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Sex and Race Differences in Faculty Salaries, Tenure, Rank, and Productivity: Why, on Average, Do Women, African Americans, and Hispanics Have Lower Salaries, Tenure, and Rank?

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This paper was presented at the *20th Annual Meeting of the Association for the Study of Higher Education*, held in Orlando, FL, from November 2 - 5, 1995. This is a paper for the *National Study of Postsecondary Faculty*.

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Abstract
This study examined the status and conditions of salaries, tenure, rank attainment, and productivity of men and women college faculty and faculty of each of five racial groups. It is based on a subset of data on 8,114 faculty members drawn from the *1992-93 National Study of Postsecondary Faculty*. The results, based on descriptive and multivariate analyses, indicate that, even after controlling for experience, education, productivity, and institutional characteristics, women received 11.3 percent lower salaries than men, had lower probabilities than men of being tenured, and were less likely than men to be full professors. While Hispanic and Black faculty received salaries comparable to those of Whites, Hispanic and Black faculty were less likely than other faculty to be tenured. The study also found that, after controlling for race, education; experience, instructional and research activities, and institutional type, women faculty had 16.7 percent higher levels of career productivity standardized by teaching field than men. Hispanic faculty were found to be 17.1 percent more productive than faculty of other race groups. The implications of these and other findings for higher education are discussed. Four appendixes provide multivariate analysis data.

Keywords
academic rank (professional), Asian Americans, Blacks, college faculty, faculty promotion, higher education, Hispanic Americans, productivity, racial differences, salaries, salary wage differentials, sex differences, tenure, Whites

Disciplines
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Sex and Race Differences in Faculty Salaries, Tenure, Rank, and Productivity:

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This paper was presented at the annual meeting of the Association for the Study of Higher Education held at the Marriott Hotel, Orlando, Florida, November 2-5, 1995. This paper was reviewed by ASHE and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC collection of ASHE conference papers.

INTRODUCTION

Sex and race group differences in faculty salaries and in the distribution of academic tenure and rank have been prominent policy issues for the past two decades. Faculty salaries, tenure and rank are believed to be primarily determined by length of service and experience, level of educational attainment, scholarly productivity, amount of administrative responsibilities, and teaching performance, as well as by the supply of and demand for faculty trained in a given discipline. Therefore one would expect that faculty who are equal in these attributes of human capital and work in "competitive" (i.e., supply equals demand) disciplines would receive equal pay and have comparable tenure and rank, regardless of their sex and race. Consequently, sex and race group differences in salaries, tenure, and rank should reflect group differences in the amounts of experience and education, levels of productivity, and types of responsibility, as well as representation in academic disciplines. But, in a synthesis of the research literature on sex and race equality among college and university faculty, Moore and Amey (1993) concluded that to assume that there is no sex and race bias is unwarranted. Moore and Amey found evidence from their review that sex and race group differences in salary and promotion are not completely and consistently explained by such human capital factors as experience, productivity, and performance and such structural factors as supply of and demand for faculty trained in a discipline, leaving open the possibility that at least part of the differences may be explained by sex and race discrimination.

Much of published research that examines sex and race bias in faculty salaries, rank, and tenure is dated. The prevailing published research literature focuses upon faculty of the 1970's and 1980's but not faculty of the 1990's. This study provides a current status report on the conditions of faculty equity in the United States during the early 1990's and examines the role that human capital and structural factors play in determining faculty salaries, tenure, and rank.

This paper has the following two foci: First, it ascertains whether and to what extent there are differences in the salaries, tenure, and rank distribution of men and women faculty and among faculty of different race groups, and second, it examines the extent to which the observed sex and race group differences in salaries, tenure, and rank can be explained by such human capital factors as experience, level of education attained, scholarly productivity, administrative responsibilities, and teaching performance, and such structural factors as academic discipline and institutional type.

REVIEW OF THE RESEARCH LITERATURE

Understanding the Faculty Reward System

As W. Lee Hansen (1988) stated, "Pay systems in higher education provide an odd mix of annual merit- and non-merit-based salary increases, reflecting adjustments for promotions, longevity, market conditions [e.g., relative supply and demand], price level changes [e.g., cost-of-living], and pure merit" (p. 115). Faculty pay and reward systems generally reflect institutional history, mission, values, and goals, as well as faculty interests and departmental needs and priorities. Colleges and universities structure their reward systems in order to direct faculty activities in certain areas, such as teaching, research, and service, as well as to attract, develop, and retain effective faculty.

Based upon his review of research on faculty promotion and tenure, Miller (1987) concluded that colleges and universities ought to be, and in fact are, using a wide range of data sources to evaluate faculty performance. Evaluation criteria include advising students, classroom teaching activities, public service, professional growth and development, professional service, public service, scholarship, self rating of value, teaching, and instructional materials developed. Department chairs, peers, deans, and students may all contribute to the evaluation process. Nonetheless, Hansen (1988) argued that, while several aspects of faculty effectiveness may be considered, most reward systems are primarily based upon research performance.

Relationship of Productivity to Faculty Salaries and Ranks

Faculty productivity is typically defined by the number of publications, such as research reports, journal articles, and books written, by teaching and administrative workload and effectiveness, and by public service. Among various measures of productivity, several researchers (Gomez-Mejia and Balkin, 1992; Ferber and Green, 1982; Astin and Bayer, 1979; Tuckman, 1979; Ferber, Loeb, and Lowry, 1978; Tuckman and Tuckman, 1976; Astin and Bayer, 1972) have found that the number of published articles is one of the most important predictors of salaries and rank of men and women faculty. A survey of a random sample of management professors in 1988 by Gomez-Mejia and Balkin (1992) revealed that publishing in top-tier journals was the largest productivity-related predictor of average annual raises and total salaries for faculty employed at both institutions that grant doctoral degrees and institutions that do not. Salaries were associated with publishing in top journals, citations, and the number of job changes. Only among faculty with above-the-median number of top-tier publications were teaching evaluations, number of citations, and number of second-tier publications found to be significantly related to faculty

salaries (Gomez-Mejia and Balkin, 1992).

Based upon a nationally representative sample of faculty in 1972, Tuckman (1979) showed that, on average, publishing articles had a greater effect on salaries and promotion for both men and women faculty than publishing books, receiving a teaching award, holding an administrative appointment, or engaging in service. Salaries generally increased with the number of articles published, although the increments in salary associated with additional publications indicated diminishing marginal returns to publishing (Tuckman and Tuckman, 1976; Tuckman, 1979). For both men and women the probability of promotion to the associate professor level increased with the number of articles published. Publishing books was not a significant predictor of salaries for either men or women faculty. Although 16% of men and 18% of women received an award for their teaching performance, receiving a teaching award was not a significant predictor of salaries or rank for either men or women.

Fairweather (1993) used the 1987 National Study of Postsecondary Faculty to test the effects of various demographic characteristics, seniority, and time spent on teaching, research, administration, and service on the salaries of full-time faculty at various types of four-year institutions, including research universities, doctoral universities, comprehensive colleges, and liberal arts colleges.[1] Although various productivity factors were rewarded differently at different types of institutions, Fairweather found that the salaries of full-time faculty at all types of four-year institutions were positively related to research productivity, as measured by total number of publications in refereed journals and emphasis on research over teaching in allocation of time.[2]

Salary and Rank Differences by Sex and Race

Relationship between Faculty Salaries and Sex

Research examining the differences in the salaries of men and women faculty over the past twenty years has produced different findings. Comparing average salaries of men and women faculty without controlling for their experience and productivity reveals advantages for male faculty overall and

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[1]Demographic characteristics included: sex, race (white/nonwhite), highest degree awarded, and relative pay of the discipline. Seniority was measured using a composite of age, time in current rank, and number years at institution. Measures of teaching and instruction included percent time spent teaching, hours spent in the classroom, type of students taught, and total student contact hours. Measures of research and scholarship included time spent on research and scholarship, total number of refereed publications, and if the individual was principal investigator on a funded project.

[2]Being a principal investigator on a research project was associated with higher salaries only among faculty at doctoral universities. Among faculty at research universities, number of career publications was the single largest predictor of faculty salaries. Teaching only graduate students as opposed to teaching undergraduates, was associated with higher salaries among full-time faculty at research universities, doctoral granting universities, and comprehensive colleges. At all types of four year institutions except liberal arts colleges, time spent on administrative duties was associated with higher salaries on average (Fairweather, 1993).

at each rank. When such factors as experience, productivity, and major field are held constant, the gaps have been found to be reduced. For example, using a national survey of economic departments, Formby, Gunther and Sakano (1993) found that among economics faculty hired nationwide in the 1987-88 academic year, the average starting salary of women faculty was 3.4% ($1,060) lower than that of men faculty. After controlling for characteristics of the employing department, such as the number of new hires in the department during the 1987-88 academic year, the prestige of the employing department, the highest degree offered by the department, whether the department was located in a business school, cost of living, institutional control, and highest degree earned, the difference in the starting salaries of men and women faculty was not statistically significant (Formby, Gunther, and Sakano, 1993). This suggests that women enter the academic labor market with less human capital than their male counterparts and that the raw difference in their average salaries may be due to differences in human capital rather than sex discrimination.

Raymond, Sesnowitz, and Williams (1988) found that among full-time, tenure-track faculty at one large, public research university in 1983, the salaries of women faculty were 16% lower than the salaries of men faculty. But, after controlling for experience (the larger of the number of years employed at the institution or the number years since receiving the terminal degree), years of experience squared,[3] highest degree, national average starting salary for assistant professors in the discipline, relative research dollars per year (grants to the individual faculty member divided by the average amount of grants to all individuals in that discipline), relative instructional dollars per year, number of publications, prior administrative position, and rank, the difference in men and women faculty salaries was not statistically significant.

During the past twenty years several studies have reached different conclusions from those of Formby, Gunther and Sakano (1993), Raymond, Sesnowitz and Williams (1988), and others who have found sex to be a non-significant predictor of salaries. Several researchers have concluded that, after controlling for demographic factors, educational background and experience, professional achievement and productivity, and characteristics of current employment, on average, women received lower salaries

[3]Including both experience and experience squared controls for the possibility that the relationship between experience and salary is non-linear. In other words, each additional year of experience is associated with a higher salary, but the size of the increase in salary decreases with each additional year of experience.

than men[4] (Astin and Bayer, 1972; Katz, 1973; Gordon, Morton, and Braden, 1974; Hoffman, 1976; Loeb, Ferber, Lowry, 1978; Ferber and Kordick, 1978; Braskamp, Muffo, and Langston, 1978; Ferber and Green, 1982; Gregorio, Lewis, and Wannter, 1982; Hirsch and Leppel, 1982; Weiler, 1990; Barbezat, 1988; Bellas, 1993; Langton and Pfeffer, 1994).

Although Hirsch and Leppel (1982) found, based upon their analysis of faculty salaries at one university in 1980, that differences in male and female earnings profiles were primarily due to differences in entry salaries, several researchers have shown that the salaries of men and women faculty were due to differences in the reward systems applied to men and women (Bellas, 1993; Barbezat, 1988; Weiler, 1990; Jusenius and Scheffler, 1981; Tuckman, 1979; Ferber, Loeb, and Lowry, 1978). Barbezat found that, in 1968, male faculty received greater rewards than female faculty for the numbers of journal articles and books published, highest degree earned, and having an eleven-month contract. Among faculty in 1977, Barbezat showed that women realized higher returns than men for book publications and for holding higher degrees.

Based upon a nationally representative sample of faculty in 1972, Tuckman (1979) found that, on average, male faculty who published books had a higher probability of being promoted to both associate and full professor ranks than male faculty who did not publish books. Among women faculty, publishing books was related only to the probability of promotion to full professor. Public service was related to salary and promotion to the full professor level only for men. Faculty with current or previous administrative responsibilities received higher salaries, on average, although the premium associated with administrative responsibilities was higher for men than for women.

Bellas (1993) found that being married, having a homemaker spouse, holding a professional degree rather than a doctoral degree, teaching in health sciences, the professions, or engineering, and spending longer hours on research contributed to higher salaries among men faculty, but not women faculty. Controlling for institutional type, institutional control, and academic field, time spent teaching reduced male faculty salaries but had no significant effect on female faculty salaries, suggesting that men and women performing the same activities were not judged for salary increases on the same criteria and were not compensated equally (Bellas, 1993).

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[4]Demographic factors include sex, age, and race. Measures of educational background and experience include number of years employed at an institution and highest degree earned. Professional achievement and productivity may be measured by numbers of publications, research grants, instructional grants, administrative experience, primary activity, and rank. Characteristics of current employment include institutional type, institutional control, type of contract, academic field, and geographic region.

Barbezat used Oaxaca's (1973 in Barbezat, 1988) method for determining the amount of the male-female wage difference that was attributable to discrimination. According to Oaxaca (1973 in Barbezat, 1988), sex discrimination is measured by the difference between the actual male-female salary gap and the gap that would exist if men faculty were compensated according to women faculty's reward system or if women faculty were compensated according to men faculty's reward system. Controlling for experience, education, age, race, region, primary work activity, productivity, academic field, and institutional type, Barbezat found that between 11.5% and 13.6% of the male-female salary differences in 1968 was attributable to discrimination and that in 1977 between 5.5% and 7% was due to discrimination. Using a comparable method to examine wage differentials among faculty participating in the Carnegie Foundation for the Advancement of Teaching's 1984 national survey, Bellas (1993) found that women faculty's salaries were 6.6% lower than they would have been had women been compensated using the reward structure applied to men. Barbezat and Astin and Bayer (1972) attributed the remaining "unexplained" salary differences to sex discrimination.

Most researchers have used multiple regression analyses to examine predictors of faculty salaries (Barbezat, 1988; Bellas, 1993; Fairweather, 1993). Arguing that multiple regression analyses underestimate the effects of sex on academic salaries by ignoring indirect effects through such intervening variables as amount of education and experience, characteristics of the employing institution and department, and primary work activities, Smart (1991) used causal modeling techniques to assess the influence of sex on the salaries of faculty participating in the Carnegie Foundation for the Advancement of Teaching's 1984 national survey of faculty. Controlling for human capital and structural factors, such as sex segregation by institution and discipline, role segregation, and academic rank, Smart concluded that, among full-time faculty employed at four-year institutions in 1984, men received higher salaries. The direct effect of sex on salaries was relatively small in magnitude, ranking tenth among the fourteen predictor variables. In terms of total effects (the sum of direct and indirect effects), only "career age" (measured by number of years since receiving the highest degree) and rank had larger total effects on faculty salaries than sex. About 85% of the total effect of sex on faculty salaries was exerted indirectly via three intervening variables: rank, career age, and percent of males in the discipline. Smart (1991) concluded that the lower salaries of women faculty were largely attributable to women holding lower ranks than men, women being of younger "career age" than men, and women working in fields with higher proportions of women.

Relationship between Rank Attainment and Sex

Based upon their sample of natural and social science faculty who received doctorates between 1957 and 1962 and using chi-square tests, Bayer and Astin (1968) found evidence of sex discrimination in faculty salaries but not in rank attainment. More recent research indicates that ignoring "unexplained differences" in rank attainment between men and women faculty (i.e., differences that may be due to sex discrimination), however, may result in an underestimation of the differences in men and women faculty's salaries (Broder, 1993; Weiler, 1990; Hirsch and Leppel 1982; Loeb, Ferber, and Lowry 1978; Astin and Bayer 1979; Hoffman 1976), particularly since rank has been shown to be the single largest predictor of faculty salaries (Smart, 1991; Broder, 1993). Male-female faculty salary differences are larger when rank is not controlled, and are likely to be due to slower promotion rates for women than men.

Based upon a sample of faculty who applied for a grant from the Division of Social and Economic Science at the National Science Foundation's Economics Program during 1988 and 1989, Broder (1993) used four simultaneous equations to test for sex differences in faculty salaries, rank, prestige of employing department, and publications. Decomposing the sex differences into explained and unexplained variances, Broder reported that 25% of the male salary advantage was unexplained, 15%-19% of the male-female difference in rank was unexplained, 75% of the sex difference in prestige of the employing department was unexplained, and 32% of the male-female difference in articles in top journals was unexplained.[5]

Using a subsample of faculty from the 1968 Carnegie Commission National Surveys of Higher Education, Weiler (1990) found that women faculty were less likely to hold the ranks of full and associate professor than men faculty with identical characteristics. Using an ordered probit model[6] describing rank attainment among men faculty to predict women faculty ranks, Weiler found that the predicted distribution of women faculty was 34.3% full professors, 32.8% associate professors, and 32.9% assistant professors while the actual distribution of women faculty was 24.6% full professors,

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[5]Predictors of salary were number of articles published in "top" journals, number of years since receiving doctorate, rank, institutional type, and sex. Predictors of rank were number of articles published in "top" journals, number of years since receiving doctorate, prestige of employing department, and sex. Predictors of prestige of employing department were number of articles published in "top" journals, prestige of doctoral-granting institution, and sex. Predictors of number of articles published in "top" journals were number of years since receiving doctorate, prestige of doctoral-granting institution, prestige of employing department, and sex.

[6]An ordered probit model was used rather than a multiple regression model because the dependent variable, rank, was a categorical, not a continuous, variable. Using multiple regression with a categorical (i.e., qualitative) dependent variable may produce unstable coefficients for the independent variables and biased tests of statistical significance (Aldrich and Nelson, 1984).

30.3% associate professors, and 45.1% assistant professors. Szafran (1984) found that, on average, women faculty in 1969 actually received 89% of the rank that would be expected based upon their credentials and performance and the manner in which these characteristics were treated in granting rank to men.

Using male and female salary structures to compare predicted salaries with actual salaries, Gordon, Morton and Braden (1974) estimated that between 29% and 35% of the male-female salary difference was due to sex discrimination. Hoffman (1976), in a replication of this single institution study using another large doctoral-granting institution but omitting rank from the model, found that between 56% and 68% of the male-female differences in salaries was attributable to sex discrimination.

One important difference between the methods used by Barbezat (1988) and Bellas (1993) is that Bellas controlled for rank, whereas Barbezat did not. Barbezat (1988) and Ferber and Green (1982) excluded rank from regression models predicting salaries because of the possibility of discrimination in promotion practices. Barbezat noted further that rank ought to be omitted because of possible collinearity between rank and other variables, such as years experience, highest degree earned, and number of publications.

In her examination of the differences in salaries of men and women faculty, Bellas (1993) included rank as a control variable as a proxy for lifetime article publications. Bellas noted that when rank was omitted from the regression model, men faculty in 1984 received salaries that were $2,117 higher than women faculty salaries after controlling for other factors, compared to $1,575 higher salaries among men faculty when rank was included. Raymond, Sesnowitz, and Williams (1988) concluded that although including rank in the earnings model may underestimate overall sex discrimination in salaries, rank is a necessary proxy for research quality, teaching, and service.

Relationship between Faculty Salaries and Race/Ethnicity

Some researchers investigated the relationship between race and faculty salaries by combining all non-white faculty into one group and comparing the average experience of this group with the average experience of all white faculty (Bellas, 1993; Fairweather, 1993). Using this approach, neither Bellas nor Fairweather found any relationship between race and salaries after controlling for education, experience, allocation of time, and institutional type. This suggests that combining non-whites into one group may understate the gaps between some minority groups (e.g. blacks and Hispanics) and their white counterparts.

Based upon a sample drawn from the Carnegie Commission's 1969 Faculty Survey and controlling for the number of years since receiving the highest degree, highest degree, type of contract, primary activity, administrative appointment, citizenship, institutional type, institutional control, geographic region, and rank, Weiler (1990) reported that non-whites received lower salaries than whites, particularly non-white women. Using the Carnegie Commission of Higher Education's 1968-69 survey of faculty and the 1977 Survey of American Professoriate and controlling for years of experience since receiving highest degree, highest degree, age, sex, geographic region, type of contract, primary activity, and time spent in administration, Barbezat (1988) found that the average salaries of black faculty in 1968 were lower than those of white faculty but that in 1977, on average, black faculty received higher salaries. The regression coefficients for both 1968 and 1977 were small. Using the National Academy of Sciences' 1973 national survey of full-time economics faculty, Jusenius and Scheffler (1981) found that at all stages in their careers, black and East Indian male economists earned less than their white counterparts. Unlike white faculty, non-white (black, East Indian, Asian, and other non-white all combined) faculty whose primary activity was teaching or administration received lower salaries than non-white faculty engaged primarily in research (Jusenius and Scheffler, 1981).

Using the American Council on Education's 1972-73 national survey of faculty, Gregorio, Lewis and Wannter (1982) found that, after controlling for other factors,[7] blacks at the full professor and associate professor ranks earned significantly more than whites, although salary differences were not significant among assistant professors. Using the same data base, Tuckman and Tuckman (1976) found that black faculty at each rank received higher salaries, although the regression coefficient for associate professors was not statistically significant. Several single-institution studies of faculty in the early 1970's revealed higher salaries for blacks than for whites after controlling for academic field, age, years employed at the university, highest degree, rank, and sex (Hoffman, 1976; Gordon, Morton and Braden, 1974). Hoffman (1976) attributed the higher salaries of blacks to the comparatively greater demand for black faculty.

Among all full-time women and Asian male faculty and a stratified random sample of white males matched by department at one large public research university in 1976-77, Braskamp, Muffo, and

[7]Gregorio, Lewis and Wannter (1982) controlled for background factors (e.g., father's education, mother's education, academic field, community size, geographic region), "merit" (e.g., time to obtaining doctorate, numbers of articles and books published, receiving a teaching award, engaging in public service, grants received, administrative experience, and time on job), "need" (e.g., sex, race, marital status, dependents, spouse's education, employed spouse, academic spouse, household earnings, number of years of work experience, number of years experience squared), and "attainment" (e.g., quality of employing institution and rank).

Langston (1978) found that the salaries of Asian Americans did not differ significantly from the salaries of whites.

Summary of Variables Explaining Differences in Salaries and Ranks

Variables that have been used to explain differences in salaries, ranks, and productivity are drawn from two types of theories: human capital and structural. The premise of human capital models is that faculty salaries are determined by individual qualifications, as well as by the relative supply of and demand for faculty in a given discipline. Structural models focus on the effects of external factors, factors that an individual cannot control, such as institutional characteristics and practices. This section presents a brief description of these models and describes why these models are used in this analysis to explain differences in salaries and ranks among men and women faculty and among faculty of different race groups.

Human Capital Models

Neoclassical economic theories about the labor market suggest that labor, as a commodity, is subject to the laws of supply and demand (Kelly and Bayes, 1988; England, 1992; Youn, 1988). According to these theories, wages should measure faculty productivity, where productivity is defined in terms of number of publications, teaching load, and service responsibilities and should reflect the supply of and demand for faculty trained in a given discipline. According to human capital theory, differences in productivity are attributable to an individual's qualifications, such as levels of education, amounts of training, years of experience, work history, and health. Therefore, wage disparities among faculty within a discipline may be due to variations in the amount of training or education while wage disparities among faculty across disciplines may be due to differences in the supply of and demand for faculty trained in each discipline.

Variables that researchers have used to measure human capital (i.e., an individual's investment in education and training and work history) include: highest degree earned, prestige of doctoral-granting institution, number of years since receiving highest degree, number of years since highest degree squared, number of years at current institution, number of years unemployed since receiving highest degree, number of years employed part-time since receiving highest degree, number of years at present rank, age, age squared, and years to degree.[8] Fairweather (1993) created a composite variable,

"seniority," by combining age, time in current rank, and number years at the institution. Gomez-Mejia and Balkin (1992) created an "experience" composite, consisting of age, years since highest degree, years at institution, rank, and tenure.

Measures of research productivity have included time spent on research and scholarship, total number of refereed publications, number of publications in the past two years, citation count, presentations at meetings, exhibitions and performances, honors received, if principal investigator on a funded project, if research assistants, and grants received. Measures of teaching and instructional duties included percent time spent teaching, hours spent in the classroom, level (undergraduate or graduate) of students taught, total student contact hours, receipt of teaching award, teaching evaluations, and number of dissertations supervised. Other measures of productivity included time spent on administrative duties, time spent on service, and committee assignments.

Structural Models

A central premise of structural models is that structural and institutional factors constrain an individual's choice of employment. According to Youn (1988), institutions establish internal labor markets defined by administrative rules and procedures, such as a tenure system and a policy of "equitable" wages across disciplines, regarding the distribution of jobs and an individual's progression within and between jobs. The external labor market controls competition among institutions for jobs and labor via enrollment changes, fluctuations in research expenditures, and production of new Ph.D.s (Youn, 1988). According to the structural perspective, sex differences in employment outcomes are primarily due to the segregation of women in institutions, academic disciplines, and work roles that are perceived to have lower prestige and lower value (Smart, 1991).

Smart (1991) examined the influence of three types of structural factors on faculty salaries: occupational segregation by institutional type, occupational segregation by academic field, and occupational segregation by work role. Segregation by institutional type was measured by institutional prestige, control, and financial health. Segregation by academic field was measured by "hard" versus "soft," "pure" versus "applied," and percent of males in the field.[9] Segregation by work role was

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[8]Including both age and age squared and years since degree and years since degree squared controls for the possibility that the relationship between experience and salary is not linear. In other words, each additional year of experience is associated with a higher salary, but the size of the increase in salary decreases with each additional year of experience.

[9]Biglan's (1973) typology was used to classify academic fields as "hard" or "soft" and "pure" or "applied." "Hard" or "soft" describes paradigm development in the field while "pure" or "applied" describes concern for practical application.

measured by the amounts of time spent on teaching, research, and administration. Other measures of structural and institutional factors have included: relative pay of the discipline compared to other disciplines, academic field, highest degree offered by employing department, department prestige, unionization, institutional size, institutional sex, percent of female faculty, percent of female students, percent of graduate students, and geographic region. Bellas (1994) included several measures of labor market conditions, including: percent of female doctorates in the field, unemployment rate in the field, percent of doctorates in the field working in non-academic employment, and non-academic salary for the field.

Summary of Methods Used to Examine Differences in Salaries and Ranks

While a few researchers have used bivariate statistical analyses (e.g., Bayer and Astin, 1968, used chi-square tests), most researchers have used multiple regression analyses to examine predictors of faculty salaries (e.g., Astin and Bayer, 1985; Weiler, 1990; Barbezat, 1988; Bellas, 1993; Fairweather, 1993). Several researchers estimated separate regression models of salary on independent variables for men and women faculty (e.g., Weiler, 1990; Barbezat, 1988; Bellas, 1993). Researchers who have examined predictors of faculty rank, a categorical dependent variable, have used probit models[10] (e.g., Weiler, 1990; Ferber and Green, 1982). Broder (1993) used two-stage least squares to estimate a model consisting of four simultaneous equations: one predicting salary, one predicting rank, one predicting prestige of the employing department, and one predicting number of articles published in top journals. Arguing that multiple regression analyses underestimate the effects of sex on academic salaries by ignoring indirect effects through such intervening variables as amount of education and experience, characteristics of the employing institution and department, and primary work activities, Smart (1991) used causal modeling techniques to assess the influence of sex on faculty salaries.

The use of multiple regression analyses has been upheld in the federal courts in which important sex and race discrimination cases have been settled. In Sobel v. Yeshiva University (1988), the U.S. Court of Appeals threw out the defendants' challenge of the plaintiffs' use of multiple regression to show sex discrimination in salaries. Specifically, Circuit Judges Kearse, Pierce, and Pratt ruled the following:

Multiple regression analysis could be properly used to determine whether a university's system

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[10]Probit, rather than multiple regression, is used when the dependent variable, rank, is a categorical, not a continuous, variable. Using multiple regression with a categorical (i.e., qualitative) dependent variable may produce unstable coefficients for the independent variables and biased tests of statistical significance (Aldrich and Nelson, 1984).

for salary guidelines was discriminatory on the basis of sex notwithstanding the complex and diverse context of a medical school faculty, the relative uniqueness of each faculty member and the subjectivity of many of the determinants of salary, as multiple regression analysis was designed to sift through various factors in order to assess as accurately as possible the influence of any one of them (839 F.2d 20).

RESEARCH DESIGN AND METHOD

The Purpose

This study examines the status and conditions of salaries, tenure, rank attainment, and productivity of men and women faculty and faculty of each of five race groups. Beyond identifying sex and race differences in salaries, tenure, rank attainment, and productivity, this research also identifies the factors that contribute to observed differences.

The need for examining these issues is threefold. First, most evidence indicates that, despite thirty years of effort to achieve equality, male faculty continue to receive higher salaries than female faculty. Most prior research indicates that, after controlling for sociodemographic factors, human capital factors, productivity, and characteristics of current employment, the gaps between men and women faculty salaries are reduced but not eliminated. Although some evidence suggests that the male-female wage gap has declined over time, on average women faculty continue to receive lower salaries than men faculty. Several studies, including some of the more recent studies, focused upon faculty in the 1960's, prior to affirmative action practices, thereby limiting the relevance of the findings to today's faculty (Weiler, 1990; Szafran, 1984; Astin and Bayer, 1972). The 1992 National Survey of Postsecondary Faculty, the most recent national survey of faculty in higher education institutions, provides an opportunity to test whether and to what extent the gaps continue to exist.

Second, differences among race groups in salaries, tenure, rank attainment, and productivity are not well understood, largely because samples have typically included too few people of different race groups to permit detailed analyses.[11] Attempts to examine differences between non-white and white faculty by aggregating non-white faculty into one category and comparing this group with white faculty underestimates the differences among faculty of some race groups, particularly blacks and Hispanics.

Third, the methodological limitations of past research restrict the applicability of findings to particular types of institutions and academic programs. A large number of studies were based upon

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[11]Szafran (1984) reported that blacks represented just 0.77% (0.32% when faculty at historically black universities were excluded) and Asian Americans represented only 1.73% of the Carnegie Commission's 1969 national sample of university faculty.

samples drawn from single institutions, limiting the generalizability of the findings to faculty nationwide (Braskamp, Muffo, and Langston, 1978; Ferber, Loeb and Lowry, 1978; Ferber, 1974; Ferber and Green, 1982; Gordon, Morton, and Braden, 1974; Gray 1983; Hirsch and Leppel, 1982; Hoffman, 1976; Katz, 1973; Loeb, Ferber, and Lowry, 1978; Raymond, Sesnowitz, and Williams, 1988). Other studies focused upon one academic discipline (Broder 1993; Formby, Gunther, Sakano, 1993; Jusenius and Scheffler 1981; Gomez-Mejia and Balkin, 1992). Due to low response rates, findings based upon survey data (Formby, Gunther, Sakano, 1993; Ferber and Kordick, 1978) or specific non-random samples, such as the National Science Foundation's pool of grant applicants (Broder, 1993) may not be sufficiently representative of the nation's faculty and, therefore, may not be generalizable. Studies that used matched samples (Ferber, Loeb and Lowry, 1978) do not show the extent of inequity because women may be clustered in departments with few male faculty counterparts and, consequently, paired comparisons are not possible for all faculty.

The findings of some studies that used multiple regression analyses to predict faculty salaries suffer from collinearity problems, particularly in terms of the measures used to describe work experience, such as age, years of continuous employment, years in academe, years at current institution, years out of labor force, and rank (Astin and Bayer, 1972; Astin and Bayer, 1979; Tuckman and Tuckman, 1976). Some of the models that have been used to examine faculty ranks and salaries have not been theoretically driven, but rather have relied upon stepwise regression to single out significant predictors from large numbers of available variables (Astin and Bayer, 1979; Ferber, 1974; Bayer and Astin, 1972).

Research Questions

This study aims to address the following two questions:

- What are the current differences in faculty salaries, tenure, ranks, and productivity for men and women and for people of various race groups?
- What are the factors that contribute to the observed differences and how much of the observed differences is explained by these factors?

Instrument and Procedures

This research is conducted using a sub-sample drawn from the 1992-93 National Study of Postsecondary Faculty (NSOPF-93), a nationally representative sample of college and university faculty

and instructional staff who were employed by public and private non-proprietary higher education institutions in the fall of 1992. NSOPF-93 provides data about the professional backgrounds of faculty, as well as their duties, workloads, salaries, benefits, and attitudes. The survey was sponsored by the U.S. Department of Education's National Center for Education Statistics (NCES) and supported by the National Science Foundation and the National Endowment for the Humanities. The National Opinion Research Center at the University of Chicago, under contract to NCES, conducted the survey.

A stratified sample of institutions was selected from the universe of public and private non-proprietary American colleges and universities that are accredited by an accrediting agency recognized by the U.S. Department of Education, that offer formal instructional programs at least two-years in length, and that generally admit only students with high school diplomas or the equivalent. Faculty were selected from full- and part-time personnel (permanent and temporary) with any instructional responsibilities, those full- and part-time personnel with faculty status (regardless of whether responsibilities included instruction), and faculty and instructional personnel on sabbatical leave. Full-time females, blacks, Hispanics, Asians American, and faculty in four disciplines (philosophy/religion, foreign languages and literature, English language and literature, and history) were over-sampled.

Of the 974 selected institutions, 817 institutions agreed to provide a list of faculty (84.9% response rate). Of the 31,354 faculty selected, 25,780 responded to the survey between January and December of 1993 (86.6% response rate). Between September 1993 and May 1994, 872 of 962 institutions submitted completed questionnaires (90.6% response rate).

For the analyses presented in this paper, the sample was limited to faculty with instructional duties, whose primary activity was teaching, who were employed full-time with a regular appointment, who were tenured or on tenure-track, and who were U.S. citizens. Faculty with the rank of lecturer, with no rank, or with a rank other than the traditional ones of full professor, associate professor, assistant professor, or instructor were also excluded. In order to ensure that the sample was representative of the population of faculty while also correcting for the influence of large sample sizes on the standard errors and t-statistics, the data were weighted by the weight for the individual case divided by the average weight for the sample. Using the unadjusted weight, the final sample included 243,833 faculty, 70.3% men (n = 171,516). Using the adjusted weight, the final sample included 8,114 cases.

Analysis

Both descriptive and multivariate analyses were employed in collaboration with researchers at WESTAT and are presented in this study. At the descriptive level, we used analysis of variance to

compare men and women faculty and faculty in five race groups (American Indian/Alaskan Native, Asian American/Pacific Islander, black, Hispanic, and white) in terms of important continuous variables. Cross tabulations and chi-square tests were used to assess differences in faculty based upon sex and race group in terms of important categorical variables. We used Pearson product-moment correlations to measure the relationships between predictor and dependent variables without controlling for other variables and multivariate analyses to examine the relationship between hypothesized predictor variables and salaries, tenure, rank attainment, and productivity holding other variables constant. For the multivariate analyses, multiple regression was used to investigate the effects of the independent variables and interaction terms on two of the dependent variables: salary and productivity. Logistic regression was used to examine the influence of the independent variables on the dichotomous dependent variables: tenure and full professor. Confirmatory factor analyses were used to construct parsimonious measures of productivity, experience, and allocation of time between teaching and research, and to reduce problems of collinearity.

Dependent variables

The dependent variable for salary is the basic salary reported by the respondent divided by the number of months of the appointment multiplied by twelve months. Annual basic salary is expressed as a natural logarithm so that the regression coefficients reflect percent changes in salary for a one unit change in a given independent variable.

The dependent variable tenure is a dichotomous variable representing tenured (yes) or on tenure track but not tenured (no). Faculty who were not on tenure track or who worked at institutions that did not have tenure systems or tenure systems corresponding to their faculty status were not included in this study.

The categorical variable rank is considered as a series of contrasts: full professor (yes/no), associate professor (yes/no), assistant professor (yes/no), and instructor (yes/no). Instructor is omitted from the model, thereby serving as the comparison group. In the regression analysis predicting rank, the dependent variable is full professor (yes/no). Since having tenure generally means holding the rank of associate or full professor, together the regression analyses predicting tenure and full professor illustrate promotion practices for college and university faculty.

The dependent variable career scholarly productivity was constructed using confirmatory factor analysis. The NSOPF-93 includes fourteen measures of output over the career: articles in refereed

journals, articles in non-refereed journals, creative works in juried media, creative works in nonjuried media, chapters in books, monographs, reviews of books, textbooks, other books, research and technical reports, presentations, exhibitions and performances in fine arts, patents and copyrights, and computer software. In order to control for variations among academic disciplines, each output measure was standardized by dividing the individual faculty member's output in each category by the mean level of output for all full-time faculty in the discipline. Six of the fourteen standardized measures loaded on the factor: articles in refereed journals, presentations, chapters published, reviews of books, articles in non-refereed journals, and books published. The alpha reliability coefficient for this standardized measure of scholarly productivity over the course of the career is 0.643. Appendix 1 shows the factor loadings for the standardized measures on the factor. Because each output measure is standardized by discipline, the productivity factor measures the percent deviation of a faculty member's productivity from the average productivity of all faculty in the sample.

About two percent of faculty included in this study (5,029 of 249,577) reported basic salaries from the institution of below $10,000 or above $400,000. Faculty with salaries falling in these "extreme" ranges were excluded from the analysis. Appendix 2 shows that faculty with salaries below $10,000 or above $400,000 were more likely than other faculty to be black, associate professors, chair of the department, single, and working in public, two-year institutions. These faculty also spent more time on professional growth and less time on teaching relative to other faculty. Faculty excluded from the sample based upon salary data were more likely than other faculty to be teaching in business, nursing and other health, computer science, and occupational programs, and less likely to be teaching in fine arts, foreign languages, biological sciences, and physical sciences.

Independent variables

Salary was expected to be determined by the following independent variables: sex, race, teaching field, rank, productivity, institutional type, institutional control, and geographic region. Tenure and rank were expected to be determined by sex, race, human capital factors, teaching field, career scholarly productivity, institutional type, and institutional control. Career scholarly productivity was expected to be determined by sociodemographic factors, such as sex, race, marital status, having dependents, and parents' education; human capital factors, such as highest degree received and experience; work activities, such as allocation of time, instruction-related activities, if current department chair (yes/no), if principal investigator (yes/no), and grant dollars received; and institutional type.

A dichotomous variable (female=1, male=0) is used to measure the effects of sex on the dependent variables. Four dichotomous variables are used to represent the five race groups: American Indian/Alaskan Native, Asian American/Pacific Islander, black/non-Hispanic, Hispanic, and White/non-Hispanic. White, non-Hispanic is the comparison group. Marital status is a dichotomous variable: married (including married and living with someone in a marriage like relationship) or not married (including single, separated, divorced, and widowed). Having dependents is also a dichotomous variable (yes or no). Parents' education represents the average of the highest levels of education received by the mother and father.

Human capital measures include highest degree received and experience. The categorical variable for highest degree received was converted into a dichotomous variable: terminal degree, representing a doctorate or professional degree, or no terminal degree, representing all other degree levels. Confirmatory factor analysis was used to create the measure of experience. This factor includes four variables: age, years since receiving the highest degree, number of years at the current institution, and number of years at the current rank. The correlations between these four measures range from .587 to .727 and the alpha reliability coefficient for this factor is .876. Appendix 3 shows the factor loadings.

Three dichotomous variables measure the influence of teaching field on the dependent variables. Using the dimensions identified by Biglan (1973) each teaching field is categorized in terms of "hard" versus "soft," "pure" versus "applied," and whether concerned with life systems. Appendix 4 shows the categorization of each of the twenty-six teaching fields in terms of these three dimensions.

Institutional control is measured as a dichotomous variable: public (yes) or private (no). Four geographic regions are considered: northeast (22.5% of faculty), midwest (31.3% of faculty), south (31.9% of faculty), and west (14.2% of faculty).[12]

The effects of institutional type on the dependent variables are measured using a series of contrasts representing five types of institutions: research universities, doctoral institutions, comprehensive institutions, private liberal arts colleges, and public two-year colleges. The effect of each

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[12]The northeast region includes New England states (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont) and Mid-Eastern States (Delaware, District of Columbia, Maryland, New Jersey, New York, and Pennsylvania). The midwest region includes Great Lakes states (Illinois, Indiana, Michigan, Ohio, and Wisconsin) and Plains states (Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota and South Dakota.) The southern region comprises Southeastern states (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia) and Southwestern states (Arizona, New Mexico, Oklahoma, and Texas). The western region is comprised of Rocky Mountain states (Colorado, Idaho, Utah, and Wyoming) and Far Western states (Alaskan, California, Hawaii, Nevada, Oregon, and Washington).

type of institution is measured relative to the average effect of all five types of institutions on the dependent variables.

Measures of work activities include: allocation of time, instruction-related activities, if current department chair (yes/no), if principal investigator (yes/no), and grant dollars received. The correlation between time spent on research and time spent on teaching is -.595. Following the example of Fairweather (1993), confirmatory factor analysis was used to construct a less redundant measure of the teaching/research tradeoff. The alpha reliability coefficient for this factor is .719. Other measures of allocation of time include percent time spent on service, percent time spent on administration, and percent time spent on professional growth. Measures of instruction-related activities include total number of student contact hours per week and total number of undergraduate and graduate dissertation and theses committees served on.

Interaction terms for sex with each independent variable were included in the final step of the regression analyses in order to test whether the influence of each independent variable on the dependent variable is the same for both men and women. Interaction terms for productivity with each rank were included to test the influence of within-rank differences in productivity on the dependent variables. Since none of the productivity-rank interaction terms were statistically significant, however, these terms were dropped from the regression models.

RESULTS

Characteristics of the Sample

Table 1 shows that the weighted sample[13] includes 243,833 faculty, 72,317 (29.7%) of whom are female. Table 1 also reveals that about 11.1% of the total sample are minority faculty. Among men faculty, 83.5% are married or living with someone, compared with just 63.3% of women. While 75.1% of male faculty have at least one child, just 49.6% of female faculty have dependents. Although, on average, the parents of women faculty have higher levels of education than the parents of men faculty, a smaller percent of women faculty (57.6%) than men (74.8%) hold terminal degrees. Women are younger (47.2 versus 50.8 years old), earned their highest degree more recently (1980 versus 1974), and have held both their current position (10.4 versus 15.1 years) and their current rank (6.6 versus 10.1 years) for a fewer number of years.

[13]In order to correct for the influence of large sample size on standard errors and significance testing, the sample was weighted using an adjusted weight for the analyses that follow. The adjusted weight is the unadjusted weight for the individual case divided by the average weight for the sample. After applying the adjusted weight, the number of cases in the analyses is 8,114.

Table 1 Characteristics of men and women faculty

Variable	Total	Men	Women	Significance Test
	n = 243,833	n = 171,516	n = 72,317	
% of Total		70.3%	29.7%	
Race Group				$\chi^2 = 63.1$, df=4, p<.001
Am. Ind./ Alask.	0.4%	0.3%	0.4%	
Asian Am/Pac. Isl.	3.4%	3.7%	2.8%	
Black	5.0%	3.8%	7.9%	
Hispanic	2.3%	2.2%	2.5%	
White	88.9%	89.9%	86.4%	
Marital Status				$\chi^2 = 491.6$, df=5, p<.001
Single	10.7%	7.3%	18.9%	
Married	75.5%	82.1%	59.9%	
Live with Someone	2.0%	1.4%	3.4%	
Separated	1.3%	1.3%	1.1%	
Divorced	9.3%	7.1%	14.4%	
Widowed	1.2%	0.7%	2.4%	
Dependents (yes)	67.6%	75.1%	49.6%	$\chi^2 = 503.18$, df=1, p<.001
Parents' Education	2.97	2.89	3.16	F=41.41, df=1, p<.001
	(sd = 1.71)	(sd = 1.70)	(sd = 1.73)	
Terminal Degree	69.7%	74.8%	57.6%	$\chi^2 = 234.7$, df=1, p<.001
Experience Factor	.00	.17	-.41	F=606.6, df=1, p<.001
	(sd = 1.00)	(sd = 1.01)	(sd = .84)	
Age	49.75	50.83	47.18	F=273.0, df=1, p<.001
	(sd = 9.24)	(sd = 9.17)	(sd = 8.91)	
Year Highest	75.47	73.69	79.66	F=693.72, df=1, p<.001
Degree	(sd = 9.71)	(sd = 9.56)	(sd = 8.71)	
Years in	13.71	15.10	10.41	F=425.88, df=1, p<.001
Current Position	(sd = 9.59)	(sd = 9.71)	(sd = 8.43)	
Years Since	9.04	10.08	6.57	F=406.60, df=1, p<.001
Rank Achieved	(sd = 7.34)	(sd = 7.62)	(sd = 5.94)	
Institutional Type				
Research	24.9%	28.1%	17.4%	$\chi^2 = 99.0$, df=1, p<.001
Doctoral	14.1%	14.7%	12.8%	$\chi^2 = 4.47$, df=1, p<.001
Comprehensive	30.6%	30.4%	31.2%	$\chi^2 = .56$, df=1, p<.001
Private Liberal Arts	9.1%	8.8%	10.1%	$\chi^2 = 3.45$, df=1, p<.001
Public Two-Year	21.2%	18.1%	28.4%	$\chi^2 = 103.6$, df=1, p<.001

Table 2 shows that women comprise nearly one-half of all black faculty (46.6%), while women represent 32.1% of American Indian/Alaskan Native, 31.9% of Hispanic, 28.8% of white, and 24.2% of Asian American/Pacific Islander faculty. On average, white and Asian American/Pacific Islander faculty have parents with higher levels of education than other faculty and are more likely to hold a terminal degree themselves. Compared with other faculty, black and

Hispanic faculty are younger, received their highest degrees more recently, have held their current positions for a fewer number of years, and received their current rank more recently than other faculty.

Table 2 Characteristics of Faculty of Each Race Group

Variable	Am. Ind/ Alask. Nat.	Asian Am./ Pac. Isl.	Black	Hispanic	White	Significance Test
Representation	n = 873	n = 8,312	n= 12,293	n= 5,579	n=216,775	
	0.4%	3.4%	5.0%	2.3%	88.9%	
% Female	32.1%	24.2%	46.6%	31.9%	28.8%	$\chi^2 = 63.11$, df=4, p<.001
Marital Status						$\chi^2 = 73.04$, df=20, p<.001
Single	8.7%	10.2%	15.9%	15.4%	10.3%	
Married	65.5%	80.6%	62.6%	70.0%	76.2%	
Live with Someone	5.2%	0.7%	0.7%	1.6%	2.1%	
Separated	2.9%	1.1%	2.5%	0.6%	1.2%	
Divorced	17.7%	6.9%	15.9%	10.3%	8.9%	
Widowed	_	0.5%	2.4%	2.1%	1.2%	
Dependents (yes)	73.0%	76.0%	62.0%	76.6%	67.3%	$\chi^2 = 22.22$, df=4, p<.001
Parents' Educ.	2.61	2.81	2.54	2.55	3.01	
	(sd =1.56)	(sd = 1.75)	(sd =1.80)	(sd =1.63)	(sd =1.70)	F=11.38, df=4, p<.001
Terminal Degree	50.5%	76.2%	58.6%	62.0%	70.3%	$\chi^2 = 40.59$, df=4, p<.001
Experience Factor	-.03	.14	-.24	-.28	.02	
	(sd = .84)	(sd = .96)	(sd = .92)	(sd = .97)	(sd =1.00)	F=11.05, df=4, p<.001
Age	50.35	50.76	48.50	46.90	49.85	
	(sd =9.06)	(sd = 8.93)	(sd =9.66)	(sd =9.33)	(sd =9.21)	F=7.40, df=4, p<.001
Year Highest	77.51	73.64	78.07	78.08	75.32	
Degree	(sd =8.19)	(sd = 9.03)	(sd =9.39)	(sd =9.23)	(sd =9.73)	F=13.94, df=4, p<.001
Years in	13.68	14.13	11.57	11.57	13.87	
Current Position	(sd =8.46)	(sd = 9.44)	(sd =9.04)	(sd =8.97)	(sd =9.62)	F=8.07, df=4, p<.001
Years Since	9.10	9.96	7.71	7.90	9.11	
Rank Achieved	(sd =7.35)	(sd = 7.32)	(sd =6.54)	(sd =6.89)	(sd =7.38)	F=5.76, df=4, p<.001
Institutional Type						
Research	13.5%	32.0%	18.8%	13.9%	25.3%	$\chi^2 = 28.8$, df=4, p<.001
Doctoral	21.9%	14.8%	13.2%	18.8%	14.0%	$\chi^2 = 5.0$, df=4, p<.001
Comprehensive	17.5%	27.6%	32.4%	20.8%	31.0%	$\chi^2 = 12.4$, df=4, p<.001
Private Liberal Arts	3.8%	5.1%	9.6%	3.9%	9.4%	$\chi^2 = 13.0$, df=4, p<.001
Public Two-Year	43.2%	20.6%	26.0%	42.7%	20.3%	$\chi^2 = 65.7$, df=4, p<.001

Current Differences in Salaries

Table 3 reveals that, on average, men faculty received 19.8% higher salaries than women faculty in 1992. The average annual basic salary among men faculty was $61,518 while the average salary among women faculty was $49,314. On average, Asian American/Pacific Islanders received 11.1% higher annual basic salaries than white faculty in 1992. Asian American/Pacific Islander faculty received an average annual basic salary

of $64,485 while white faculty received an average of $58,062. Compared with the salaries of white faculty, on average, the salaries of American Indian/Alaskan Native faculty were 10.6% lower ($51,936), the salaries of black faculty were 9.1% lower ($52,766), and the salaries of Hispanic faculty were 7.0% lower ($53,975).

Table 3 Differences in observed salaries between men and women faculty of different race groups: fall 1992

Race Group	Total	Men	Women	Men-Women		White-Race Gap	
				$	%	$	%
Am. Indian/ Alaskan Native	$51,936 (sd=17,807)	$56,468	$42,343	14,125	25.0%	6,126	10.6%
Asian American/ Pacific Islander	64,485 (sd=21,581)	67,855	53,927	13,928	20.5%	-6,423	-11.1%
Black	52,766 (sd=19,410)	56,355	48,654	7,701	13.7%	5,296	9.1%
Hispanic	53,975 (sd=17,233)	56,350	48,902	7,448	13.2%	4,087	7.0%
White	58,062 (sd=20,332)	61,626	49,269	12,357	20.5%	--	--
Total	**$57,898**	**$61,518**	**$49,314**	**$12,204**	**19.8%**		

Main Effects:
Sex: F= 637.03, df =1, p<.01
Race: F = 11.20, df=4, p<.001
Interaction Effect: F = 2.05, df=4, p=.09

Table 3 also shows that among faculty of all race groups, men earned higher salaries than women and that the differences between the salaries of men and women faculty were comparable regardless of race. Among both Asian American/Pacific Islander faculty and white faculty, the average salaries of men were 20.5% higher than the average salaries of their women counterparts. The male salary advantage was smaller, but still substantial, among black faculty (men received 13.7% higher salaries than women) and Hispanic faculty (men received 13.2% higher salaries than women). On average, the salaries of American Indian/Alaskan Native men were 25.0% higher than the salaries of American Indian/Alaskan Native women.

Factors Explaining Differences in Average Salaries

Table 4 shows that the factors with the largest effects on annual basic salaries were

holding the rank of full professor (beta=.484), working at a research institution (beta=.266), holding the rank of associate professor (beta=.189), and working at a doctoral institution (beta=.122). Career scholarly productivity was positively associated with annual basic salaries (beta=.107). The model explained 42.3% of the variance in annual basic salary.

Table 4 Predictors of faculty annual basic salaries

Variable	Unstandardized Coefficient	Standardized Coefficient	T-value
Female	-.113	-.153	-10.61***
AsianAmerican/Pacific Islander	.042	.023	2.51*
Black	.018	.012	1.29
Hispanic	-.006	-.003	-.32
American Indian/Alaskan Native	-.064	-.012	-1.32
New England	.114	.140	13.41***
Midwest	.024	.033	3.17**
West	.161	.167	16.40***
"Pure" Field	-.057	-.085	-7.72***
"Hard" Field	.022	.028	2.98**
Research Institution	.207	.266	18.27***
Doctoral Institution	.118	.122	10.24***
Comprehensive Inst.	.044	.060	4.53***
Private Liberal Arts Inst.	-.031	-.027	-2.49*
Full Professor	.334	.484	26.41***
Associate Professor	.141	.189	10.21***
Assistant Professor	-.00008	-.0001	-.007
Career Productivity	.035	.107	10.95***
Female x "Pure"	.033	.033	2.51*
Female x Associate Professor	.028	.024	1.89
Female x Research Institution	-.068	-.045	-4.09***
Constant	10.73		837.73***
R Square	.423		

*p<.05, **p<.01, ***p<.001

Note: Independent variables that were not statistically significant and dropped from the regression model are not shown.

Table 4 also shows that, even after controlling for race, rank, productivity, academic field, institutional type and control, and geographic region, female faculty received 11.3% lower salaries than male faculty. Different factors influenced the salaries of men and women faculty, as illustrated by the statistically significant interactions between sex and several of the independent variables. While faculty teaching in "pure" fields received 5.7% lower salaries than faculty teaching in "applied" fields, women teaching in "pure" fields received 3.3% higher

salaries than their male counterparts.[14] While all associate professors received higher salaries than instructors (14.7%) on average, women associate professors received higher salaries than male associate professors. While faculty employed at research universities received substantially higher salaries than faculty employed at other institutions (20.7%) on average, the premium associate with working at a research university was lower for women than for men.

After controlling for other factors in the model, Asian American/Pacific Islander faculty received 4.2% higher salaries than other faculty. The annual basic salaries of black faculty, Hispanic faculty, and American Indian/Alaskan Native faculty did not differ statistically from the salaries of white faculty.

Current Differences in Tenure

Table 5 reveals that men faculty were more likely to hold tenured positions than women faculty. In 1992, 79.8% of men faculty were tenured, compared with just 60.4% of women faculty. Table 6 shows that American Indian/Alaskan Native and Asian American/Pacific Islander faculty were more likely than faculty of other race groups to hold tenured positions. About 74.7% of white faculty held tenured positions, compared with 84.1% of American Indian/Alaskan faculty and 80.6% of Asian American/Pacific Islander. Similar percents of black and Hispanic faculty held tenured positions, 62.1% and 62.8% respectively, substantially lower than the percent of white faculty holding tenured positions (74.7%).

Table 7 reveals that the percent of men with tenure was higher than the percent of women with tenure among all five race groups, but that the relative representation of men and women faculty with tenure varied among race groups. The percent of women with tenure was relatively higher among black faculty (41.7%), Hispanic faculty (33.7%), and American Indian/Alaskan Native faculty (27.7%) and lower among Asian American/Pacific Islander faculty (19.6%) and white faculty (23.4%).

[14]"Pure" fields include English, foreign languages, history, philosophy, biological sciences, physical sciences, mathematics, economics, political science, psychology, and sociology. "Applied" fields include agriculture/home economics, business, communications, teacher and other education, engineering, fine arts, first-professional health, nursing, law, and computer science.

Table 5 Observed differences in tenure between men and women faculty in Fall 1992

Variable	Total	Men	Women	Men-Women Gap
Representation	n = 243,833	n = 171,516	n = 72,317	
Tenured	74.0%	79.8%	60.4%	19.4%

χ^2 = 329.6, df=1, p<.001

Table 6 Observed differences in tenure among faculty of different race groups in Fall 1992

Variable	Am. Indian/ Alaskan Native	Asian Am./ Pacific Islander	Black	Hispanic	White
Representation	n = 873	n = 8,312	n = 12,293	n = 5,579	n = 216,775
Tenured	84.1%	80.6%	62.1%	62.8%	74.7%
χ^2 = 51.9, df=4, p<.001					
White-Race Group Gap	-9.4%	-5.9%	12.6%	11.9%	_

Table 7 Differences in observed representation of men and women of different race groups among faculty with tenure: 1992

Race Group	Men	Women	Sample Size
American Indian/Alaskan Native	72.3%	27.7%	24
Asian American/Pacific Islander	80.4%	19.6%	223
Black	58.3%	41.7%	254
Hispanic	66.3%	33.7%	117
White	76.6%	23.4%	5,390
Total	75.8%	24.2%	6,008

χ^2 = 52.69, df=4, p<.001

Factors Ey ' 'ng Differences in Tenure

With a partial correlation of 0.541, experience was the single most important predictor of tenure. Career scholarly productivity made a smaller, but still significant, contribution to the probability of tenure (partial correlation of 0.084). Holding other factors constant, faculty employed at public two-year and research institutions were more likely to be tenured than faculty employed at doctoral, comprehensive, and private liberal arts institutions.

Table 8 also shows that, after controlling for race, education, experience, teaching field, career scholarly productivity, and institutional control and type, men were more likely than women to hold tenured positions (.799 lower odds for women than for men). Blacks and Hispanics were also less likely than other faculty, net of other factors, to hold a tenured position. The odds for black faculty holding a tenured position were .552 lower and the odds for Hispanic faculty were .451 lower than for other

faculty. But, among Hispanic faculty, women were more likely to be tenured than men, suggesting that Hispanic women are treated differently in the tenure process than both Hispanic men and non-Hispanic women.

Table 8 Predictors of Tenure

Variable	Unstandardized Coefficient	Exp (B)	Partial Correlation
Female	-.224	.799	-.024*
Race			.044**
American Indian	1.53	4.62	.013
Asian American	.008	1.01	<.001
Black	-.595	.552	-.034**
Hispanic	-.796	.451	-.033**
Experience Factor	2.79	16.31	.541***
Terminal Degree	.465	1.59	.063***
"Pure" Field	.302	1.35	.039**
Female x "Pure"	-.344	.71	-.025
Career Productivity	.427	1.53	.084***
Public Institution	.274	1.31	.033**
Institutional Type			.092***
Research Institution	.185	1.20	.026*
Doctoral Institution	-.381	.68	-.061***
Comprehensive Inst.	-.131	.88	-.020***
Private Liberal Arts	-.181	.83	-.010***
Female x Race			.010
Female x Am. India	-.989	.37	<.001
Female x Asian Am.	-.126	.88	<.001
Female x Black	.432	1.54	<.001
Female x Hispanic	1.19	3.30	.030*
Constant	1.96		
-2 Log Likelihood	4437.8		
Goodness of Fit	15891.2		

*p<.05, **p<.01, ***p<.001

Note: Independent variables that were not statistically significant and dropped from the regression model are not shown.

Current Differences in Rank

In 1992 women faculty were more likely than men faculty to hold the ranks of assistant professor and instructor while men were more likely than women to hold the rank of full professor. Table 9 shows that 35.8% of women faculty were assistant professors, compared with 17.3% of men faculty. While

13.6% of women were instructors, just 8.1% of men held this rank. In contrast, 20.8% of women faculty but 46.7% of men faculty held the highest rank of full professor. Similar percents of women and men held the rank of associate professor: 29.8% of women versus 27.9% of men.

Table 9 Observed differences in rank between men women faculty in fall 1992

Variable	Total	Men	Women	Male-Female Gap
Representation	n = 243,833	n = 171,516	n = 72,317	
Full Professor	39.1%	46.7%	20.8%	25.9%
$\chi^2 = 478.3$ df=1, p<.001				
Associate Professor	28.5%	27.9%	29.8%	-1.9%
$\chi^2 = 2.87$, df=1, p=.09				
Assistant Professor	22.8%	17.3%	35.8%	-18.5%
$\chi^2 = 329.3$, df=1, p<.001				
Instructor	9.7%	8.1%	13.6%	-5.5%
$\chi^2 = 60.21$, df=1, p<.001				

Table 10 shows that Asian American/Pacific Islander faculty and white faculty were more likely than black, Hispanic, and American Indian/Alaskan Native faculty to hold the rank of full professor. About one-half (48.6%) of Asian American/Pacific Islander faculty and 39.6% of white faculty were full professors, compared with 34.7% of American Indian/Alaskan Native faculty, 31.2% of Hispanic faculty, and 26.7% of black faculty. While 12.6% of Asian American/Pacific Islander, 15.3% of American Indian/Alaskan Native, and 22.7% of white faculty were assistant professors, 29.2% of black and 26.6% of Hispanic faculty held this rank. Hispanic, American Indian/Alaskan Native, and black faculty were more likely than white and Asian American/Pacific Islander faculty to hold the rank of instructor. While 26.2% of American Indian/Alaskan Native, 21.4% of Hispanic, and 16.1% of black faculty were instructors, just 8.9% of white and 10.7% of Asian American/Pacific Islander faculty held this rank. Faculty of the five race groups were equally represented among associate professors.

Table 11 reveals that the relative representation of men and women with the rank of full professor varied by race group. Among blacks, more than one-third (36%) of full professors were women and among American Indian/Alaskan Native 21.5% of full professors were women. In contrast, among Asian American/Pacific Islander faculty just 11.1% of full professors were women. The representation of women among Hispanic and white full professors was comparable, 15.0% and 15.3% respectively.

Table 10 Observed differences in rank among faculty of different race groups in fall 1992

Variable	Am. Indian/ Alaskan Native	Asian Am./ Pacific Islander	Black	Hispanic	White
Representation	n = 873	n = 8,312	n = 12,293	n = 5,579	n = 216,775
Full Professor	34.7%	48.6%	26.7%	31.2%	39.6%
$\chi^2 = 42.7$, df=4, p<.001					
Associate Prof.	23.9%	28.1%	28.0%	20.8%	28.7%
$\chi^2 = 6.0$, df=4, p=.20					
Assistant Prof.	15.3%	12.6%	29.2%	26.6%	22.7%
$\chi^2 = 28.3$, df=4, p<.001					
Instructor	26.2%	10.7%	16.1%	21.4%	8.9%
$\chi^2 = 62.1$, df=4, p<.001					

Table 11 Observed differences in representation of men and women of different race groups among full professors: Fall 1992

Race Group	Men	Women	Sample Size
Am. Indian/Alaskan Native	78.5%	21.5%	10
Asian Am./Pacific Islander	88.9%	11.1%	134
Black	64.0%	36.0%	109
Hispanic	85.0%	15.0%	58
White	84.7%	15.3%	2,857
Total	84.2%	15.8%	3,169

$\chi^2 = 36.64$, df=4, p<.001

Factors Explaining Differences in Rank

Table 12 shows that experience was the single largest predictor of holding the rank of full professor (partial correlation of .340). Career productivity (partial correlation of .155) and having a terminal degree (partial correlation of .152) also contributed to the probability of holding the rank of full professor. Net of other factors, faculty employed at research and doctoral institutions were relatively less likely to hold the rank of full professor, while faculty employed at private liberal arts institutions were relatively more likely. Among faculty employed at research and doctoral institutions, women faculty were less likely than their male counterparts to hold the rank of full professor.

Table 12 also shows that, controlling for race, experience, education, teaching field, career scholarly productivity, and institutional type and control, women faculty were less likely than men faculty (.42 lower odds for women than for men) and black faculty were less likely than faculty of other race groups to hold the rank of full professor (.63 lower odds for black faculty than for faculty of other race groups).

Table 12 Predictors of Full Professor Rank

Variable	Unstandardized Coefficient	Exp (B)	Partial Correlation
Female	-.870	.419	-.057***
Race			<.001
American Indian	.081	1.08	<.001
Asian American	.150	1.16	<.001
Black	-.463	.629	-.023*
Hispanic	-.085	.919	<.001
Experience Factor	1.16	3.19	.340***
Terminal Degree	1.35	3.86	.152***
"Pure" Field	.198	1.22	.029**
Career Productivity	.720	2.05	.155***
Public Institution	.164	1.18	.016
Institutional Type			.040***
Research Institution	-.175	.84	-.025*
Doctoral Institution	-.262	.77	-.035**
Comprehensive Inst.	.032	1.03	<.001
Private Liberal Arts	.337	1.40	.033**
Female x Race			<.001
Female x Am. Indian	.425	1.53	<.001
Female x Asian American	-.226	.798	<.001
Female x Black	.742	2.10	.025*
Female x Hispanic	-.152	.86	<.001
Female x Terminal Degree	.505	1.66	.024*
Female x Experience	.181	1.20	.018*
Female x "Pure"	-.374	.69	-.026*
Female x Productivity	-.252	.78	-.025*
Female x Inst. Type			.062***
Female x Research	-.238	.79	-.007***
Female x Doctoral	-.522	.59	-.028***
Female x Comprehensive	-.042	.96	<.001
Female x Priv. Liberal Arts	-.184	.83	<.001
Constant	-1.57		
-2 Log Likelihood	6866.3		
Goodness of Fit	7111.2		

*p<.05, **p<.01, ***p<.001

Note: Independent variables that were not statistically significant and dropped from the regression model are not shown.

Different factors influenced the probabilities of men and women holding the rank of full professor, as indicated by the statistically significant interactions between female and several independent variables. For instance, although black faculty were less likely than other faculty to be full professors, among black faculty women were more likely than men to be full professors. While holding

a terminal degree increased the probability of both men and women faculty being full professors, women faculty were even more likely than comparable men to be promoted for holding a terminal degree. Although experience was the primary criteria for promotion to the rank of full professor among all faculty, among faculty with comparable experience women were more likely than men to hold the rank of full professor. Teaching in a "pure" rather than "applied" field was associated with a higher probability of being a full professor for both men and women faculty. Among faculty teaching in "pure" fields, however, women were less likely than men to be full professors. Although productivity was associated with increased probability of promotion to full professor for all faculty, among faculty with comparable levels of productivity, women were less likely than men to hold the rank of full professor.

Table 13 Observed differences in career scholarly productivity (standardized by teaching field) between men and women faculty of different race groups: fall 1992

Race Group	Total	Men	Women	Men-Women Gap
Am. Indian/Alaskan Native	-.03	-.02	-.07	.05
Asian Am./Pacific Islander	.05	.17	-.32	.49
Black	-.15	-.04	-.26	.22
Hispanic	-.06	.10	-.38	.48
White	.01	.06	-.13	.19
Total	.00	.06	-.15	.21

Main Effects:
Sex: F= 74.36, df = 1, p<.01
Race: F = 1.51, df=4, p=.20
Interaction Effect: F = 1.92, df=4, p=.10

Current Differences in Career Scholarly Productivity

Table 13 shows that men had higher levels of career scholarly productivity standardized by teaching field than women. On average, men reported 6% higher productivity than all faculty while women reported 15% lower productivity levels. Table 13 also shows no significant differences among faculty of different race groups in terms of observed career scholarly productivity levels.

Factors Explaining Differences in Career Scholarly Productivity

Table 14 shows that largest predictors of career scholarly productivity were spending more time on research than teaching (beta = -.201), having more experience (beta = .198), working at a research institution (beta = .131), and serving on a greater number of committees (beta = .124).

Table 14 Predictors of Career Scholarly Productivity

Variable	Unstandardized Coefficient	Standardized Coefficient	T-value
Female	.167	.076	4.46***
Asian American/Pacific Islander	-.023	-.004	-.35
Black	.050	.010	.76
Hispanic	.171	.025	2.04*
Am. Indian/Alaskan Native	-.013	-.0007	-.07
Dependents (yes)	.099	.046	3.50***
Parents' Education	.020	.035	3.30***
Terminal Degree (yes)	.161	.074	5.78***
Experience Factor	.198	.198	18.07***
Teaching/Research	-.202	-.201	-14.66***
Time Administration	-.004	-.049	-4.26***
# Committees Serve on	.015	.124	11.39***
Chair Department	.105	.035	3.08***
Grant Dollars	.000000093	.061	5.19***
Principal Investigator (yes)	.205	.081	7.13***
Research Institution	.305	.131	7.70***
Doctoral Institution	.123	.043	3.01**
Comprehensive Institution	.018	.008	.55
Private Liberal Arts Institution	.0005	.0002	.01
Female x Asian American	-.26	-.024	-2.03*
Female x Black	-.162	-.024	-1.69
Female x Hispanic	-.342	-.029	-2.32*
Female x Dependents	-.148	-.052	-3.14**
Female x Teach/Research	.111	.056	4.60***
Female x Grant Dollars	-.00000009	-.028	-2.41*
Constant	-.361		-9.56***

R Square = .208

*p<.05, **p<.01, ***p<.001

Note: Independent variables that were not statistically significant and dropped from the regression model are not shown.

Table 14 also shows that, controlling for race, sociodemographic factors, experience and education, work activities, and institutional type, career scholarly productivity levels were 16.7% higher among women than men. Although this model explains just 20.8% of the variance in career scholarly productivity, statistically significant interactions suggest important differences in the factors that influence the productivity of men and women faculty. While Hispanic faculty reported 17.1% higher productivity levels than faculty of other race groups, Hispanic women were 34.2% less productive than their male counterparts. Asian American/Pacific Islander women were 26% less productive than Asian American/Pacific Islander men. Although faculty with at least one child were 9.9% more productive than faculty with no children, women with dependents were 14.8% less productive than men with

dependents. Faculty who spent relatively more time on research and less time on teaching were 20.2% more productive than other faculty and, among faculty with comparable ratios of teaching to research, women were 11.1% more productive than men. Although each $100,000 increase in grant dollars was associated with a 0.9% increase in productivity, the increase in productivity associated with additional grant dollars was lower for women than for men.

Summary

The regression analyses reveal that, even after controlling for experience, education, productivity, and institutional characteristics, women receive 11.3% lower salaries than men, have lower probabilities than men of being tenured, and are less likely than men to be full professors. On average, Asian American/Pacific Islander faculty receive 4.2% higher salaries than other faculty. While Hispanic and Black faculty receive salaries comparable to those of whites, net of other factors, Hispanic and black faculty are less likely than other faculty to be tenured and black faculty are less likely than other faculty to be full professors.

Consistent with previous research, these analyses show that salaries and promotions for men and women faculty are influenced by different factors. Unlike previous research, this study reveals that the relationship between sex and promotion vary by race group. Hispanic women are more likely than Hispanic men to be tenured and black women are more likely than black men to be full professors. This study also shows that career scholarly productivity is positively associated with faculty salaries, tenure, and rank. Among faculty with comparable productivity levels, however, women are less likely than men to be full professors.

This study shows that, after controlling for race, education, experience, instructional and research activities, and institutional type, women faculty have 16.7% higher levels of career productivity standardized by teaching field than men. Overall, Hispanic faculty are 17.1% more productive than faculty of other race groups. But, net of other factors, Hispanic women and Asian American/Pacific Islander women are less productive than their male counterparts. The findings that Hispanic women are less productive than Hispanic men and that Hispanic women are more likely to be tenured than Hispanic men highlight the complexity of the faculty reward system.

The relationship between "pure" versus "applied" field and the dependent variables salary, rank, and tenure indicates that faculty reward systems vary by discipline. Moreover, even after controlling for experience, education, and institutional characteristics, women and men teaching in "pure" fields are

rewarded differently. The finding that women in "pure" fields receive higher salaries than men with comparable experience and education suggests that the demand for women faculty in these fields exceeds the supply, thereby elevating the average salaries of women. The finding that women in "pure" fields are less likely than men to be tenured and less likely to hold the rank of full professor suggests the possibility of discrimination against women in pay and promotion practices within some disciplines.

IMPLICATIONS OF THE FINDINGS FOR HIGHER EDUCATION

For colleges and universities seeking to improve the status of women, blacks, and Hispanics on campus, this study reveals three areas where research and intervention at the institutional level are needed. First, colleges and universities need to investigate the possibility of discrimination in salaries, tenure, and rank practices for women and in the promotion process for blacks and Hispanics. Second, methods for increasing the representation of women, blacks, and Hispanics on campus need to be developed. Third, strategies are needed for rewarding the productivity of women faculty and increasing the productivity of Asian American/Pacific Islander and Hispanic women faculty and women faculty with dependents.

Prospect of Discrimination

This study demonstrates that salary, tenure, and rank differences between men and women and among faculty of different race groups are not explained solely by human capital (e.g., education and experience) and structural attributes (e.g., type of work activities, institutional type, and field), pointing to the prospect of discrimination in faculty reward systems by sex and race. Even after controlling for education and experience, academic field, institutional type, and career productivity, women receive lower salaries and are less likely to be tenured or promoted to full professor than men. Black and Hispanic faculty are less likely than faculty of other race groups to be tenured and black faculty are less likely than other faculty to hold the rank of full professor. The possibility of discrimination is strengthened by the findings that, after controlling for demographic factors (marital status, dependents, and parents' education), education and experience, teaching field, allocation of time and types of activities, and institutional type, women faculty are more productive than men faculty, Hispanic faculty are more productive than faculty of other race groups, and women are less likely to be promoted to full professor than men with comparable levels of productivity.

A strength of the study is that it utilizes a nationally representative sample of faculty to identify average trends and patterns. A related limitation, however, is that the findings do not describe the

experiences of any particular faculty member or of faculty at any particular college or university. Therefore, individual colleges and universities are encouraged to use these findings to examine salary, tenure, and rank differences between men and women and among faculty of different race groups in order to ensure that such differences can be explained by factors, such as productivity and experience, that are appropriate for awarding salaries and promotions.[15]

Increased Representation of Underrepresented Groups

This study also reveals the continuing under representation of women, blacks, and Hispanics among college and university faculty. Women represent just 29.7% of the full-time faculty in this study. Black, non-Hispanics represent 11.7% of the U.S. population, but just 5% of college and university faculty. Hispanics represent 9.0% of the U.S. population, but only 2.3% of faculty. Women represent a greater proportion of black faculty than of any other race group. Women represent nearly one-half of black faculty (46.6%) compared with less than one-third of Hispanic (31.9%) and white (28.8%) faculty and one-quarter of Asian American/Pacific Islander faculty (24.2%).

This study also demonstrates that, after controlling for other factors, faculty at research universities earn substantially higher salaries, have higher probabilities of both tenure and full professor, and are more productive. In addition, full professors earn substantially higher salaries than faculty of lower ranks. Therefore, in addition to increasing the representation of women, blacks, and Hispanics among college and university faculty in general, a second challenge is to increase the representation of women, blacks and Hispanics in more prestigious institutions and among faculty with higher ranks. Increasing the representation of women, blacks and Hispanics at research universities and among full professors will likely narrow the gaps in salary, tenure, and ranks.

Asian American/Pacific Islanders represent 5.1% of college and university faculty, nearly twice their representation in the U.S. population (2.8%). This study also shows that Asian American/Pacific Islander faculty are older than other faculty. In order to ensure that Asian American/Pacific Islanders continue to be sufficiently represented, higher education policy makers must ensure that Asian

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[15]Using the Carnegie Commission on Higher Education's 1969 Faculty Survey to examine equity in recruitment, promotion, tenure, and pay of full-time tenure track faculty working at 79 American universities, Szafran (1984) found that the correlations between recruitment equity, rank equity, tenure equity, and salary equity at higher education institutions were small in magnitude, indicating an institution's behavior was generally not uniform across these different personnel practices. The negative relationship between rank equity and salary equity suggests that a university that awards salaries more equitably may award rank less equitably.

American/Pacific Islanders continue to enter academe.

Importance of Productivity

On average, faculty who are more productive earn higher salaries and have greater probabilities of being tenured and promoted to full professor. This study shows that, after controlling for other factors, women faculty are more productive than men faculty, that Hispanic faculty are more productive than faculty of other race groups, and that black faculty are no less productive than white and Asian American/Pacific Islander faculty. Despite these favorable findings, colleges and universities ought to examine the influence of productivity on salary and promotion practices as well as the factors that influence productivity. For instance, although women are more productive than men, net of other factors, among faculty with comparable productivity levels women are less likely than men to be promoted to full professor. In other words, on average, women are rewarded differently than men for career scholarly productivity. Perhaps this difference is attributable to the concentration of women in disciplines that place lower premiums on career scholarly productivity as defined in this study.

Several findings suggest that colleges and universities may be able to enhance the productivity of faculty. For instance, although among all faculty having at least one child is associated with greater productivity, women with dependents are less productive than men with dependents. Asian American/Pacific Islander and Hispanic women are less productive than their male counterparts. Among faculty with comparable amounts of grants, women are less productive than men. Spending time on research-related activities, obtaining grants, being a principal investigator, and serving on undergraduate and graduate theses and dissertation committees increases productivity while spending time on administrative activities reduces productivity. In other words, since this study reveals that the faculty reward system is based upon research-related activities, colleges and universities should examine factors that may inhibit the ability of faculty to do research.

Limitations

One of the limitations of this study is the extent to which the influence of structural factors on faculty rewards was incorporated into the regression models. This study includes the three aspects of occupational segregation defined by Smart (1991): segregation by institutional type, as measured by institutional type and control; segregation by work role, as measured by the amounts of time spent on teaching, research, and administration; and segregation by academic field, as measured by "hard" versus "soft," "pure" versus "applied," and "life" systems or non-life systems. This study does not include other

measures of labor market characteristics used by some researchers (Bellas, 1994; Formby, Gunther, and Sakano, 1993; Gomez-Mejia and Balkin, 1992), such as the percent of women with doctoral degrees in a field, the unemployment rate in a field, the nonacademic salary of those in each field, county per capita income, cost of living, and state household income.

A second limitation pertains to the examination of race and ethnic group differences. Although the NSOPF-93 database includes information on ethnicity, the sample sizes for these groups are too small to permit detailed analysis. The use of broad race groups, particularly for Hispanics and Asian American/Pacific Islanders, necessarily masks the diversity of experiences for faculty within these categories. Moreover, the low representation of American Indian/Alaskan Natives (0.4% of the sample) likely explains the failure to identify significant relationships between American Indian/Alaskan Native and the dependent variables.

A third limitation pertains to the variables used to measure faculty productivity. Although the NSOPF-93 database offers significant advantages for researchers studying sex and race differences in faculty rewards, the database does not include measures of the quality of work activities. Consequently, measures for the quality of faculty teaching and the quality of publications and presentations are not included in the analyses. The database also does not include information on starting salaries of faculty or annual raises.

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APPENDIX 1

CAREER SCHOLARLY PRODUCTIVITY - FACTOR LOADINGS

	Factor 1	Factor 2	Factor 3	Factor 4
Articles, Refereed Journals (a1)	.722	.043	-.008	-.081
Chapters Published (a6)	.698	-.060	.081	-.095
Presentations (a11)	.697	.024	.055	.081
Reviews of Books (a5)	.541	.042	.044	.227
Articles, Non-Ref. Journals (a2)	.499	.089	.187	.061
Books Published (a8)	.436	.257	.199	-.213
Patents or Copyrights (a13)	.074	.769	-.046	.062
Creative Works, Juried (a3)	-.060	.628	.335	-.033
Textbooks Published (a7)	.394	.417	-.250	.111
Creative Works, Non-Juried(a4)	.025	.011	.674	.305
Monographs Published (a9)	.214	.057	.586	-.182
Technical Reports (a10)	.162	.040	.168	-.001
Computer Software (a14)	.138	.151	-.187	.691
Exhibitions in Fine Arts (a12)	-.063	-.073	.282	.581
Alpha reliability coefficient	.643			
Eigenvalue	2.69	1.22	1.10	1.03

APPENDIX 2
BASIC SALARY - MISSING DATA ANALYSIS

Variable	Not Missing	Missing	Statistical Significance
Male	70.3%	73.8%	$\chi^2 = .941$, p=.332
Race Group			$\chi^2 = 9.65$, p=.047
American Indian/Alaskan	0.4%	0.2%	
Asian/Pacific Islander	3.4%	2.0%	
Black, not-Hispanic	5.0%	9.6%	
Hispanic	2.3%	0.7%	
White, not-Hispanic	88.9%	87.5%	
Academic Rank			$\chi^2 = 10.28$, p=.016
Full Professor	39.1%	27.5%	
Associate Professor	28.5%	36.8%	
Assistant Professor	22.8%	25.4%	
Instructor	9.7%	10.3%	
Chair of Department (yes)	13.0%	22.1%	$\chi^2 = 11.81$, p<.001
Years in Current Position	13.71	13.32	
	(sd = 9.59)	(sd = 9.45)	t = .51, p=.61
Highest Degree Year	75.47	75.83	
	(sd = 9.71)	(sd = 9.66)	t = -.48, p=.63
Age	49.75	49.82	
	(sd = 9.24)	(sd = 8.95)	t = -.11, p = .91
Marital Status			$\chi^2 = 24.75$, p<.001
Single	10.7%	17.7%	
Married	75.5%	62.4%	
Living with Someone	2.0%	2.7%	
Separated	1.3%	4.3%	
Divorced	9.3%	12.1%	
Widowed	1.2%	0.8%	
Family Status			$\chi^2 = 15.72$, p<.01
Single with no Dependents	15.5%	25.3%	
Single with Dependents	7.0%	9.7%	
Married with no Dependents	16.9%	16.6%	
Married with Dependents	60.6%	48.5%	
Four-Year Institution	79.4%	70.0%	$\chi^2 = 9.01$, p<.001
Public Institution	73.1%	80.1%	$\chi^2 = 4.18$, p=.04
Institutional Strata			$\chi^2 = 12.94$, p=.11
Public Research	19.1%	17.7%	
Private Research	4.6%	4.2%	
Public Doctoral	9.6%	10.7%	
Private Doctoral	3.8%	2.0%	
Public Comprehensive	20.9%	18.5%	
Private Comprehensive	8.2%	8.6%	
Private Liberal Arts	8.7%	4.2%	
Public Two-Year	20.1%	29.2%	
Other	5.0%	4.9%	

APPENDIX 2
BASIC SALARY - MISSING DATA ANALYSIS (cont.)

Variable	Not Missing	Missing	Statistical Significance
Academic Field			$\chi^2 = 54.04$, $p<.001$
Agriculture/Home Economics	2.0%	2.2%	
Business	8.4%	9.7%	
Communications	2.1%	1.9%	
Teacher Education	3.0%	3.7%	
Other Education	5.1%	5.6%	
Engineering	5.0%	6.0%	
Fine Arts	7.0%	4.4%	
First-Professional Health	2.4%	1.3%	
Nursing	3.9%	4.9%	
Other Health	2.7%	9.2%	
English/ Literature	8.0%	9.8%	
Foreign Languages	2.7%	0.6%	
History	3.9%	4.5%	
Philosophy	2.0%	0.8%	
Law	1.8%	1.2%	
Biological Sciences	5.3%	2.7%	
Physical Sciences	5.9%	2.5%	
Mathematics	5.2%	6.0%	
Computer Sciences	2.4%	4.3%	
Economics	2.2%	1.7%	
Political Science	2.6%	0.3%	
Psychology	3.6%	0.8%	
Sociology	2.0%	3.3%	
Other Social Sciences	2.8%	1.4%	
Occupational Program	3.0%	5.5%	
All Other Programs	5.3%	5.9%	

APPENDIX 2
BASIC SALARY - MISSING DATA ANALYSIS (cont.)

Variable	Not Missing	Missing	Statistical Significance
Career Publications			
Articles, Refereed	9.47 (sd = 23.22)	12.49 (sd = 26.20)	t = -1.48, p=.14
Articles, Non-Refereed	4.14 (sd = 14.45)	4.12 (sd = 14.71)	t = .02, p=.99
Creative Works, Juried Media	1.15 (sd = 10.77)	1.00 (sd = 6.78)	t = .17, p = .86
Creative Works, Nonjuried	2.32 (sd = 19.81)	.96 (sd = 6.61)	t = .89, p=.37
Reviews of Books	3.61 (sd = 15.30)	5.78 (sd = 29.28)	t = -.96, p=.34
Chapters Published	1.30 (sd = 3.73)	1.65 (sd = 5.57)	t = -.82, p=.41
Textbooks Published	.30 (sd = 1.13)	.54 (sd = 1.79)	t = -1.76, p=.08
Books Published	.45 (sd = 1.58)	.40 (sd = 2.01)	t = .44, p = .66
Monographs Published	.43 (sd = 2.04)	.25 (2.22)	t = 1.03, p=.31
Technical Reports	5.52 (sd = 26.67)	7.59 (sd = 26.36)	t = -1.00, p=.32
Presentations	19.97 (sd = 46.21)	22.16 (sd = 73.68)	t = -.38, p=.70
Exhibitions in Fine Arts	13.50 (sd = 109.65)	35.16 (sd = 259.20)	t = -1.08, p=.28
Patents and Copyrights	.375 (sd = 2.84)	1.81 (sd = 10.04)	t = -1.85, p=.06
Computer Software	.29 (sd = 2.36)	.148 (sd = .61)	t = .78, p=.43
Allocation of Time			
% Time Research	15.26 (sd = 15.59)	16.90 (sd = 17.62)	t = -1.19, p =.24
% Time Teaching	62.93 (sd= 21.96)	56.61 (sd = 25.61)	t = 3.18, p<.01
% Time Professional Growth	4.77 (sd = 6.79)	6.70 (sd = 9.62)	t = -2.60, p<.01
% Time Administration	8.50 (sd = 12.84)	10.27 (sd = 13.69)	t = -1.76, p=.08
% Time Consulting	2.83 (sd = 6.64)	3.47 (sd = 10.11)	t = -.83, p=.41
% Time Service	5.54 (sd = 8.63)	6.06 (sd = 8.68)	t = -.77, p=.44
Sample Size	243,867 (98%)	5,037 (2%)	

APPENDIX 3
FACTOR LOADINGS - EXPERIENCE

Variable	Factor Loading
Year received Highest Degree (B16B1)	-.879
Age (X01F52)	.856
Years in Current Position (X01A6)	.855
Years since Rank Achieved (X01A10)	.837
Alpha Reliability Coefficient	.876

APPENDIX 4

CATEGORIZATION OF ACADEMIC DISCIPLINES

	Hard v. Soft	Pure v. Applied	Life Systems?
Agric./Home Econ.	0	0	1
Business	0	0	0
Communications	0	0	0
Teacher Education	0	0	1
Other Education	0	0	1
Engineering	1	0	0
Fine Arts	0	0	0
First-Prof. Health	0	0	1
Nursing	0	0	1
Other Health	0	0	1
English & Literature	0	1	0
Foreign Languages	0	1	0
History	0	1	1
Philosophy	0	1	0
Law	0	0	0
Biological Sciences	1	1	1
Physical Sciences	1	1	0
Mathematics	1	1	0
Computer Science	1	0	0
Economics	0	1	0
Political Science	0	1	1
Psychology	0	1	1
Sociology	0	1	1
Other Social Sciences	0	1	1
Occupational Prog.	0	0	1
All Other Programs	–	–	–