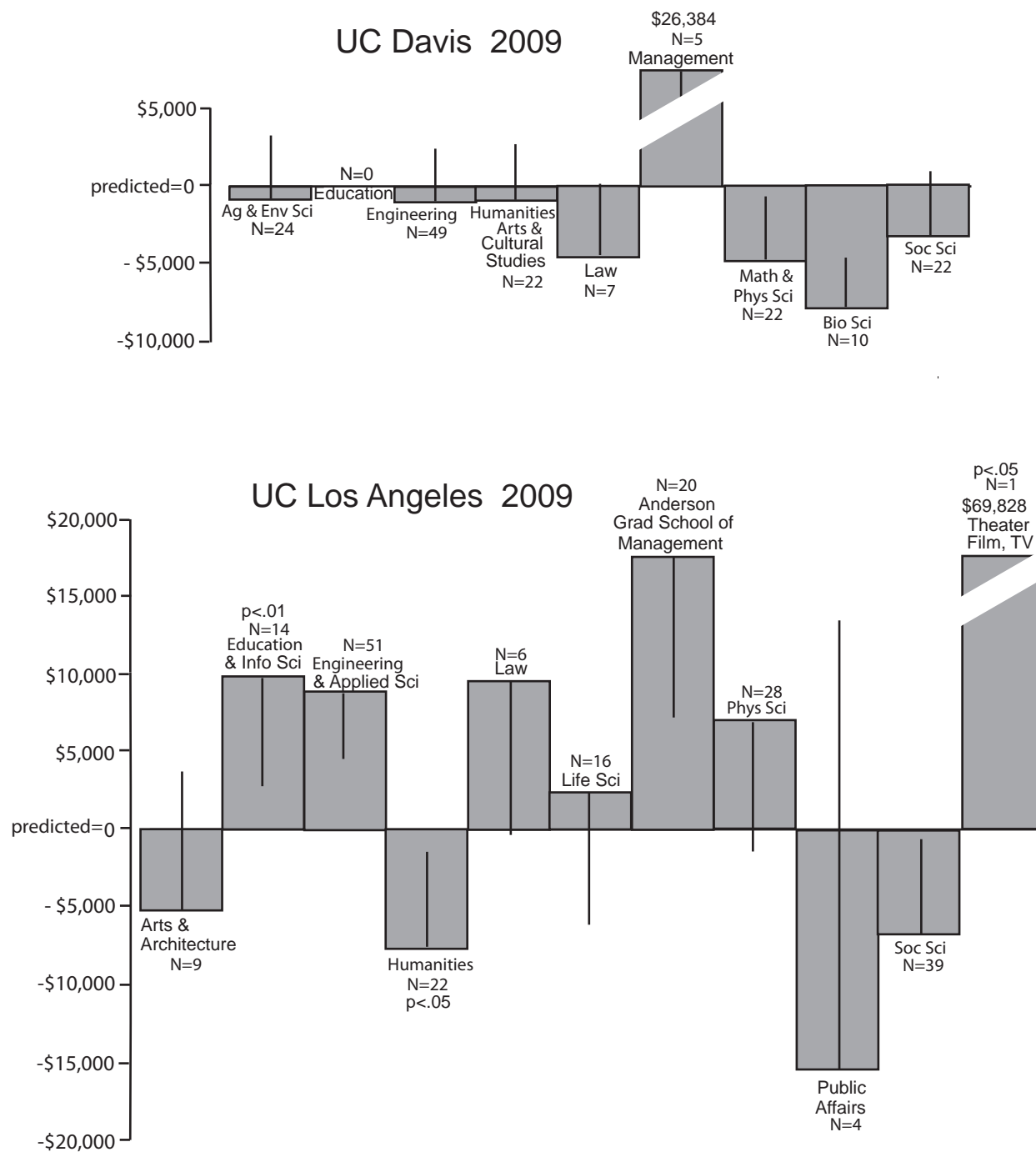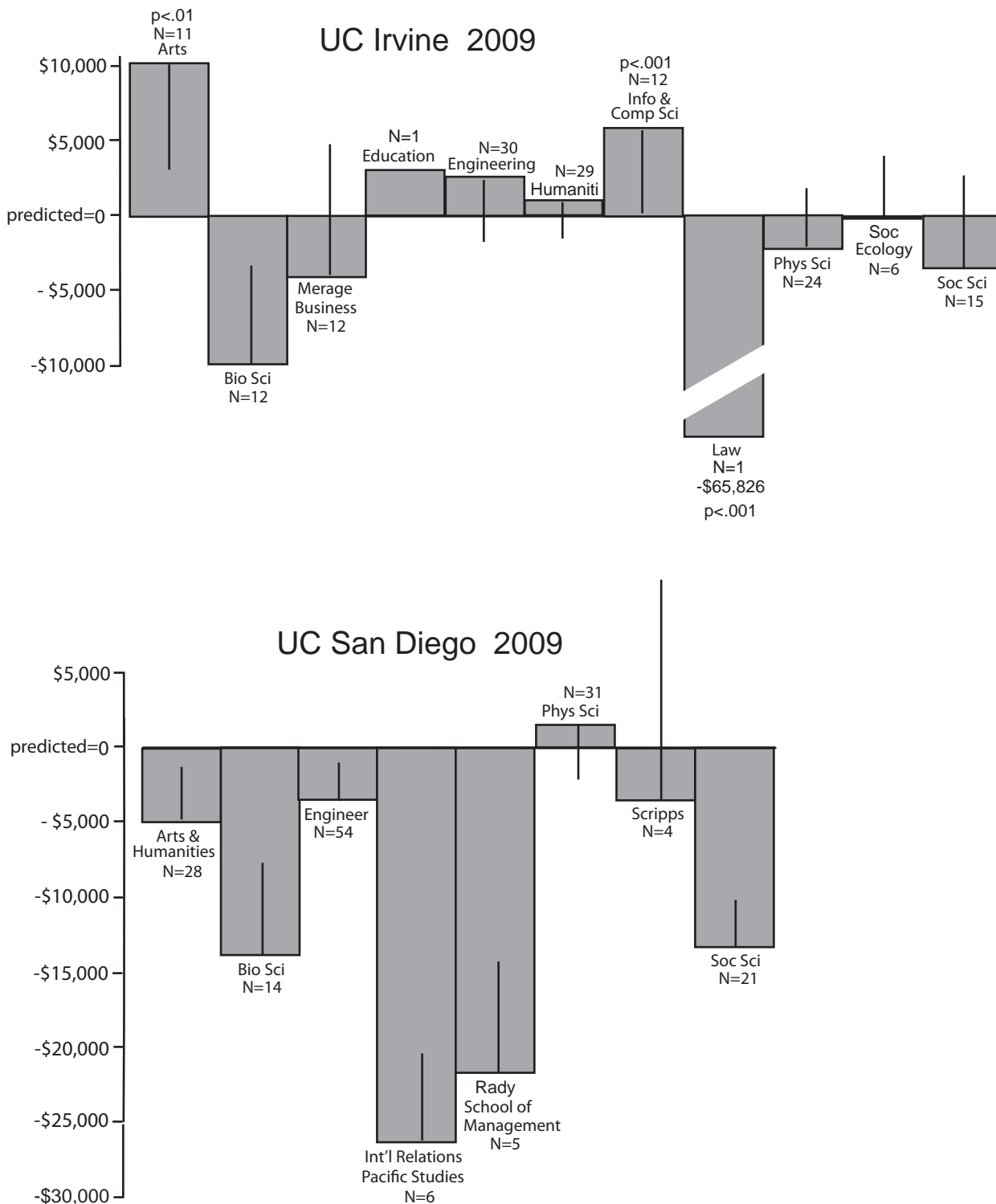

UC Santa Barbara 2009

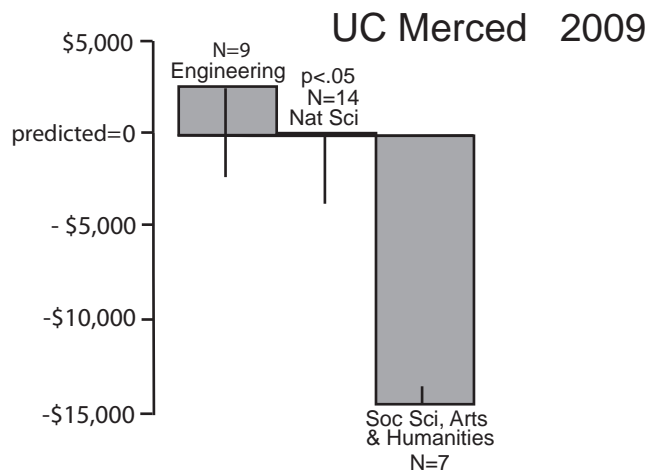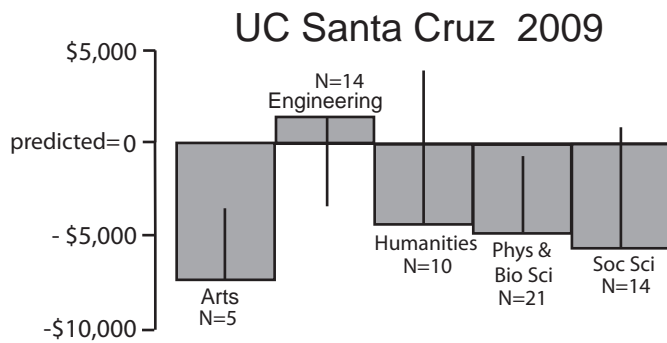
UC Santa Cruz 2009

UC Merced 2009

Figure 4

Results of Goodness-of-Fit Tests for White Men's Pay-Prediction Equations for Nine UCI Units
for 1997-98, 1998-99, and 199-2000 for Comparison to Those for 2009-10

University of California, Irvine
General Campus Ladder Rank Faculty Salaries
Significance Measures for White Male Regression Model

Year/Unit	N	Adjusted R^2	F	Sign F
Oct-97				
Arts	18	.56040	6.41799	.0044
Bio Sci	45	.63121	26.10279	.0000
Engineering	29	.74945	28.91757	.0000
GSM	17	.70075	13.48910	.0003
Humanities	61	.78040	54.30633	.0000
ICS	23	.55292	10.06922	.0003
Phys Sci	69	.63458	40.36237	.0000
Soc Ecology	21	.80059	27.76505	.0000
Social Sci	46	.72140	39.84066	.0000
Oct-98				
Arts	20	.58247	7.62644	.0015
Bio Sci	51	.72865	45.75443	.0000
Engineering	30	.78327	35.93550	.0000
GSM	15	.66301	10.18145	.0017
Humanities	56	.76321	45.31780	.0000
ICS	20	.49748	7.26970	.0027
Phys Sci	72	.59170	35.29679	.0000
Soc Ecology	24	.74735	23.67887	.0000
Social Sci	48	.71637	40.56972	.0000
Oct-99				
Arts	21	.57368	7.72839	.0011
Bio Sci	53	.72592	46.90822	.0000
Engineering	35	.75010	35.01856	.0000
GSM	19	.27438	2.70158	.0738
Humanities	58	.72887	39.30691	.0000
ICS	21	.48219	7.20804	.0025
Phys Sci	72	.58925	34.95166	.0000
Soc Ecology	23	.70529	18.54953	.0000
Social Sci	55	.74507	53.60665	.0000

Here, Sign F denotes p value

Source: PERS, Academic Personnel, OASIM Pay Equity Study 1998 and 1999.

Analytical Studies and Information Management
MLR   1-09-2001 P3286

Figure 5: Long-term Pay Equity Data for UCI, part A

Ladder Ranks Faculty Salary Mean Residuals: Women and Minorities
Paul Merage School of Business
October 1998 through 2010

UC Irvine Office of Academic Personnel
Sources: Payroll/Personnel Extracts as of October 1998 through 2010, Academic Personnel, Pay Equity Study.

Ladder Ranks Faculty Salary Mean Residuals: Women and Minorities
School of Biological Sciences
October 1998 through 2010
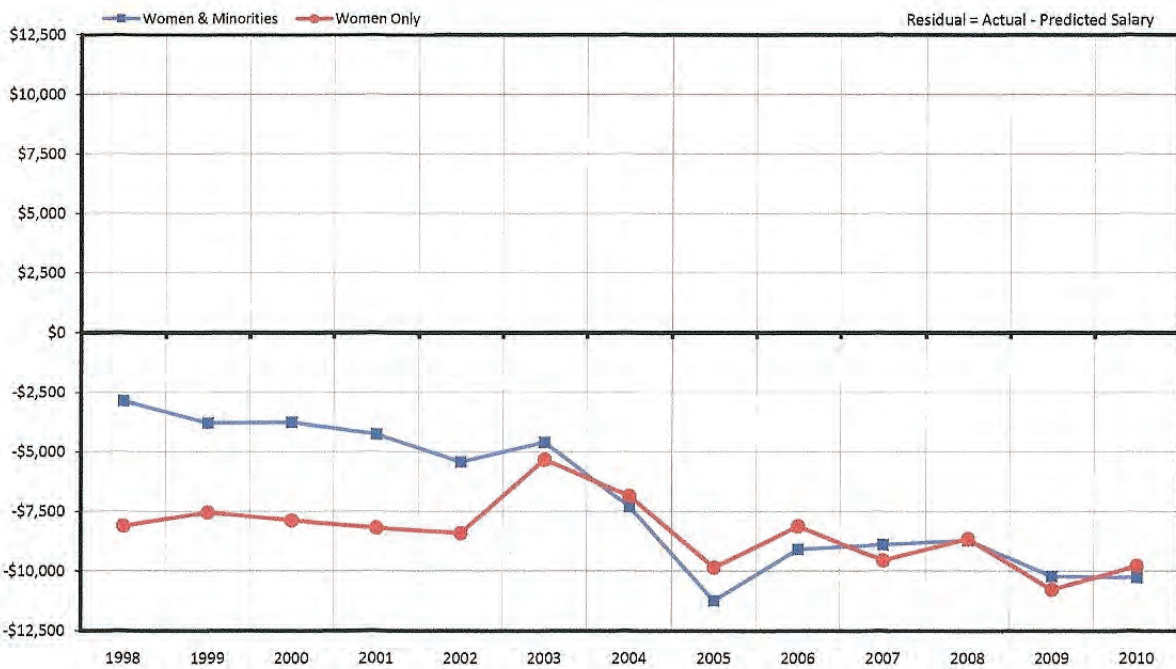
UC Irvine Office of Academic Personnel
Sources: Payroll/Personnel Extracts as of October 1998 through 2010, Academic Personnel, Pay Equity Study.

Figure 5: Long-term Pay Equity Data for UCI, part B

Ladder Ranks Faculty Salary Mean Residuals: Women and Minorities
School of Humanities
October 1998 through 2010
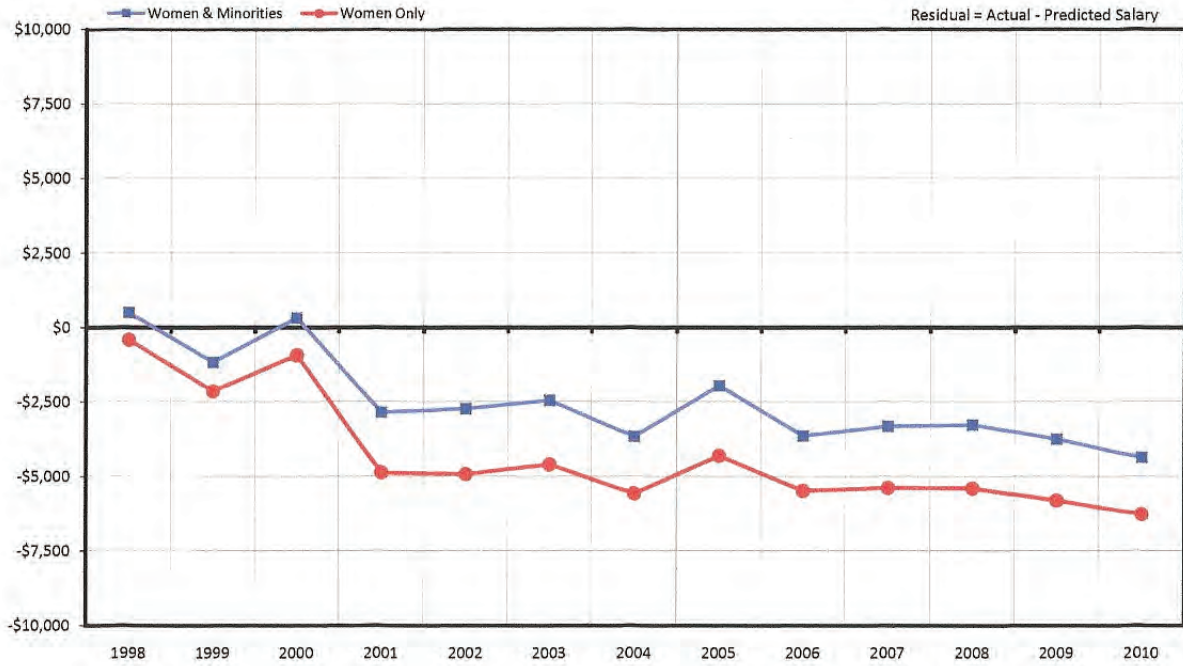
UC Irvine Office of Academic Personnel
Sources: Payroll/Personnel Extracts as of October 1998 through 2010, Academic Personnel, Pay Equity Study.

Ladder Ranks Faculty Salary Mean Residuals: Women and Minorities
General Campus
October 1998 through 2010

UC Irvine Office of Academic Personnel
Sources: Payroll/Personnel Extracts as of October 1998 through 2010, Academic Personnel, Pay Equity Study.
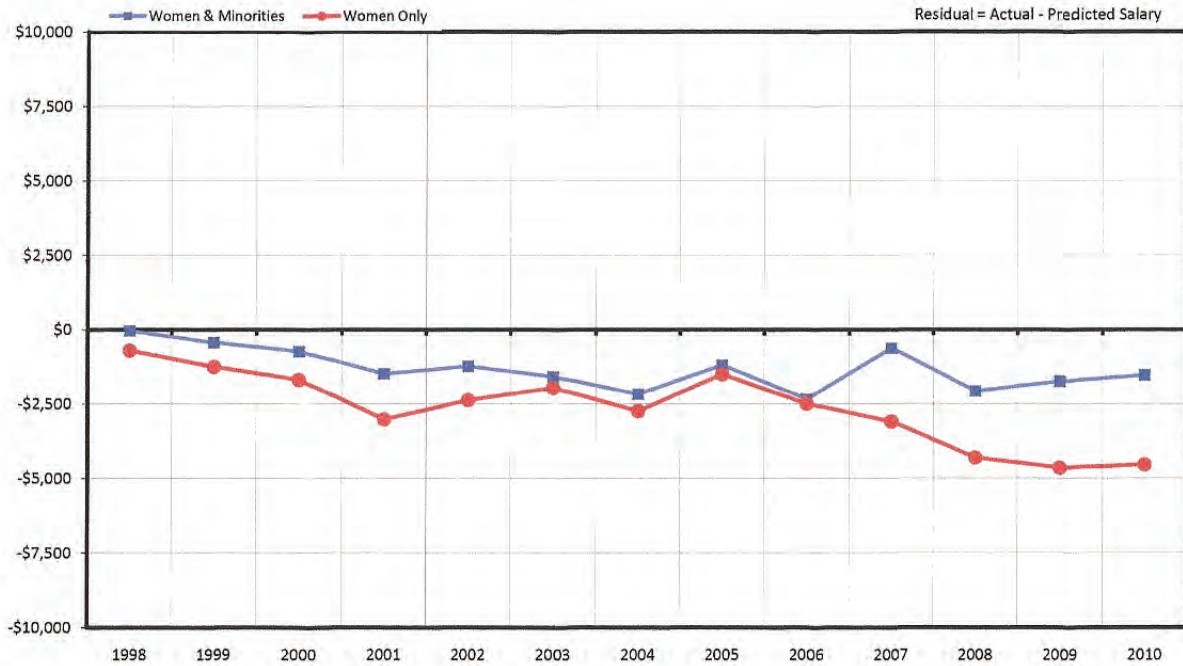
Table 1

No Information on Type or Year of Highest Degree				Non-minority Eth Codes (No. of Men)	
	White Men	Other Men	Women	Total	Int'l	Unk

Berkeley

	White Men	Other Men	Women	Total	Int'l	Unk
Arts/Humanities	3	2	8	13	2	1
Biological Sci	10	0	1	11	0	0
Business	0	0	0	0	1	5
Chem/ChemEng	1	0	0	1	0	1
Education	1	0	0	1	0	1
Engineering	6	2	0	8	0	0
Envir Design	4	0	7	11	0	0
Information	0	0	0	0	0	0
Law	1	1	0	2	0	0
Math/Phys Sci	1	0	0	1	1	2
Nat Resources	7	1	2	10	1	1
Public Policy	2	0	0	2	0	0
Social Sci	9	3	7	19	1	5
Social Welfare	0	0	1	1	0	0
Total	45	9	26	80	6	16

Davis

	White Men	Other Men	Women	Total	Int'l	Unk
Ag/Env Sci	18	3	10	31	1	0
Biological Sci	1	0	1	2	0	0
Education	0	0	0	0	0	1
Engineering	2	0	0	2	2	2
Human/Art/Cult	3	3	9	15	0	2
Law	0	0	0	0	0	0
Management	0	0	0	0	0	2
Math/Phys Sci	1	0	1	2	3	10
Social Sci	1	1	2	4	2	2
Total	26	7	23	56	8	19

Irvine

	White Men	Other Men	Women	Total	Int'l	Unk
Arts	2	1	2	5	0	0
Biological Sci	0	1	1	2	0	0
Business	0	0	0	0	0	1
Education	0	1	0	1	0	0
Engineering	0	1	0	1	0	1
Humanities	2	0	3	5	1	2
Info/Comput Sci	0	0	0	0	0	1
Law	0	0	0	0	0	0
Physical Sci	1	0	1	2	1	0
Social Ecology	3	1	1	5	0	0
Social Sci	2	3	0	5	0	0
Total	10	8	8	26	2	5

Table 1 - continued

No Information on Type or Year of Highest Degree				Non-minority Eth Codes (No. of Men)	
White Men	Other Men	Women	Total	Int'l	Unk
Los Angeles					
Arts/Architec	20	3	8	31	0	1
Educ/Info Serv	1	0	2	3	0	0
Engineering	0	1	1	2	0	0
Humanities	4	0	8	12	1	0
Law	0	0	0	0	0	0
Life Sci	8	0	2	10	0	0
Management	2	0	0	2	0	0
Physical Sci	4	1	1	6	3	1
Public Affairs	3	0	1	4	0	1
Social Sci	2	1	5	8	0	4
Theat/Film/TV	9	5	4	18	0	0
Total	53	11	32	96	4	7
Merced					
Engineering	0	1	0	1	0	0
Natural Sci	0	0	0	0	0	1
Social Sci	0	0	0	0	0	0
Total	0	1	0	1	0	1
Riverside					
Business Admin	0	1	1	2	0	0
Education	1	0	1	2	0	0
Engineering	0	1	0	1	0	3
Hum/Art/SocSci	2	1	1	4	1	6
Nat/Ag Sciences	1	2	0	3	0	1
Total	4	5	3	12	1	10
San Diego					
Art/Humanities	11	0	2	13	1	2
Biological Sci	4	0	0	4	0	0
Engineering	1	0	3	4	0	0
Int'l Rel/Pacif St	0	0	0	0	0	1
Management	0	0	0	0	0	0
Physical Sci	0	0	0	0	0	2
Scripps	11	2	1	14	0	0
Social Sci	1	1	1	3	2	4
Total	28	3	7	38	3	9

Table 1 - continued

| <u>No Information on Type or Year of Highest Degree</u> | | | | Non-minority Eth <u>Codes (No. of Men)</u> | |
White <u>Men</u>	Other <u>Men</u>	<u>Women</u>	<u>Total</u>	<u>Int'l</u>	<u>Unk</u>
<u>Santa Barbara</u>					
Education	3	1	1	5	0	0
Engineering	3	2	0	5	3	0
Env Stud/Manag	0	0	1	1	0	0
Hum/Fine Arts	2	2	7	11	4	0
Mat/Life/PhysSc	8	2	1	11	3	0
Social Sci	1	2	1	4	1	0
Total	17	9	11	37	11	0
<u>Santa Cruz</u>					
Arts	1	3	5	9	0	0
Engineering	4	1	2	7	0	10
Humanities	4	1	6	11	0	5
Phys/Bio Sci	5	1	2	8	0	7
Social Sci	1	3	10	14	0	2
Total	15	9	25	49	0	24
<u>UC System</u>	198	62	135	395	35	91

Note: the first two column labels (White/Men and Other/Men) span two header rows, and the "Men" under each appears beneath "White" and "Other" respectively.

Table 2
Numbers of Faculty Used in Graphed Analyses

| | Men: by Ethnicitiy | | | |
	WH	AS HI BK IN	Women	Total
Berkeley				
Arts/Humanities	103	20	96	219
Biological Sci	52	10	20	82
Business	34	11	15	60
Chem/ChemEng	33	10	10	53
Education	12	3	17	32
Engineering	128	52	26	206
Envir Design	21	5	14	40
Information	6	2	5	13
Law	26	3	12	41
Math/Phys Sci	103	12	18	133
Nat Resources	56	12	29	97
Public Policy	7	2	2	11
Social Sci	121	33	84	238
Social Welfare	6	2	5	13
Total	708	177	353	1238
Davis				
Ag/Env Sci	157	24	60	241
Biological Sci	68	10	30	108
Education	9	0	12	21
Engineering	106	49	33	188
Human/Art/Cult	72	22	94	188
Law	8	7	9	24
Management	10	5	12	27
Math/Phys Sci	87	22	34	143
Social Sci	111	22	71	204
Total	628	161	355	1144
Irvine				
Arts	22	11	23	56
Biological Sci	55	12	21	88
Business	14	12	17	43
Education	5	1	12	18
Engineering	58	30	10	98
Humanities	44	29	74	147
Info/Comput Sci	34	12	16	62
Law	4	1	4	9
Physical Sci	78	24	20	122
Social Ecology	22	6	26	54
Social Sci	69	15	47	131
Total	405	153	270	828

Table 2 - continued
Numbers of Faculty Used in Graphed Analyses

| | Men: by Ethnicitiy | | | |
	WH	AS, HI, BK, IN	Women	Total
Los Angeles				
Arts/Architec	34	9	25	68
Educ/Info Serv	17	14	22	53
Engin/Appl Sci	79	51	18	148
Humanities	114	22	75	211
Law	35	6	13	54
Life Sci	50	16	38	104
Management	49	20	13	82
Physical Sci	141	28	27	196
Public Affairs	14	4	16	34
Social Sci	131	39	90	260
Theat/Film/TV	10	1	12	23
Total	674	210	349	1233
Merced				
Engineering	11	9	5	25
Natural Sci	17	14	14	45
Social Sci	22	7	15	44
Total	50	30	34	114
Riverside				
Business Admin	10	11	3	24
Education	7	1	10	18
Engineering	40	30	6	76
Hum/Art/SocSci	112	40	125	277
Nat/Ag Sciences	137	39	54	230
Total	306	121	198	625
San Diego				
Art/Humanities	70	28	65	163
Biological Sci	35	14	18	67
Engineering	101	54	15	170
Int'l Rel/Pacif St	14	6	4	24
Management	9	5	4	18
Physical Sci	98	31	12	141
Scripps	45	4	12	61
Social Sci	118	21	72	211
Total	490	163	202	855

Table 2 - continued
Numbers of Faculty Used in Graphed Analyses

| | Men: by Ethnicitiy | | | |
	WH	AS, HI, BK, IN	Women	Total
Santa Barbara				
Education	11	3	19	33
Engineering	78	23	12	113
Env Stud/Manag	10	1	3	14
Hum/Fine Arts	108	17	97	222
Mat/Life/PhysSc	159	19	37	215
Social Sci	57	23	55	135
Total	423	86	223	732
Santa Cruz				
Arts	19	5	29	53
Engineering	32	14	10	56
Humanities	30	10	40	80
Phys/Bio Sci	88	21	30	139
Social Sci	59	14	62	135
Total	238	64	171	463
UC System	3922	1165	2155	7232

FAQs for Pay Equity Analysis

Why do a pay-equity study?
Who decided UC would do an equity study?
Who chose the method?
What is the method?
Where can I learn more about the AAUP method?
How is the relationship between the white men's pay, degree, years of professional experience
    and years at UC identified?
What is appointment pay rate?
What is linear multiple regression?
Why is multiple regression useful for such a study?
Is this method used to flag individuals for further pay scrutiny?
Why use a linear rather than a logarithmic method?
Why is the prediction equation based on white men?
How is degree incorporated into the equation?
Why are the analyses done by academic units headed by a dean?
My FTE is split across units. In what unit would my data be in this study?
Why use a method that does not include subjective measures of merit?
Can 2-3 objective factors predict faculty pay?
How were overall effects of sex and of ethnicity among men assessed?
How were within-units effects of sex and ethnicity among men assessed?
Who chose likelihood-ratio tests to evaluate effects of sex and ethnicity within units?
The number of white men shown for my unit does not match my impressions. Why?
The number of minority men for my unit does not match my impressions. Why?
The number of women of women for my unit does not match my impressions. Why?
Why was ethnicity studied only among men?
What ethnicities were included in the study of ethnicity among men?
What do the lines inside the bars in Figures 2 and 3 indicate?
What do the p values on the figures mean?
What do the N values on Figures 2 and 3 mean?
Why do some bars in Figures 2 and 3 have diagonal blank spaces across them?
What do the adjusted R^2 values in Figures 1 and 4 mean?
Some differences in Figures 2 or 3 are large and have short SEM lines but are not marked as
    being statistically significant. Why?
Why were rank and step not used as factors?
Does ethnicity affect pay among men?
Does sex affect pay?
Since the data analyzed are "snap-shot", is there any reason to suspect that they reflect long-term
    patterns?
What are the limitations of the study?
At what stage in hiring or advancement does pay begin to diverge by sex?
Why show pay deviations as means rather than medians or modes?
Where can I learn how my pay compares to that of other UC faculty?

<u>Why do a pay-equity study</u>? To determine if UC is following federal regulations, such as Title IX, and state regulations that prohibit actions favoring one group over another.   A pay equity study determines if group differences exist, such as differences associated with sex or ethnicity.

<u>Who decided UC would do an equity study</u>? The Office of the President (UCOP).

<u>Who chose the method</u>? The UC Chancellors.

<u>What is the method</u>? The method used is based on recommendations in *Paychecks: A Guide to Conducting Salary-Equity Studies for Higher Education Faculty* (2002, L. Haignere), published by the American Association of University Professors (AAUP), with an adaptation used by UCI in its annual studies. The AAUP method uses information on the education (highest degree) and professional experience (years since degree) of white men to identify a mathematical relationship between those factors and their pay. The UCI adaptation is to include years at UC.

<u>Where can I learn more about the AAUP method</u>? *Paychecks: A Guide to Conducting Salary-Equity Studies for Higher Education Faculty*, 2nd edition, 2002, is available online http://www.academic.umn.edu/wfc/Paychecks_%20A%20Guide%20to%20Conducting%20Salary%20Equity%20Studies%20for%20Higher%20Education%20Faculty.pdf and from the AAUP.

<u>How is the relationship between the white men's pay, degree, years of professional experience and years at UC identified</u>? By linear multiple regression (see also, <u>What is linear multiple regression</u>?), which produces an equation of the form: pay = X times degree code + Y times years since degree + Z times years at UC + C, a constant. If all the white men in the unit have the same degree code, degree drops out of the equation. The regression process determines what values X, Y, Z and C must have for the equation to do the best job of fitting, or predicting, the white men's actual pay. If one uses it to predict each white man's pay and then averages the differences between their actual and predicted pay, that average will be zero because that is how the best-fit equation is defined.

<u>What is appointment pay rate</u>? It is the full-time pay associated with one's rank and step and any off-scale pay. It does not include stipends, summer salary or one-time payments (e.g., honoraria). For faculty with 9-month appointments, it is the pay associated with a 9-month appointment. For those with 11-month appointments, it is the pay associated with an 11-month appointment. For faculty whose pay is temporarily reduced due to sabbatical or other leave, appointment pay rate is, nonetheless, the amount that they would receive if at UC full-time.

<u>What is linear multiple regression</u>?   A regression is called linear when it produces an equation that describes a straight line.   It is called multiple when it describes a relationship between one factor, such as pay (on left side of equal sign), and several (i.e., multiple) others, such as degree, years of professional experience and years at UC (on right side of equal sign). Each factor must be expressed numerically, so, here, degree information is converted to a number (1 for a doctoral or professional degree, 0 otherwise). Because the prediction factors may have different impacts on pay, and may even affect pay in opposite directions, we must determine how to weight those impacts. The weights, let's call them X, Y and Z, respectively, are expressed by multiplication. We give degree weight X by multiplying the degree code by X. We give years of professional experience weight Y by multiplying them by Y. We give years at UC weight Z by multiplying them by Z.   Then, we add those three products together. The regression process determines the

values that X, Y and Z must have for this sum to do the best job of predicting (aka fitting, aka describing the relationship between the factors and) pay. Not surprisingly, pay can also involve a baseline value higher than zero, so the regression process may add a constant, C, to the sum of the three products. The result is an equation of the form: pay = X times degree code + Y times years since degree + Z times years at UC + C, a constant.   If one uses it to predict each white man's pay and averages the differences between their predicted and actual pay, the average will be zero, by definition. In other words, regression gives X, Y, Z and C values such that the equation predicts pay values that, on average, do not differ from the actual pay values of the people in the baseline group.

Why is multiple regression useful for such a study? Because its strength lies in detecting group differences.

Is this method used to flag individuals for further pay scrutiny? *Paychecks* (2nd ed. 2002; see Where can I learn more about the AAUP method?) notes (pg. 63) that "Salary bias identified by multiple regression is by definition not individual, but pertains to class or systemic differences…Flagging, which uses multiple regression to focus on individuals and individual corrections, is, therefore, inappropriate."   It also notes, though, that flagging of individuals is preferred by administrators responsible for salary-setting processes.

Why use a linear rather than a logarithmic method? As noted on pgs. 41-42 of *Paychecks* (2nd ed. 2002; see Where can I learn more about the AAUP method?), analyzing faculty pay using natural logarithms can have greater costs (lost understanding) than benefits (possibly better fit to white men's data). While often used in Economics to study investment yields, natural logarithms may not be appropriate for factors that can not be controlled as investments can.   Becoming a white man is not an investment option for women or minority men. Mostly, though, results presented in dollars, which can be divided by the dollars of a mortgage payment, car payment or grocery bill, are easier for most faculty to understand than results presented as percent changes in pay per year, as they are when analyzed using natural logarithms.

Why is the prediction equation based on white men? White men predominate on faculties at most U.S. research universities, including UC, making them the most appropriate baseline group.

How is degree incorporated into the equation? VP Jewell and UCAAD chose simply to distinguish doctoral and professional degrees from others, encoded as 1 vs. 0.

Why are the analyses done by academic units headed by a dean? To maintain the integrity of the paths followed by academic personnel reviews. From one UC campus to another, these units may have different names, such as divisions or schools.   Here, they are just called units.

My FTE is split across units. In what unit would my data be in this study? Faculty were assigned to units based on information that UCOP listed under "Home Department". Even faculty with split FTE have only one home department. The unit associated with that department was determined from the information on the campus website. The only exception to the use of home department information concerned identifying faculty in the Economics department at UCSB. That information was obtained from what UCOP listed under "Title Department".

Why use a method that does not include subjective measures of merit? Doing a pay equity study in regard to sex and ethnicity to determine if UC practices are meeting regulations such as Title IX means assessing whether or not there are differences in pay related to groups. Identifying group differences is the strength of multiple regression. Using objective measures, such as degree, years since degree and years at UC, to generate the regression, and then testing its ability to predict pay, provides a way to determine if the net result of the subjective assessments that affect the determination of rank, step and their dissociation from pay for individuals, have produced group differences that run afoul of federal regulations, such as Title IX, and state measures prohibiting actions that preferentially benefit one group.

Can 2-3 objective factors predict faculty pay? Yes, though with varying degrees of accuracy. The results obtained here, like those obtained over years at UCI, show that, for most units, degree, years of professional experience and years at UC produce a statistically significant fit to the white men's pay. Among units for which the fit was statistically significant, the portion of the white men's pay variation accounted for by those factors ranged from 12% to 96%.

How were overall effects of sex and of ethnicity among men assessed? By comparing the distribution of positive/negative pay deviations across the 72 units to the probability of getting a distribution of tails/heads that skewed, or more skewed, in either direction, by chance, when tossing a fair coin. This is done by computing the 2-tailed, cumulative, binomial probability.

How were within-units effects of sex and ethnicity among men assessed? With likelihood-ratio tests. Using combined data for groups within a unit, e.g., women and white men, women and all men, or white and minority men, this test evaluates models (log-likelihood models) produced for a pair of regressions. One regression predicts pay for the two groups based solely on their years of professional experience, years at UC and degree. The second adds sex (or ethnicity among men) as a factor, and its interactions with each of the other 2-3 factors. The test asks whether the model that included sex (or ethnicity) predicted pay significantly better than the one that did not.

Who chose likelihood-ratio testing to evaluate effects of sex and ethnicity within units? Nicholas Jewell, Professor of Biostatistics and Statistics at UC Berkeley, when he began the study while serving as Vice Provost of Academic Affairs at UCOP.

The number of white men shown for my unit does not match my impressions. Why? The data provided by UCOP excluded Lecturers, Deans, Provosts, VPs, etc., but included Chairs and Associate Deans. From what UCOP provided, some faculty members had to be excluded because of incomplete information or because of seeming logical errors in their data. Some men's data could not be used to study the effects of ethnicity because they had not specified an ethnicity (code UNK) or because their ethnicity was listed as INT'L. Also, to keep the units comparable, individuals with Acting Titles or appointments outside the Professor series (e.g., those with appointments in the 3000 or 2100 series) were excluded. The information in Tables 1 and 2 may help you here. Also, since ethnicity codes are based on self identification, some individuals you think belong to one group may self identify differently. For example, some may classify themselves based on country of origin, others on family/genetic heritage. How they classify themselves may also be affected by staff alerting them to the definitions of groupings used for federal reporting. For example, individuals who grew up in Latin America but are not of Latino heritage and do not have Latino surnames may legitimately list themselves as Hispanic, but you may not think of them as Hispanic. Conversely, individuals from Spain and having

Spanish surnames may list themselves as white. Also, keep in mind that individuals provide information on ethnicity only when they join UC or leave one UC campus for another, so the information available was provided under different guidelines over the years.

The number of minority men for my unit does not match my impressions. Why? See The number of white men shown for my unit does not match my impressions. Why?

The number of women for my unit does not match my impressions. Why? (See also, The number of white men shown for my unit does not match my impressions. Why?) Just as for men, some women's data was not used because information on their degree and/or degree year was missing, their data contained seeming errors, or their appointments were Acting or outside the Professor series (see Tables 1 and 2). Women's data were used, though, even if their ethnicity codes were UNK or INT'L, just as men's data with those codes were used for unit assessments involving sex, since it was assumed that an individual's sex would be known to their colleagues and to reviewers regardless of uncertainties in the data record about their ethnicity.

Why was ethnicity studied only among men? To avoid confounding any bias related to sex with any bias related to ethnicity. Also, given their small numbers in many units, separating white women from minority women would greatly reduce sample sizes and statistical power.

What ethnicities are represented in each of the codes used? The ethnicity code definitions are: AS = Chinese/Chinese-American, Japanese/Japanese-American, Pakistani/East Indian, Southeast Asian, other Asian, Filipino/Pilipino and other Polynesian; BL = Black/Afro-American (not of Hispanic origin); HI = Latin American/Latino, Mexican/Mexican-American/Chicano and other Spanish/Spanish-American; IN = American Indian/Alaskan; WH = white not of Hispanic origin. Until 1976, WH included "Other Non-White", which gave way to the descriptor "White (not of Hispanic origin)". These designations are independent of citizenship or country of origin. Also, keep in mind that individuals provide information on their ethnicity only when they join UC or leave one UC campus for another, so the information available was provided under different guidelines over the years. In addition, all ethnicity listings are by self-identification.

What do the lines inside the bars in Figures 2 and 3 indicate? The length of each bar shows the average (mean) difference between actual and predicted pay for women (Figure 2) or minority men (Figure 3) in the unit. This difference is also referred to as the pay deviation. The length of the line inside each bar is an estimate of the variability of the pay deviations (standard error of the mean, SEM).

What do the p values on the figures mean? The p stands for probability, and the p value indicates the probability or likelihood that the result would occur by chance. If $p < 0.05$, that probability is less than (<) 5 in 100. Similarly, $p < 0.0001$ means that the result would occur by chance less than 1 in 10,000 times. Some results were computed to only four decimal places, so $p = 0.0000$ means $p < 0.0001$. Results were considered statistically significant when $p < 0.05$.

What do the N values on Figures 2 and 3 mean? The value shown for N is the number of faculty women or minority men included in the average represented by the bar.

Why do some bars in Figures 2 and 3 have diagonal blank spaces across them? That is done when the bar would be very long compared to the others in the graph, hence drawing it at its full

length would require much more space. Instead, the bar is broken into two parts, and the dollar value to which it would reach is given below the bar.

What do the adjusted R^2 values in Figures 1 and 4 mean? The adjusted R^2 indicates how much of the variation in the white men's pay reflects variations in their degrees, years of professional experience and years at UC. For example, adjusted $R^2 = .70$ means that 70% of the variation in the white men's pay reflects variations in those three factors.

Some units having large pay differences with short SEM lines in Figures 2 or 3 are not marked as being statistically significant. Why? For results to be statistically significant at $p < 0.05$, they must pass a threshold value. Some results come very close to the threshold without passing it.

Why were rank and step not used as factors? Like the author of *Paychecks* (2nd ed. 2002; see Where can I learn more about the AAUP method?), VP Jewell recommended against their use because such variables may be confounded with sex and/or ethnicity. Therefore, using them as factors in the regression could mask effects of sex and/or ethnicity on pay. UCAAD agreed.

Does ethnicity affect pay among men? The present study does not provide statistically significant evidence to refute the null hypothesis that ethnicity does not affect pay among men at UC. Compared to white men, minority men had negative average pay deviations in 58% of units (42/72). The probability of getting a pattern that skewed in either direction with a fair coin (42 tails in 72 tosses) does not differ significantly from chance ($p = 0.19$).

Does sex affect pay? Overall, yes. Compared to white men, women had negative average pay deviations in 75% of units (54/72). When Econ departments were excluded from units that have them, that number was reduced to 53. The probability of getting a pattern that skewed in either direction by chance with a fair coin (54 tails in 72 tosses) is 26 in a million ($p = 0.000026$; without Econ, $p = 0.000076$).

Since the data analyzed are "snap-shot", is there any reason to suspect that they reflect long-term patterns? Yes. The longitudinal data from UCI's annual pay equity studies suggest, at least for that majority of units in which there is a significant relationship between the white men's pay and their degree, years of professional experience and years at UC, that the '09-10 data do reflect long-term patterns. Figure 5 shows 13 years of data for three UCI units and its general campus as a whole. One unit, Business, is among the minority of UC units in which white men's '09-10 pay was not related to degree, experience and time at UC. It has shown large pay equity swings over time. The other two - Biological Sciences and Humanities – are in that majority of UC units described above.   They have shown persistent inequity for 10-13 years. For the general campus as a whole, pay inequity for women increased 6- to 7-fold over the last 13 years, going from about $700/woman in '98-99 to about $4,500/woman in 2010-11. Since UCI's '09-10 data resemble those for other UC campuses *and* its own long-term patterns, the hypothesis that the '09-10 data do not reflect long-term patterns contradicts the available evidence.

What are the study's limitations? It does not identify mechanisms by which sex or ethnicity may impact pay and does not describe the time course over which such impacts develop. The purpose of the study was to determine if sex or ethnicity affects pay at UC. The results indicate that sex does impact UC pay, but the underlying mechanisms may vary across units and time. Patterns seen in older units almost certainly reflect cumulative effects of multiple mechanisms operating

over decades as UC has fluctuated in its tendency to adhere to pay scales vs. to allow them to be superseded by "market forces" and individual negotiations. Sex-related patterns may also have been affected by a growing realization that federal granting agencies were not monitoring non-athletic compliance with Title IX (see http://www.gao.gov/new.items/d04639.pdf).

At what stage in hiring or advancement does pay begin to diverge by sex? This study asked whether sex or ethnicity affect faculty pay at UC. Until such an effect is identified, it is premature to ask about its developmental time course. Since an impact of sex was identified here, this question becomes pertinent. However, the answer probably varies across units and time (see also, What are the limitations of the study?).

Why show pay deviations as means rather than medians or modes? Central tendencies of any set of data can be measured several ways. The mean is what we know as the average (i.e., the total of all the data values divided by the number of data points). The median is the midpoint of the data values; half of the data points are above it and half below. The mode is the data value that occurs most often. Medians and modes are less susceptible to effects of a few extreme values at the tails of a distribution than means are, which can be important when considering incomes for everyone in a city or state. The pay of UC faculty pay is much more constrained. For all white men (4,176 total) for which UCOP sent data, mean pay was only $10,610 higher than median pay. Also, if the W shape of UCI's pay-deviation distribution for white men is typical, men in the tails are *not* outliers http://www.ap.uci.edu/Equity/studies/payequity11/bars/gencampus.html . Comparing all women (2,342 total) for which UCOP sent data to the white men, means differed least ($22,649 higher for white men) and medians differed most ($27,041 higher for white men). Modes were in between ($25,600 higher for white men). For minority men (1,224 total), mean pay was $10,282 lower, median pay $16,141 lower and modal pay $30,100 lower than for white men. Compared to white men, minimum and maximum pay for women were $3,000 and $73,000 lower, respectively; for minority men, they were $200 and $1,107 higher, respectively. Of course, using medians could lead to different results. For example, from '98-99 to '08-09, while pay equity for UCI women deteriorated based on means, it improved based on medians http://www.senate.uci.edu/Councils/CFW/salaryResults13may2009FINAL.pdf. That study, which used a logarithmic analysis, found that women's median pay started out 3.7% below men's but increased more rapidly (4.5% vs. 4.1% per year). But it did not translate its results into dollars. If women started at $60,000, the 3.7% advantage gave men $62,220, for an initial gap of $2,220. If men's pay went up 4.1% the next year and women's went up 4.5%, the men got $64,771 ($62,220 x 1.041) and the women $62,700 ($60,000 x 1.045). Thus, the faster rise in women's pay closed the gap by $149, but still left women $2,071 behind. Their pay would remain below men's until their 10th year at UC [$(1.045)^y = (1.037)(1.041)^y$ when y = 9.18], by which time they would have lost over $13,000, plus interest. It would take considerably longer for women to be compensated for the initial disadvantage (i.e., for their cumulative pay to equal men's and to overcome the delay in receiving that pay).

Where can I learn about how my pay compares to that of other UC faculty? By law, pay of CA public employees is publicly available. It can be found online at www.sacbee.com/statepay/ . However, pay reported there is not the appointment pay rate used for the present study (see What is appointment pay rate?). For example, it includes summer salary and administrative stipends. However, if a faculty member was on leave, the publicly reported pay would include only that portion of the appointment pay rate that was paid out that year.