Research in Higher Education, Vol. 46, No. 1, February 2005 (© 2005)
DOI: 10.1007/s 11162-004-6287-6

PROGRESS FOR WOMEN IN ACADEME, YET INEQUITIES PERSIST: Evidence from NSOPF:99*

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In this study, we use data from the 1999 National Study of Postsecondary Faculty (NSOPF:99) to measure the unexplained wage gap between men and women in academe. We pay particular attention to how these unexplained wage gaps have changed over time by comparing the results from the 1999 survey to published results from previous national surveys and test for the sensitivity of these findings to the method used for measuring the unexplained wage gap and the type of institution or field being examined. We found that there has been a notable reduction in the overall unexplained wage gap between men and women, and that there is no longer any evidence of a statistically significant pay differential between men and women in doctoral-level or liberal arts institutions. The results also show that significant pay differentials still persist in some segments of academe, and that overall women with comparable qualifications to men have lower salaries.

KEY WORDS: discrimination, compensation, faculty, gender.

INTRODUCTION

Following the passage of affirmative action legislation designed to ensure equal pay between men and women for equal work, numerous studies have been conducted to measure the wage gap between men and women, and the portion of the wage gap that cannot be attributed to

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*Earlier versions of this paper were presented at the annual meetings of the Association for Institutional Research, Tampa, FL, May 2003, and the Association for the Study of Higher Education, Portland, OR, November 2003.

differences in worker characteristics that should affect salary. This latter portion is referred to as the unexplained wage gap, and provides a better measure of the salary differential between comparable men and women.[1] Studies from the private sector have concluded that while unexplained pay gaps between the genders persist in many labor markets, these gaps have been shrinking over time (Blau and Kahn, 1997; Even and Macpherson, 1993; Katz and Murphy, 1992; Murphy and Welch, 1993; O'Neill, 2003; U.S. General Accounting Office, 2003). Despite the persistence of pay differentials between the genders in the general labor market, this evidence has provided some assurances to advocates of equal pay for equal work that progress is being made in closing the unexplained wage gap.

There have likewise been many studies conducted of the academic labor market to examine the relative compensation of men and women. This has been motivated in part by national comparisons of average faculty salaries published by the National Center for Education Statistics (U.S. Department of Education, 2002a) and the American Association of University Professors (AAUP) that have consistently shown female faculty earning less than male faculty. Data from the AAUP for the 2002–2003 academic year, for example, show that in the aggregate female full professors earn 11.2% less than male full professors, female associate professors earn 6.9% less than male associate professors, and female assistant professors earn 7.6% less than male assistant professors (Ehrenberg, 2003). Comparisons of the wage gap between men and women in academe further suggest that these differences have persisted over time. Looking only at doctoral institutions, for example, female full professors earned 11.8% less than male full professors in 1992–1993, and 11.2% less in 2002–2003 (Fogg, 2003).

As noted above, however, differences in average salaries for male and female faculty could reflect differences in characteristics such as experience, educational attainment, field, rank, and institution type that could also influence salaries. Accordingly, it is important to develop statistical models using the human capital framework that will allow for the measurement of the unexplained wage gap between men and women in order to determine if male and female faculty with comparable qualifications receive comparable pay. One of the most consistent and discouraging findings from these studies is that there is no evidence that the unexplained wage gap between male and female faculty has changed in recent years. Studies by Barbezat (1991), Ransom and Megdal (1993), and Toutkoushian (1998), for example, show that the unexplained wage gaps in the late 1980s and early 1990s are comparable to the levels found by researchers in the mid 1970s. The failure of affirmative action policies and legislation to lead to reductions in pay inequities between men and women, and the persistence of these gaps across different types of

institutions, have been a cause of concern for observers of higher education, and necessitates the continued measurement of the unexplained wage gap as new data on faculty become available.

In this study, we use data from the recently-released 1999 National Study of Postsecondary Faculty (NSOPF:99), conducted by the National Center for Education Statistics, to measure the unexplained wage gap between men and women in academe. We pay particular attention to how these unexplained wage gaps have changed over time by comparing the results from the 1999 survey to published results from previous national surveys and test for the sensitivity of these findings to the method used for measuring the unexplained wage gap. We also focus on how the findings for 1999 vary by the type of institution employing faculty and the field/discipline in which faculty work, and how these results compare to those presented by Toutkoushian (1998) using data from the 1993 NSOPF. Using a series of different model specifications, we found that there has been a notable reduction in the overall unexplained wage gap between men and women in academe. There is no longer any evidence of a statistically significant pay differential between men and women in doctoral-level or liberal arts institutions, and the unexplained wage gaps have been eliminated in particular groupings of fields. Nonetheless, the results also show that significant pay differentials still persist in some segments of academe, and that overall women with comparable qualifications to men have lower salaries.

LITERATURE REVIEW

There is a sizable literature on the earnings of men and women in academe, including studies by Bayer (1973), Bayer and Astin (1975) Tuckman and Tuckman (1976), Barbezat (1987a, 1987b, 1989, 1991), Smart (1991), Ransom and Megdal (1993), Bellas (1993), Ashraf (1996), Barbezat and Donihue (1998), Toutkoushian (1998, 1999), and Perna (2001, 2002). Studies have been conducted both at individual institutions using data from personnel files, and from national datasets obtained by surveys of faculty. The national surveys of faculty include the 1968 Carnegie Commission Surveys of Higher Education, 1977 Survey of the American Professorate, the 1984 and 1989 Carnegie Foundation Surveys of Higher Education, and the 1988, 1993, and 1999 National Studies of Postsecondary Faculty.

The majority of these studies relied on the human capital framework and theories from labor economics to identify the variables and functional form most appropriate for the earnings equations of faculty (see, for

example, (Johnson and Stafford, 1974; Mincer, 1974; Schultz, 1961). According to human capital theory, earnings should be a function of the skills and ability (''human capital'') possessed by workers. As a result, earnings equations for faculty (as well as workers in other employment sectors) include control variables for their quantities of labor market experience and educational attainment, since a worker's human capital is expected to rise with educational attainment and labor market experience. For similar reasons, research productivity measures are used by analysts in studies of faculty compensation when they are available because these serve as estimates of human capital in producing research. Earnings equations also typically control for differences in field or discipline to reflect possible pay differences arising from the supply and demand for workers in competing (external) labor markets. The semi-logarithmic functional form was first introduced by Mincer (1974) for the specification of earnings equations to account for the compounding nature of salaries (see Becker and Goodman, 1991). For a thorough review of the literature on faculty compensation models, we direct readers to the reviews conducted by Ransom and Megdal (1993) and Barbezat (2002), as well as Ferber and Loeb (2002).

Statistical analyses of the data from these national surveys of faculty have consistently shown that after controlling for a variety of factors and regardless of the chosen model specification, women in academe earn significantly less than men. The work by Barbezat (1989, 1991) in particular has been extremely valuable in describing how the level of pay disparity between men and women has changed over time. The approach that she developed was to first identify sets of independent variables that could be reasonably argued for inclusion in a series of earnings equations based on human capital theory and related models of compensation, construct these variables in the most consistent manner possible using data from each of the national surveys, and then estimate these salary models and compare the resulting unexplained wage gaps. The use of different model specifications allows the reader to determine whether the inclusion or exclusion of particular factors, such as rank or research productivity, has a bearing on the main conclusions from the analysis. Comparing results across different studies, however, can be particularly challenging due to differences in survey instruments and sample designs. Nonetheless, Barbezat's approach presents the best opportunity for analysts to look over longer periods of time and identify possible trends in the relative treatment of women. In her studies, Barbezat showed that across the five regression model specifications that she used, the unexplained wage gap between men and women declined from the late 1960s through the mid 1970s, but has since remained relatively constant. For example, in her

"base regression model (I)" controlling for highest degree, length of appointment, race, age, whether the faculty member held an administrative position, years since highest degree, geographic region, and whether the person's primary position was teaching, Barbezat found that female faculty earned about 20% less than male faculty. By 1975, this salary differential between the genders had been reduced substantially to approximately 13%, and yet the unexplained wage gap in 1989 was found to be virtually the same.

More recently, Toutkoushian (1998) used the data from the 1993 National Study of Postsecondary Faculty (NSOPF:93) to update the salary models developed by Barbezat using previous national surveys of faculty. He found that there were only slight reductions in the unexplained wage gap between men and women by 1993 in two of Barbezat's models, and no reduction using two of Barbezat's other models. For example, controlling for the same factors described above in Barbezat's base regression model (I), he found that female faculty earned approximately 10% less than male faculty. The unexplained wage gaps were statistically significant across all of the different regression models estimated in the study. Toutkoushian (1998) also estimated several new regression models that controlled for a richer set of human capital and related variables, and still found significant pay differences between comparable men and women ranging from 6 to 10%. Additional results presented in this study showed that when the sample was disaggregated by either institution type or the faculty member's field, the estimates varied considerably. With regard to institution type, the findings showed that the unexplained wage gap was largest at Research institutions and smallest at Liberal Arts colleges. Turning to field, Toutkoushian (1998) found that the largest pay inequities existed in the professional fields and arts and humanities, with smaller unexplained pay gaps in the physical sciences.

DATA AND METHODOLOGY

Data Description

We used data from the 1999 National Study of Postsecondary Faculty to conduct the analyses shown here. The NSOPF:99 is a nationally representative sample of faculty and instructional staff, including those employed both full- and part-time by their institutions. It is the most comprehensive study of faculty available to researchers, conducted by the National Center for Education Statistics (NCES). The target population for the survey was anyone who was designated as faculty (regardless of whether or not their responsibilities included instruction) and anyone who

had instructional responsibilities. NSOPF excludes private for-profit institutions and graduate teaching assistants from its sampling universe.

The NSOPF:99 relied on a two-stage stratified, clustered probability design to select the sample. The first-stage sampling frame (institution universe) consisted of the 3,396 postsecondary institutions in IPEDS that were public or private not-for-profit Title IV participating institutions and provided formal degree programs of at least two years' duration. The institutions were stratified based on a modification of the Carnegie Foundation's classification system. There were 960 institutions included in the study. Because there is no complete list of the target population (all faculty and instructional staff), the second-stage sampling frame was derived from lists provided by the sampled institutions. Detailed instructions were provided to help institutions compile the lists. Faculty were grouped into five strata based on their demographic characteristics including (a) Hispanic faculty; (b) African American faculty; (c) Asian and Pacific Islander faculty; (d) full-time female faculty who were not Hispanic, African American, Asian or Pacific Islander; and (e) all other faculty. A sixth stratum was created for faculty missing demographic data. In addition, within each institution and stratum, faculty members were sorted by academic program area or discipline. The initial sample consisted of about 28,600 faculty and instructional staff. However, a subsample of 19,813 individuals was later drawn for follow-up. There were approximately 18,000 respondents to the survey.[2] The weighted response rate was 83%.

Since the objective of this study was to determine if there have been changes in the unexplained wage gap between male and female faculty over time, we attempted to replicate as closely as possible the methodology used by Barbezat (1991) and Toutkoushian (1998) in their studies. We began by limiting our analysis to the same group of faculty reported in previous work; namely, full-time faculty holding the rank of full, associate, or assistant professor in Research I or II, Doctoral I or II, Liberal Arts I or II, or Comprehensive I or II institutions. This resulted in a final sample size of 6,007 faculty. We next created variables similar to those used by Barbezat and Toutkoushian in their work. However, this process was complicated by the fact that some of the changes made in the NSOPF:99 questionnaire may impact the comparability of the models. For example, respondents were not asked to provide detail about their previous three jobs on the 1999 survey as they were in the 1993 survey, nor were they asked about the full-time or part-time status of the previous jobs they had held in higher education. Instead, respondents were asked to provide detail on the first and the most recent professional position (other than the one they currently held) in a higher education institution.

However, respondents were asked to provide similar information on the 1999 survey about their professional positions *outside* of higher education (first and most recent). This revision addresses a limitation identified in the earlier instrument. Toutkoushian (1998) noted that the experience measure derived from the 1993 survey may understate the true experience level. Finally, it is no longer possible to derive the same weighted measure of total experience used in the NSOPF:93 because the 1999 survey did not ask respondents how many of their professional positions (or academic positions) were part-time.

There were a series of other changes in NSOPF:99 that should be noted before proceeding. Military studies and multi/interdisciplinary studies were omitted from the major fields of study codes on the 1999 survey. Respondents were asked to provide less detail regarding their publications. For example, in the 1999 survey chapters in edited volumes were combined with published reviews of books, articles or creative works; and other books were included in the same category as textbooks, monographs, and research or technical reports. The Masters of Fine Arts (M.F.A.) and Masters of Social Work (M.S.W.) degrees were added as options for types of degrees on the 1999 survey. Questions requesting information on race and ethnicity were also revised. Overall, however, these changes to the survey instrument should have minimal impact on the general results of the models. Furthermore, the many similarities in the NSOPF:99 and NSOPF:93 survey instruments makes the comparison of findings from these studies of particular importance when examining changes in salary equity over time.

METHODOLOGY

To estimate the unexplained wage gap by gender for faculty, we specified a salary model of the form used by Barbezat (1991) and Toutkoushian (1998)

$$\ln Y_i = X_i'\beta + F_i\delta + \varepsilon_i \tag{1}$$

where $\ln Y_i = \log$ of annual salary for the ith faculty member, $X_i' =$ set of independent variables that influence the earnings of faculty, $\beta =$ set of coefficients for the variables in X', $F_i = 1$ if female and 0 otherwise, and $\varepsilon =$ random error term. In this model, the coefficient δ represents the estimated unexplained wage gap between male and female faculty after controlling for differences across the genders in the variables included in X. This is known as the single-equation method for measuring the unexplained wage gap. According to the theory behind this model, pay discrimination arises from female faculty receiving a fixed percent pay reduction relative to similarly qualified male faculty.

Since the choice of variables included in X' can greatly affect the unexplained wage gap, we first chose variables that would parallel those used in the analysis by Barbezat (1989, 1991): highest degree, length of appointment, race, age, whether the faculty member held an administrative position, years since highest degree, whether the person's primary duties were in teaching, geographical region, career journal articles, career books, field/discipline, and Carnegie classification of institution. Additional variables were then created so that we could also replicate the models used by Toutkoushian (1998): years of academic experience, current rank, years within current rank, whether chairperson, public vs. private institution, years of seniority, and career textbooks and patents.[3] The means and standard deviations for the variables used in this study, and how they vary by gender, are presented in Table 1.[4]

The first two rows show that the total wage gap between men and women in 1999 was $11,373, or approximately 17.7% based on the difference in mean log of salaries. Comparing the characteristics of men and women in the sample reveals some notable differences in their experience level, educational attainment, and rank. On average, male faculty had more labor market experience than female faculty, and were more likely to hold the Full Professor rank. In addition, male faculty tended to have more career publications than women and were more likely to be employed at Research I or II institutions. In contrast, female faculty were predominantly at the Assistant Professor rank and had greater representation than their male counterparts at Masters I or II institutions.

In Table 2, we estimated the same five salary model specifications introduced by Barbezat using data from the NSOPF:99. Model I represents the basic regression model from Barbezat and as noted earlier controls for a faculty member's highest degree, length of appointment, race, age, whether the faculty member held an administrative position, years since highest degree, geographic region, and whether the faculty member held a teaching or administrative position. Model II adds two dummy variables for current rank to the salary model. The next model III adds six dummy variables for career journal articles and four dummy variables for career books to the basic regression model I. Model IV begins with the same factors in model III and augments the list with 20 dummy variables for a faculty member's field/discipline. Finally, the last regression model V adds controls for the Carnegie classification of the institution to model IV. Note that models I, III, IV, and V do not control for current rank. As with the descriptive statistics, all of the results rely on unweighted data.

One of the advantages of Barbezat's approach is that it allows one to observe the impact of controlling for—or not controlling for—specific factors that may affect compensation. For example, considerable

TABLE 1. Descriptive Statistics for Selected Variables by Gender, NSOPF:99

	Male Faculty (n = 3875)		Female Faculty (n = 2132)	
Variable	Mean	Standard Deviation	Mean	Standard Deviation
Salary	$65,648	$29,433	$54,275	$23,432
Log(Salary)	11.007	0.410	10.830	0.373
Years Experience	18.700	10.818	14.559	9.326
Years Seniority	13.296	10.515	9.168	8.477
Age	49.327	9.691	46.768	9.287
Full Professor	0.456	–	0.238	–
Associate Professor	0.303	–	0.342	–
Assistant Professor	0.241	–	0.420	–
Doctorate Degree	0.818	–	0.757	–
Professional Degree	0.076	–	0.058	–
Masters Degree	0.103	–	0.178	–
Chairperson	0.140	–	0.121	–
Career Articles	25.917	38.091	11.701	20.834
Career Chapters	5.809	11.884	4.415	9.447
Career Books	3.986	9.779	2.277	5.471
Career Patents	0.593	2.078	0.276	1.431
Research I or II	0.470	–	0.377	–
Doctoral I or II	0.148	–	0.145	–
Masters I or II	0.285	–	0.357	–
Liberal Arts I or II	0.097	–	0.121	–

Notes: Dataset includes only full-time faculty at four-year institutions with primary responsibilities being teaching (n = 6,007). See Appendix for details on how the variables were constructed for this study.

controversy exists as to whether or not faculty rank should be used as an independent variable in faculty salary studies (Becker and Toutkoushian, 2003). Many institutional studies of salary equity are open to criticism on the grounds that they do not include controls for the quantity of faculty publications due to the lack of data on this factor. Collectively, these models provide a more thorough view of how current estimates of pay disparities between male and female faculty compare to estimates over a longer period of time than is possible using only the NSOPF surveys.

The five salary models developed by Barbezat explain between 34 and 45% of the variations in salaries across individual faculty members, which is comparable to the overall goodness-of-fit measures reported by

TABLE 2. Barbezat Salary Models for Faculty, NSOPF:99

Variable	Model I	Model II	Model III	Model IV	Model V
Female	−0.0595** (.009)	−0.0453** (.009)	−0.0430** (.009)	−0.0389** (.009)	−0.0395** (.009)
Years Potential Experience	0.0259** (.002)	0.0122** (.002)	0.0196** (.002)	0.0194** (.001)	0.0200** (.001)
Squared Years Potential Experience	−0.0002** (3.9e − 05)	8.7e − 06 (4.0e − 05)	−0.0001** (3.8e − 05)	−0.0001** (3.7e − 05)	−0.0002**(3.6e − 05)
Age	−0.0027** (.001)	−0.0049** (.001)	−0.0014 (.001)	−0.0009 (.001)	4.2e − 05 (.001)
Advanced Degree	0.287** (.013)	0.210** (.013)	0.216** (.014)	0.220** (.014)	0.211** (.014)
Chairperson	−0.0018 (.013)	−0.0280* (.013)	0.0106 (.013)	0.0244* (.012)	0.0449** (.012)
African American	−0.0110 (.017)	0.0055 (.017)	0.0101 (.017)	0.0146 (.016)	0.0131 (.016)
Teaching Position	−0.182** (.010)	−0.178** (.010)	−0.150** (.010)	−0.134** (.010)	−0.107** (.010)
Appointment Length	0.0237** (.004)	0.0272** (.004)	0.0249** (.004)	0.0232** (.004)	0.0225** (.003)
Intercept	10.363** (.050)	10.489** (.049)	10.310** (.050)	10.222** (.053)	10.094** (.054)
Controls for rank	No	Yes	No	No	No
Controls for publications	No	No	Yes	Yes	Yes
Controls for department	No	No	No	Yes	Yes
Controls for institution type	No	No	No	No	Yes
R-squared	0.34	0.38	0.37	0.44	0.45

Notes: Sample is restricted to full-time faculty at either the assistant, associate, or full professor rank employed by a four-year college or university without missing data on the variables in the models ($n = 6{,}003$). Standard errors are shown in parentheses. Dependent variable is the natural logarithm of annual base salary. Regression model specifications and labels are taken from Barbezat (1991). Model I includes controls for geographic region (8 variables). Model II adds controls for current rank to Model I. Model III adds controls for geographic region, whether teaching position, career articles (5 variables), and career books (3 variables) to Model I. Model IV includes the same variables as Model III plus additional controls for departmental affiliation (20 variables). Model V contains the same variables as Model IV plus additional controls for Carnegie classification of institution (4 variables). $^{**}p < .01$; $^{*}p < .05$ (two-tailed test).

Toutkoushian (1998) using the NSOPF:93 data. The salaries for individual faculty members are found to increase along with a faculty member's experience level, rank, and educational attainment, and decrease for those faculty whose primary responsibility is teaching. Turning to the main variable of interest here, however, it can be seen that after controlling for the different variables in the salary models, female faculty earn between 4 and 6% less than their male counterparts (significant at $p < .01$). Controlling for current academic rank or the number of career publications reduces the unexplained wage gap by about 1.5% points, and additional controls for department affiliation leads to a further reduction of 0.5% point.

To determine how these estimates of the unexplained wage gap compare to previous findings in the literature, Table 3 provides a summary of the unexplained wage gaps found by Barbezat and Toutkoushian for her five salary model specifications. In the interest of brevity, only the gender coefficients are shown here. The figures in the first four columns were reported by Barbezat (1991) using the 1968, 1975, 1984 and 1989 surveys, while the results for the fifth column were updated in the study by Toutkoushian (1998). Since Toutkoushian did not estimate Barbezat's model II in his 1998 study using the NSOPF:93, we have done so here and inserted this value into the table. The values in the last column are simply the gender coefficients taken from Table 2. To determine if there is a statistically significant difference in the estimated gender coefficients from 1993 to 1999, we employed a two-sample t-test of the form:

$$t(df_1 + df_2) = \frac{\hat{\delta}_{99} - \hat{\delta}_{93}}{\sqrt{s_{99}^2 + s_{93}^2}} \tag{2}$$

where the numerator represents the difference in estimated gender coefficients between the 1993 and 1999 NSOPF surveys, the denominator is the estimated standard error of the difference in coefficients, and df_j = degrees of freedom for each estimated coefficient. This ratio will follow a student t-distribution with $df_1 + df_2$ degrees of freedom. In the interest of space, we only provide a test of the differences between the 1993 and 1999 surveys.

While female faculty in 1999 still earn significantly less than comparable male faculty after controlling for the variables used by Barbezat in her five models, the encouraging news is that these unexplained wage gaps are lower than those found in previous national surveys. The unexplained wage gaps between male and female faculty fall from 8.5% in 1993 to 6% in 1998 using model I, from 6.9 to 4.5% using model II, from 7.2 to 4.3% using model III, from 7.8 to 3.9% using model IV, and from 7.5 to 4.0%

TABLE 3. Comparison of Unexplained Wage Gaps between Male and Female Faculty for Barbezat's Salary Model Specifications

	Estimated Unexplained Wage Gap					
Models	1968	1975	1984	1993	1999	*T*-test: 1993–1999
Model I	−0.207** (.015)	−0.127** (.014)	−0.090** (.011)	−0.085** (.007)	−0.060** (.009)	$t = 2.19^{*}$ ($p = .029$)
Model II	−0.151** (.015)	−0.099** (.013)	−0.068** (.011)	−0.069** (.007)	−0.045** (.009)	$t = 2.10^{*}$ ($p = .036$)
Model III	−0.174** (.015)	−0.100** (.013)	−0.081** (.011)	−0.072** (.007)	−0.043** (.009)	$t = 2.54^{*}$ ($p = .011$)
Model IV	−0.165** (.015)	−0.104** (.013)	−0.068** (.011)	−0.078** (.007)	−0.039** (.009)	$t = 3.42^{**}$ ($p = .001$)
Model V	−0.163** (.015)	−0.095** (.013)	−0.070** (.011)	−0.075** (.007)	−0.040** (.009)	$t = 3.07^{**}$ ($p = .002$)
Sample size	13,613	2,202	1,791	9,790	6,003	

Notes: $^{**}p < .01$; $^{*}p < .05$. Sample is restricted to full-time faculty at either the assistant, associate, or full professor rank employed by a four-year college or university without missing data on the variables in the models. Standard errors are shown in parentheses for columns 1–5. Dependent variable is the natural logarithm of annual base salary. Table format, model labels, and values from earlier studies are taken from Barbezat (1991, p. 193) and Toutkoushian (1998, p. 59). Model I controls for years of potential experience and squared years of potential experience, age, whether advanced degree, whether chairperson, race, whether teaching position, appointment length, and geographic region (8 variables). Model II adds controls for current rank (2 variables) to model I. Model III includes the same variables as model I plus career articles (5 variables) and career books (3 variables). Model IV contains the same variables as model III plus variables for departmental affiliation (20 variables). Model V contains the same variables as model IV plus controls for Carnegie classification of institution (4 variables). The *t*-ratio in the last column is based on a two-sample *t*-test using the estimated coefficients and standard errors shown in columns 4 and 5. The *p*-values below each *t*-ratio represent the (two-tail) probability of obtaining a larger sample difference in estimated coefficients from the independent samples.

using model V. As shown in the last column of Table 3, all of these differences are statistically significant at the .04 level or higher. Figure 1 provides one view of how the total wage gap and unexplained wage gap have changed over the 30 year period from 1969 to 1999. The unexplained wage gaps are based on (Barbezat, 1991) model V.

Figure 1 shows that while both the total wage gap and the unexplained portion of the wage gap between men and women persist into the late 1990s, they are notably smaller than in previous years. While more work needs to be done to eliminate the average unexplained wage gap between the genders, this provides the first evidence from national faculty surveys that progress is being made in achieving equity between men and women in academe in terms of their compensation.

In Table 4, we used the NSOPF:99 to reestimate the three alternative salary models reported by Toutkoushian (1998) using the NSOPF:93. Model I is the baseline model that controls for Carnegie classification and private vs. public status of a faculty member's institution, four dummy variables for an individual's highest degree, race, career articles, books, and patents, 41 variables for primary teaching field, 5 variables for length of academic appointment, years of experience and squared years of experience, years of seniority and squared years of seniority, age and squared age, and 8 variables for geographic location. Model II adds controls for current rank and years within current rank to model I. Model III removes the research productivity variables from the baseline model so that the effect of controlling for research productivity can be observed.

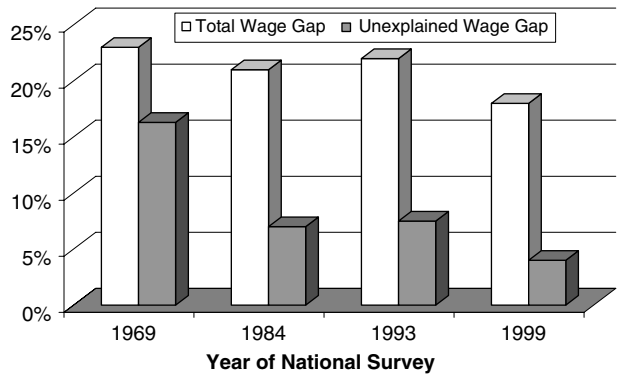

FIG. 1. The total and unexplained wage gap between men and women in academe, 1969–1999. The total wage gap represents the percentage difference in average salaries for male and female faculty based on the national faculty surveys used in these studies. The unexplained wage gaps are based on model V from Barbezat (1991).

TABLE 4. Toutkoushian's Salary Models for Faculty, NSOPF:99

Variable	Model I	Model II	Model III
Female	−0.0524** (.009)	−0.0356** (.009)	−0.0693** (.009)
Years Experience	0.0103** (.002)	0.0040* (.002)	0.0120** (.002)
Squared Years Experience	−4.5e−05 (5.1e − 05)	−5.5e−06 (5.0e − 05)	−4.3e−05 (5.3e − 05)
Years Seniority	0.0102** (.002)	−0.0004 (.002)	0.0106** (.002)
Squared Years Seniority	−0.0003** (5.5e − 05)	−0.0001* (5.4e − 05)	−0.0003** (5.7e − 05)
Chairperson	0.0624** (.012)	0.0395** (.012)	0.0665** (.012)
Research I or II	0.2190** (.016)	0.2200** (.015)	0.2820** (.016)
Doctoral I or II	0.1230** (.017)	0.1280** (.016)	0.1550** (.017)
Masters I or II	0.0760** (.015)	0.0715** (.014)	0.0842** (.015)
Private	−0.0172 (.010)	−0.0188* (.009)	−0.0099 (.010)
Full Professor	–	0.3170** (.015)	–
Associate Professor	–	0.1320** (.012)	–
Years Within Rank	–	0.0081** (.001)	–
Career Articles	0.0024** (1.4e − 04)	0.0017** (1.4e − 04)	–
Career Chapters	0.0014** (.0004)	0.0006 (.0004)	–
Career Books	0.0004 (.0005)	−0.0001 (.0005)	–
Intercept	9.960** (.116)	10.138** (.112)	9.856** (.119)
R^2	0.45	0.49	0.41

Notes: Sample is restricted to full-time faculty at either the assistant, associate, or full professor rank employed by a four-year college or university without missing data on the variables in the models (n = 6,007). Standard errors are shown in parentheses. Dependent variable is the natural logarithm of annual base salary. Regression model specifications and labels for models I–III are taken from Toutkoushian (1998). All models include additional controls for highest degree (3 variables), departmental affiliation (40 variables), race/ethnicity (1variable), age and squared age, geographic region (7 variables), career patents, and length of appointment (4 variables). **$p < .01$; *$p < .05$ (two-tailed test).

The results for models I through III using the NSOPF:99 are very similar to those found for the NSOPF:93. Collectively, the independent variables in the models explain between 41 and 49% of the variations in salaries. A faculty member's career publications, experience level, and type of institution were found to have large, positive effects on their level of compensation. Turning to the issue of gender-based pay disparities, the findings show that in all four model specifications, female faculty members earn significantly less than male faculty with similar characteristics. According to the baseline model I, female faculty earn 5.2% less than comparable male faculty. When controls for current rank are added to the model, the unexplained wage gap between men and women falls to 3.6%, but is still statistically significant. Comparing the gender coefficients in models I and III shows that research productivity differences between the genders account for only a small portion of the unexplained wage gap between them. Nonetheless, the gender coefficients in 1999 are notably smaller than they were in 1993.

Pay Disparity and Sample Design

All of the salary models presented above utilized the raw (unweighted) data and thus did not take into account possible sample design differences between the various national surveys. It is common for analysts to utilize complex sample designs to ensure that they obtain a sufficient number of respondents with certain characteristics to allow them to analyze various segments of the population (Thomas and Heck, 2001). These sample designs can take the form of either oversampling particular types of institutions, or oversampling faculty with particular characteristics of interest to the researcher. These differences in sample design would certainly lead to significant differences in samples across studies, making comparisons of means and standard deviations problematic. Furthermore, these differences in sample design could possibly affect selected findings from multivariate statistical models if the relationship between the characteristics of respondents and their salaries are not adequately captured in the model. This should be less important in a multivariate analysis when the characteristics used in the sample design (such as type of institution) are also used as controls in statistical models because the resulting coefficients would capture the average effects of the control on the outcome variable of interest. Similarly, as the size of the sample under analysis increases, the effects of sample designs on the standard errors would be expected to decrease.

While information is not available on the sample designs used in the earlier national surveys of faculty analyzed by Barbezat, the National Center for Education Statistics provides researchers with detailed

information on how the samples of institutions and faculty were drawn for the NSOPF surveys in 1993 and 1999. Both surveys relied on oversampling of full-time female faculty and faculty by race/ethnicity to obtain larger numbers of respondents in underrepresented categories, and both surveys included every research and doctoral-granting institution in their sample, whereas only 10% of the baccalaureate institutions were included in each study. The 1999 survey also included more faculty than the 1993 survey who were employed by Research or Doctoral-level institutions. These and other changes in the survey design could contribute to differences in the samples derived from each survey. The NCES has computed the weights necessary to take into account different probabilities for individuals of being selected for the study and of responding to the survey, so that the weighted proportions would be equal to or closely approximate their representation in the entire population.[5] Accordingly, the effects of these sample design differences on the multivariate results can be examined by weighting the data prior to estimating the statistical models.

In Table 5, we provide a more direct comparison of the unexplained wage gaps using models I through III based on the 1993 and 1999 NSOPF surveys. The first three columns correspond to the results that we found

TABLE 5. Comparison of Unexplained Wage Gaps between Male and Female Faculty by Toutkoushian's Salary Model Specifications, NSOPF:93 and NSOPF:99

	Unweighted Data			Weighted Data[c]		
	1993[a]	1999[b]	Change	1993[a]	1999[b]	Change
Model I	−0.091**	−0.052**	+0.039**	−0.109**	−0.043**	+0.066**
Model II	−0.062**	−0.035**	+0.027*	−0.080**	−0.032**	+0.048**
Model III	−0.101**	−0.069**	+0.032**	−0.120**	−0.063**	+0.057**

Notes: **$p < .01$; *$p < .05$ (two-tailed test). Sample is restricted to full-time faculty at either the assistant, associate, or full professor rank employed by a four-year college or university without missing data on the variables in the models ($n = 6{,}007$). Standard errors are shown in parentheses. Dependent variable is the natural logarithm of annual base salary. Regression model specifications and labels for models I–III are taken from Toutkoushian (1998). All models include additional controls for highest degree (3 variables), departmental affiliation (40 variables), race/ethnicity (1 variable), age and squared age, geographic region (7 variables), career patents, length of appointment (4 variables), years of experience and squared years of experience, years of seniority and squared years of seniority, whether chairperson, Carnegie classification of institution (3 variables), and whether private institution. Model I adds controls for career articles, career book chapters, and career books. Model II adds additional controls for current rank (2 variables), years within rank, career articles, career book chapters, and career books. [a]Results taken from Toutkoushian (1998), Table 2. [b]Results taken from Table 3. [c]Weighted least squares was used to estimate each of the models, where the weights correspond to the faculty respondent weight variable created by NCES for each survey.

when the salary models were estimated using unweighted data. The third column shows the change in the unexplained wage gap between 1993 and 1999. A positive value implies that the unexplained wage gap between men and women has decreased over this six-year interval, and vice-versa. In columns four and five, we list the unexplained wage gaps obtained by reestimating the same three salary models after first weighting the data with the faculty respondent weights supplied by NCES. The last column again provides the change in the unexplained wage gaps between 1993 and 1999. The statistical significance of the changes is again tested using the two-sample *t*-test described earlier.

Beginning with the results from the salary models with unweighted data, the first model reports an unexplained wage gap of approximately 5.2%, which is notably lower than the 9.1% reported by Toutkoushian (1998) from the 1993 survey. Similarly, the unexplained wage gaps for models II and III (3.5 and 6.9%, respectively) are approximately one-third lower than gaps from the same regression models using data for 1993 (6.2 and 10.1%, respectively). All of these reductions are statistically significant at the 1.5% level or higher. These findings mirror the changes found with the Barbezat salary model specifications in that the unexplained wage gaps between male and female faculty are notably smaller in 1998 than in 1993 and earlier years. Turning to the last three columns in Table 5 where the data were weighted prior to the estimation of the salary models, it can be seen that there were similar reductions in the unexplained wage gap between men and women from 1993 to 1999. In fact, the reductions were between 2 and 3% greater when weighted data were used in the analysis. The weighting of data in the 1993 and 1999 surveys had the effect of raising the unexplained wage gaps in 1993 and lowering the unexplained wage gaps in 1999. The similarity of the results may also reflect the fact that the standard errors are obtained from very large samples and are thus relatively immune to possible changes due to the sample design. For example, the standard errors for the gender coefficients in Model I for 1999 differ by only.001 using unweighted vs. weighted data. The main conclusion to highlight here, however, is that there has been a reduction in the average unexplained wage gap between men and women regardless of whether the data are weighted or not prior to estimation.

Pay Disparity by Method

The results shown above all rely on the single-equation method for measuring the unexplained wage gap between male and female faculty. This is the most commonly-used method for measuring the unexplained wage gap between two groups of employees due to its simplicity and ease

of calculation and interpretation, and is based on the notion that all women receive the same percentage salary reduction due to being female. There are, however, alternative methods for measuring the unexplained wage gap developed by Oaxaca (1973), Blinder (1973), Reimers (1983), Cotton (1988), and Neumark (1988), and these different methods can alter the conclusions drawn regarding the level of pay disparity between men and women. These models are based on alternative theories regarding the nature of pay discrimination between men and women. For example, the Neumark model posits that discrimination arises from both women being underpaid and men being overpaid relative to a specific standard, and that the level of pay disparity can vary across individuals. A more detailed discussion of the comparisons between these alternative methods, the models on which they are based, and the advantages and disadvantages of each can be found in Toutkoushian and Hoffman (2002). The alternatives are commonly referred to as multiple-equation methods because they require two or more equations for their calculation. These methods begin by removing the dummy variable for gender from Eq. (1) and then estimating the salary model separately for male and female faculty:

$$\ln Y_{Mi} = X'_{Mi}\beta_M + \varepsilon_{Mi}, \quad i = 1, \ldots, N_M \tag{3}$$

$$\ln Y_{Fi} = X'_{Fi}\beta_F + \varepsilon_{Fi}, \quad i = 1, \ldots, N_F \tag{4}$$

where subscript M = male faculty, subscript F = female faculty, N_M = number of male faculty, and N_F = number of female faculty. In this framework, each variable in X' can have a different effect on the salaries of male and female faculty, whereas in the single-equation method the effects are restricted to be the same for both genders. The coefficients β_M are often referred to as the male wage structure, and likewise β_F represents the female wage structure. Similarly, we can define the "no-discrimination" wage structure β_N as the set of coefficients that would exist in the absence of discrimination. If these coefficients are estimated by B_M, B_F, and B_N, it has been shown by Neumark (1988) that the wage gap can be broken down as follows:

$$\ln \bar{Y}_M - \ln \bar{Y}_F = [(\bar{X}_M - \bar{X}_F)' B_N] + [\bar{X}'_M(B_M - B_N) - \bar{X}'_F(B_F - B_N)] \tag{5}$$

The left-hand side of Eq. (5) represents the total wage gap, or the difference in mean log of salaries between male and female faculty. The first portion in square brackets on the right-hand side of Eq. (5) is the

portion of the wage gap that is explained by differences in the characteristics of males and females. The remaining portion in square brackets in Eq. (5) is the unexplained wage gap. Note that when the no-discrimination wage structure changes, so will the portions of the total wage gap that are explained and unexplained.

There are a number of approaches suggested in the literature for estimating the no-discrimination wage structure, and hence the unexplained wage gap. Here we consider three popular alternatives. The first two alternatives were developed by Oaxaca (1973), in which he suggests that either the male wage structure or the female wage structure be used as the no-discrimination wage structure. The third alternative is from Neumark (1988), who recommended estimating the salary model in Eq. (3) for the pooled sample of males and females, and using the resulting coefficients as the no-discrimination wage structure. In Table 6, we show how the unexplained wage gap from the baseline model I in Table 4 varies depending on which method is used for its measurement. The first column represents the total wage gap, which by definition is the same across all methods. The second column shows the portion of the total wage gap that is explained by differences in the average characteristics of male and female faculty, and the last column is the resulting unexplained wage gap.

TABLE 6. Measures of the Unexplained Wage Gap by Gender Using Alternative Methods, NSOPF:99

Method	Wage Gap	Explained Wage Gap	Unexplained Wage Gap
Single-equation	0.1774	0.1250	0.0524
Oaxaca (M)	0.1774	0.1213	0.0561
Oaxaca (F)	0.1774	0.1308	0.0466
Neumark	0.1774	0.1343	0.0431

Notes: Oaxaca (M) method uses the coefficients from the all-male regression model as the no-discrimination wage structure. Oaxaca (F) method uses the coefficients from the all-female regression model as the no-discrimination wage structure. Neumark method uses the coefficients from the pooled salary model (excluding the dummy variable for gender) as theno-discrimination wage structure. Sample is restricted to full-time faculty at either the assistant, associate, or full professor rank employed by a four-year college or university without missing data on the variables in the models (n = 6,007). Standard errors are shown in parentheses. Dependent variable is the natural logarithm of annual base salary. Regression model (“model I”) includes controls for highest degree (3 variables), departmental affiliation (40 variables), race/ethnicity (1 variable), age and squared age, geographic region (7 variables), career patents, length of appointment (4 variables), years of experience and squared years of experience, years of seniority and squared years of seniority, whether chairperson, Carnegie classification of institution (3 variables), whether private institution, career articles, career book chapters, and career books.

From Table 6, it can be seen that the estimated unexplained wage gap varies by approximately 1% point across methods, from a low of .0431 using the Neumark method to a high of .0561 using the Oaxaca (M) method. Interestingly, the unexplained wage gap using the single-equation method falls in the middle of this range. Taken together, it does not appear as though the choice of method used to measure the unexplained wage gap in this application has a significant effect on the conclusions drawn with regard to gender-based pay disparities.

Pay Disparity by Institution Type

Up to this point, the analysis has focused on the average level of pay disparity between men and women in academe. Averages, however, can be misleading in that they may not reflect important differences in the relative compensation of men and women by type of institution and field. We now turn to whether the levels of pay disparity between comparable men and women in academe vary by the type of institution where they are employed. Differences in the nature of faculty positions and the emphasis on teaching vs. research across types of institutions may lead to differences in the relative treatment of the men and women that they employ. For example, the descriptive statistics presented in Table 1 show that on average, female faculty have produced fewer publications than their male counterparts. Previous work by Toutkoushian (1998) using the NSOPF:93 showed that the level of pay disparity widened as the research intensity of the institution increased, and that pay disparities existed at all four major levels of institutions. To determine if the situation has changed between 1993 and 1999, we used the baseline model I from Table 4 and estimated this model separately for four groups of institutions: Research I and II, Doctoral I or II, Comprehensive I or II, and Liberal Arts I or II institutions. The resulting gender coefficients are shown in Table 7. We applied the same two-sample *t*-test to determine if there is evidence of a significant difference in the gender coefficients across samples.

It can be seen that the unexplained wage gap between male and female faculty is still largest in Research I/II institutions than in less-research intensive institutions. It is particularly noteworthy that the unexplained wage gaps in Doctoral I and II institutions and Liberal Arts institutions are no longer statistically different from zero. Applying the two-sample *t*-test reveals that only in Doctoral-granting institutions is the reduction in the gender coefficient statistically significant at the 5% level. In part, however, this reflects the fact that statistical significance becomes more difficult to establish due to the smaller sample sizes and corresponding larger standard errors.

TABLE 7. Comparison of Unexplained Wage Gaps by Gender by Type of Institution, NSOPF:93 and NSOPF:99

Institution Type	Unexplained Wage Gap: 1993[a]	Unexplained Wage Gap: 1999	Change: 1993–1999
Research I or II	−0.118**	−0.073**	−0.045 (t = −1.87)
Doctoral I or II	−0.099**	−0.029	−0.070 (t = −2.57**)
Comprehensive I or II	−0.071**	−0.042**	−0.029 (t = −1.74)
Liberal Arts I or II	−0.064**	−0.047	−0.017 (t = −0.60)

Notes: **$p < .01$. [a]Results taken from Toutkoushian (1998), Table 6. Sample is restricted to full-time faculty at either the assistant, associate, or full professor rank employed by a four-year college or university without missing data on the variables in the models. Dependent variable is the natural logarithm of annual base salary. Regression model ("model I") includes controls for highest degree (3 variables), departmental affiliation (40 variables), race/ethnicity (1 variable), age and squared age, geographic region (7 variables), career patents, length of appointment (4 variables), years of experience and squared years of experience, years of seniority and squared years of seniority, whether chairperson, whether private institution, career articles, career book chapters, and career books.

Pay Disparity by Field

Finally, we turn to the question of whether the level of pay disparity varies by field. Models from labor economics would argue that wages for faculty will be influenced by the wages that faculty members could earn in external labor markets. If these external labor market opportunities differ for men and women, it is possible that they would have a resulting impact on their relative compensation within academe. To test this notion, we constructed five groups of fields similar to the ones used by Toutkoushian (1998): arts and humanities, social sciences, physical sciences, professional fields, and all other fields. The list of fields within each category is provided in the Appendix. In Table 8, we applied the baseline model I to each of these subgroups of faculty, and report the coefficient estimates for gender in the 1993 and 1999 surveys: We found that the point estimates of pay disparity are fairly similar across most of the fields considered here, ranging from 3.3% in the professional fields to 6.7% in the all other fields category. Furthermore, the unexplained wage gaps are not statistically different from zero in the arts and humanities grouping nor the professional grouping, and is only marginally significant (at the 5% level) in the physical sciences and in the all other fields category. The differences in the unexplained wage gap by field are

TABLE 8. Comparison of Unexplained Wage Gaps by Gender by Field, NSOPF:93 and NSOPF:99

Field	Unexplained Wage Gap: 1993[a]	Unexplained Wage Gap: 1999	Change: 1993–1999
Arts and Humanities[b]	−0.092**	−0.034	−0.058 (t = −2.26*)
Social Sciences[c]	−0.075**	−0.047**	−0.028 (t = −1.62)
Physical Sciences[d]	−0.060**	−0.038*	−0.022 (t = −0.92)
Professional Fields[e]	−0.100**	−0.033	−0.067 (t = −2.11*)
All Other Fields	−0.068*	−0.067*	−0.001 (t = −0.03)

Notes. **$p < .01$; *$p < .05$. [a]Results taken from Toutkoushian (1998), Table 7. Sample is restricted to full-time faculty at either the assistant, associate, or full professor rank employed by a four-year college or university without missing data on the variables in the models. Dependent variable is the natural logarithm of annual base salary. Regression model (''model I'') includes controls for highest degree (3 variables), departmental affiliation within field grouping, race/ethnicity (1 variable), age and squared age, geographic region (7 variables), career patents, length of appointment (4 variables), years of experience and squared years of experience, years of seniority and squared years of seniority, whether chairperson, whether private institution, Carnegie classification of institution (3 variables), career articles, career book chapters, and career books. [b]Languages, home economics, industrial arts, library science, and art. [c]Religion, psychology, public affairs, anthropology, archaeology, ethnic studies, economics, geography, history, international relations, political science, sociology, communications, education, demography, and other general social sciences. [d]Agriculture, biological sciences, physical sciences, mathematics, architecture, science technologies, computer science, and engineering. [e]Health sciences, business, and law.

particularly interesting when contrasted with the findings from the same salary model using the NSOPF:93 data. Note that the estimated unexplained wage gaps in four of the five groupings of fields are smaller in 1999 than they were in 1993. While the professional fields and arts and humanities had the largest unexplained wage gaps in 1993, these were now the smallest in 1999, and the reductions for these two groups were statistically significant at the 5% level. Interestingly, the unexplained wage gap for ''all other fields'' did not decrease over this six-year time frame. With this exception, however, the trend towards a smaller unexplained wage gap between men and women in academe appears to hold within most of these categories.

SUMMARY AND DISCUSSION

The fact that studies of academe have consistently shown that the salaries of women lag behind those for comparable men and that these differences have not faded over time has been a cause of concern among administrators, analysts, and other observers of higher education. The

persisting unexplained wage gap has seemed incompatible with the significant time and attention that has been devoted to enacting legislation and hiring policies to ensure equal treatment of men and women in the academic labor market. Interpreted in this light, the results that we present here are an encouraging sign that progress is finally being made in eliminating the pay differential between men and women with similar qualifications. The decreases that we found in the average unexplained wage gap between men and women hold across a wide range of salary model specifications, and are equally robust to the methodology used to measure the unexplained wage gap. We further showed evidence that suggests that there is no longer any statistical evidence of pay disparity by gender within Doctoral-level or Liberal Arts institutions, and that Doctoral-level institutions saw the largest reduction in estimated gender coefficients during the last six years. Significant gains in the treatment of women with regard to their compensation were also found for faculty in the arts and humanities and professional fields. While these observations are not proof that policies to ensure equal pay for men and women has led to this improvement, they are certainly consistent with this conjecture.

At the same time, our findings demonstrate that more work needs to be done. Our results clearly showed that even after controlling for characteristics such as experience, educational attainment, field, rank, and institution type as well as other variables that could also influence salaries, women still on average earn between 4% and 6% less than men in academe. These unexplained wage gaps are not only statistically significant, but are large and important in a practical sense since they translate into pay differences of several thousand dollars per year. When these differences are compounded over a woman's career, the magnitude should be alarming. These inequities still persist across a number of institution types and fields, and thus we should not lose focus on the fact that despite the clear evidence of progress, more improvement in the situation for women is needed.

In one sense, studies such as this point out the fact that there is still a lot that we do not know about the compensation of faculty and the extent of pay discrimination in academe. The models that we show here, and others have shown using national data, explain less than half of the variation in salaries across individual faculty after controlling for a myriad of personal and institutional characteristics. While institution-specific studies generally account for more variation, they also leave as unexplained a significant portion of the salary differences across individuals. Compensation studies are naturally constrained to take into account only those factors that are observable and measurable, and cannot directly capture the effects of other factors that are important but unobservable. Analysts also cannot observe

the processes of negotiating and setting salaries that occurs on campuses, nor other aspects of institutional behavior that might tell us if the unexplained wage gaps we calculate are due to employer discrimination, legitimate pay differentials, or some combination.

Despite these limitations, the results presented here illustrate the importance of continuing to analyze the relationship between male and female faculty members' salaries using the models that have been established in the literature so that we may track progress over time. New iterations of national data afford an opportunity to check the status of this important issue. Further studies are also needed to delve more deeply into other aspects of careers for men and women in academe. The fact that academic rank is a determinant of career success, for example, highlights the importance of studies of the determination of rank and the role that gender plays in rank attainment. Likewise, more studies are needed of the process by which faculty engage in research and whether policies can be created that would help women increase their research productivity.

ACKNOWLEDGMENTS

We are indebted to the National Center for Education Statistics for granting permission to use the data in this study, and to Laura Perna and two anonymous referees for their comments on earlier drafts of this paper.

END NOTES

1. Generally speaking, the term "unexplained wage gap" could refer to the unexplained salary difference between any two groups of workers (male vs. female, white vs. non-white, young vs. old, etc.). For brevity, we use the term to only refer to the unexplained wage gap between men and women.
2. The exact number of respondents was not reported to protect confidentiality.
3. There were a number of differences in the specific variables used in the studies by Barbezat and Toutkoushian. For example, Barbezat created five dummy variables for different levels of career publications, whereas Toutkoushian included a single variable representing the number of career publications. We followed the same methods of variable construction as described by Toutkoushian (1998, Table 12, p. 67).
4. The data in Table 1 describe the sample only and are not weighted population estimates. The unweighted means and standard deviations are provided here to help describe the sample under investigation and ensure comparability to previously-published studies using national data.
5. The data in Table 1 describe the sample only and are not weighted population estimates. The unweighted means and standard deviations are provided here to help describe the sample under investigation and ensure comparability to previously-published studies using national data.
6. The details on the sample design and construction of weights used in the NSOPF:99 can be found in the report *1999 National Study of Postsecondary Faculty (NSOPF:99) Methodology Report* (U.S. Department of Education, 2002b), p. 25–40.

APPENDIX 1. Variable Definitions for NSOPF:99

Variable Name	Definition and Method of Construction
Experience Variables	
Years of Seniority:	Current year (1998) minus year began current position.
Years of Experience:	Years teaching in higher education institutions.
Age (in years):	Current year (1998) minus year of birth.
University Characteristics (omitted category = "Liberal Arts I or II Institution")	
Research I or II Institution:	1 if current institution is listed as a Research I or II Institution according to the Carnegie classification system, 0 otherwise.
Doctoral I or II Institution:	1 if current institution is listed as a Doctoral I or II Institution according to the Carnegie classification system, 0 otherwise.
Comprehensive I or II Institution:	1 if current institution is listed as a Comprehensive I or II Institution according to the Carnegie classification system, 0 otherwise.
Liberal Arts I or II Institution:	1 if current institution is listed as a Liberal Arts I or II Institution according to the Carnegie classification system, 0 otherwise.
Private Institution:	1 if private institution, 0 otherwise.
Highest degree (omitted category is "other degree")	
Doctorate Degree:	1 if highest degree is doctorate, 0 otherwise.
Professional Degree:	1 if highest degree is professional degree, 0 otherwise.
Masters Degree:	1 if highest degree is masters, 0 otherwise.
Research/Publication Measures	
Career Articles:	The number of articles in peer-reviewed professional or trade journals, or creative works published in juried media by the faculty member in his/her career.
Career Textbooks:	The number of textbooks, other books, monographs, research or technical reports published by the faculty member in his/her career.
Career Chapters:	The number of reviews of books, articles, and creative works, or book chapters published by the faculty member in his/her career.

APPENDIX 1. (*Continued*)

Variable Name	Definition and Method of Construction
Career Patents:	The number of career patents produced by the faculty member.
Geographical Location Variables (omitted region = "Other")	
Region0–Region9:	Ten regional dummy variables (BEA regional codes). Includes New England, Mid East, Great Lakes, Plains, Southeast, Southwest, Rocky Mountain, Far West, Outlying Areas, and other.
Field Variables (omitted field = "Other")	
Dept1–Dept41:	Forty-one dummy variables for principal field of teaching. Includes agriculture, architecture, arts, business, communications, computer science, education, engineering, English, foreign languages, health sciences, home economics, industrial arts, law, library/archival, biological sciences, physical sciences, mathematics, parks/recreation, philosophy, protective services, psychology, public affairs, science technologies, social science/general, anthropology, archeology, area and ethnic studies, demography, economics, geography, history, international relations, political science, sociology, construction trades, miscellaneous services, mechanics and repairs, precision production, transportation, and other.
Personal Characteristics, Other Variables	
Length of Appointment:	The number of months of appointment for the faculty member.
Chairperson:	1 if faculty member is the chairperson of the department, 0 otherwise.
Female:	1 if female, 0 otherwise.
Black:	1 if non-Hispanic black, 0 otherwise

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Received October 16, 2003.