

RUNNING HEAD: Pay inequities

Pay Inequities for Recently-Hired Faculty, 1988-2004

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It has been widely reported in the media and academic journals that there is a sizable wage gap between men and women in academe, and that the gap has persisted over time (see, for example, Ashraf, 1996; Barbezat, 1991; Ehrenberg, 2003; Fogg, 2003; Perna, 2001, 2002; Ransom & Megdal, 1993; Umbach, 2006). Data from the National Center for Education Statistics for 2004-05 show that the average salary for all male faculty (\$69,337) exceeded the average salary for female faculty (\$56,926) by almost 22 percent (National Center for Education Statistics, 2006, Table 235). Although some of the total wage gap by gender is due to the higher concentration of males at the Full Professor rank, recent national comparisons of average faculty salaries published by the American Association of University Professors (AAUP) in 2007 showed that the gender pay gaps persist within ranks. Similar concerns have also been raised as to the relative pay for faculty by race. Due to the relatively small numbers of non-white faculty, however, there is little evidence reported on their total wage gaps (Barbezat, 2002; Hearn, 1999). The limited information to date suggests that the total wage gaps between faculty by race are smaller than is true in the general labor market outside of academia (Barbezat, 2002; Gordon, Morton, and Braden, 1974; Hoffman, 1976; Toutkoushian, 1998b). Toutkoushian (1998b) showed that in 1993, for example, the average salaries of black and Hispanic male faculty were between 11 to 12 percent less than for white male faculty.

Results from national surveys of faculty have also shown that after controlling for a variety of factors, the unexplained wage gaps in the late 1980s and early 1990s were comparable to the levels found by researchers in the mid 1970s (Barbezat, 1987, 1989, 1991; Ransom & Megdal 1993; Toutkoushian, 1998a). Although more recent work found that the unexplained wage gap had decreased by 1999 (Toutkoushian and Conley, 2005), the remaining difference

was still sizable and significant. In contrast, the limited research on pay differences by race has found that there is often no unexplained wage gap between faculty (Barbezat, 2002; Toutkoushian, 1998b).

Academics have struggled to find an explanation for the origins of pay differentials and why institutions have not been able to eliminate them. In particular, little is known about the pay gaps for newer faculty by gender and race and how the unexplained wage gaps change over the course of a faculty member's career. It is possible that the unexplained wage gaps begin at the time of hire and remains constant over one's career. Finkelstein, Seal, and Schuster (1998) report that among newly-hired faculty in 1993, fewer females (49%) than males (56%) were satisfied with their salary.

Alternatively, faculty could be treated equitably at the time of hire, and yet pay disparities emerge over time due to inequitable salary increases and rates of promotion. Johnson and Stafford (1974a; 1974b) attributed these gender differences to female faculty being more likely to take time out of the labor market for family responsibilities, and thus they accumulate less human capital. Others such as Hirsch and Leppel (1982), however, counter that the positive relationship between the unexplained wage gap and experience could be due to discriminatory practices of institutions that take advantage of the fact that women become less mobile as they gain experience. Of course, it is also possible that pay disparities both originate at the time of hire and increase over the course of one's career. Determining which of these competing explanations is true is a crucial first step towards isolating the causes of pay inequity in academe, and devising policies that would be more effective at removing them.

To date, the literature on the origins of pay differentials by gender and race, and how they have changed over time, has been relatively small and inconsistent. As noted by Toumanoff

(2005, p.179), “Very little attention has been paid to the question of whether gender discrimination exists in faculty salaries at the time of hiring (salary-at-hire), although, for both theoretical and practical reasons, it is a very important question.” Several studies such as Johnson and Stafford (1974b) and Toutkoushian (1998a) found that the unexplained wage gap by gender widens with experience, although others including Hirsch and Leppel (1982) reached the opposite conclusion. No studies to date have examined whether there are unexplained wage gaps for faculty by race, and few studies in the field have focused on how the unexplained wage gaps for junior faculty have changed over time.

In this study, we use national data on faculty from four iterations of the National Study of Postsecondary Faculty (NSOPF), including the newly-released 2004 survey, to examine three main research questions: (1) do unexplained wage gaps exist for recently-hired faculty and/or do they expand over one’s career?; (2) have the unexplained wage gaps for recently-hired faculty changed over the past sixteen years?; and (3) do the patterns in the unexplained wage gaps differ by gender and race? By using survey data from multiple surveys, we can examine these questions in ways that would not be possible using only one cross-sectional survey or longitudinal data for one institution. We define recently-hired faculty as Assistant Professors who are new to the profession and were hired within three years of the survey. This allows us to obtain sufficient sample sizes to determine whether there is any evidence of pay discrimination by gender and race for faculty close to the time of hire, and how selected characteristics affect starting pay.

Literature Review

Studies of pay equity in labor markets are usually initiated by observing a total wage gap between two or more groups of employees. It should be of no surprise to even casual observers of general labor markets that female and minority workers often earn less than their male and majority counterparts, respectively. The U.S. Census Bureau estimates that the median annual earnings for males ages 15 and over who worked at full-time jobs in 2005 was \$38,330, compared to only \$30,130 for similarly-defined females, and the median earnings for white males (\$42,350) exceeded the medians for both black (\$30,366) and Hispanic (\$25,259) males (U.S. Census Bureau, 2006, Table PINC-10).

These ratios are often misinterpreted as proof of the inequitable treatment of women and minorities in the labor market. Statistics that simply compare the average earnings of workers, however, do not take into account that workers may differ substantially in terms of other characteristics that may also affect their pay. To address this issue, analysts begin by using human capital theory to identify factors that are thought to influence faculty compensation. The unexplained wage gap is then defined as the portion of the total wage gap between two groups of employees that cannot be attributed to human capital or other worker characteristics that are deemed appropriate for determining salaries. The unexplained wage gap is typically measured with a multiple regression model containing a set of variables measuring human capital and other worker-related variables, as well as a dummy variable indicating the employee was female.¹ The coefficient for the female dummy variable represents the effect of gender on salaries after taking into account the effects of the other worker-related variables on salaries, and thus is a measure of the unexplained wage gap. Studies that have looked at the relative pay status of men and women in the general labor market include Blau and Kahn (1997), Even and Macpherson (1993), and

O'Neill (2003).² Similarly, Reimers (1983), Verdugo (1992), and others have applied this model to estimate the unexplained wage gaps by race in nonacademic labor markets. Hierarchical linear modeling (HLM) uses a similar approach, but takes into account the grouped nature of the data (i.e., employees within firms) (Loeb, 2003).

The same issues regarding the effects of gender and race on compensation have been raised in the academic labor market. Over the past thirty years, there have been many investigations conducted into the pay status of women in academia and whether there is an unexplained wage gap between male and female faculty, including Ashraf (1996), Barbezat (1987; 1989; 1991; 2002), Bayer and Astin (1975), Bellas (1993), Ransom and Megdal (1993), Smart (1991), and Perna (2001). Due to the small numbers of minority faculty, however, there has been less attention given towards the pay status of faculty by race (Ashraf, 1996; Barbezat, 1989; 1991; 2002; Bellas, 1993; Toutkoushian, 1998b). All of these studies were initiated in response to the Equal Pay Act of 1964 and its application to the academic labor market in 1972. Almost every study controlled for measures of human capital (as reflected in experience, educational attainment, and research productivity) and primary teaching field to capture wage adjustments due to the demand/supply for faculty in specific areas (Ferber and Loeb, 2002; Ransom and Megdal, 1993). Studies using national data usually add control variables for the type of institution at which a faculty member is employed, the geographic region where they reside, and their research productivity. Other factors such as academic rank have also been used in salary equity studies, but typically provide lower estimates of the unexplained wage gap because of the potential gender bias in rank (Ransom and Megdal, 1993; Strathman, 2000).

The findings from national studies have been used to measure the unexplained wage gaps at particular points in time and determine if they are changing. The findings have consistently

shown that even after removing the effects of these control variables from faculty salaries, there were sizable and statistically significant unexplained wage gaps between male and female faculty at every point of time considered. With regard to changes over time, Barbezat (1989; 1991) and Toutkoushian (1998a) applied several similar regression model specifications to national surveys of faculty over time and found that the unexplained wage gap between male and female faculty decreased from the 1960s to the mid 1970s, and then remained constant through the early 1990s. Using data from the 1999 NSOPF, however, Toutkoushian and Conley (2005) note that while gains have been made in achieving gender pay equity, more progress was still needed to reach this goal.

While strides have been made in developing better ways of measuring the unexplained wage gap and tracking changes over time, relatively little is known about the origins of gender and racial pay differentials. One possibility is that the unexplained wage gaps in academe begins at the time of hire. This might occur, for example, if discrimination in the larger job market leads to different starting salaries for male and female hires (Toumanoff, 2005). It could be argued that the conditions are ripe for pay inequities to happen at the time of hire because starting salaries are not widely shared among the faculty in a department and faculty of different genders or races may not be hired in the same year. The salary negotiation process between institutions and job candidates can introduce further differences in starting salaries. Anecdotal evidence suggests that female job candidates are less likely than their male counterparts to negotiate for a higher salary (Babcock and Laschever, 2003; Dey and Hill, 2007; Joslyn, 2003). However, Formby, Gunther, and Sakano (1993) and Hirsch and Leppel (1982) counter that pay differences should be smaller near the time of hire because of competitive pressures from the

labor market, and Perna (2001) suggests that the greater attention given to faculty accomplishments at the time of hire may lead to smaller pay inequities.

Other researchers have argued that pay inequities emerge over the course of a faculty member's career. This can be traced back to the seminal work of Johnson and Stafford (1974a; 1974b), who suggested that career interruptions for female faculty due to family responsibilities would lead to a reduction in accumulated human capital, which would then account for the gender earnings difference. As noted by Hirsch and Leppel (1982, p.829), "...the human capital view attributes the widening sex differential...to differences in acquired skill and productivity. This literature emphasizes differences in continuous labor market experience..." Alternatively, the rising pay inequity over one's career could be due to discrimination (Hirsch and Leppel, 1982; Jackson and Lindley, 1989; Jusenius and Scheffler, 1981; Toumanoff, 2005). This would be the case if male and majority faculty are routinely given larger salary increases than female and minority faculty, respectively, and the salary increases do not correspond to measurable differences in productivity. Another potential source of inequities over time would arise from inequitable rates of promotion for faculty. Because promotions in rank are usually accompanied by salary increases, if there are gender or racial differences in the timing or rate of promotions, this may lead to increasing unexplained wage gaps (Ransom and Megdal, 1993).

Figure 1 depicts the possible scenarios for pay inequity between two groups of faculty (A and B), assuming for simplicity that there is a linear relationship between years of experience and salary. The first chart corresponds to the case where pay inequities occur only at the time of hire. In panel (b), there are no pay inequities at the time of hire, but the pay inequities emerge over time. Finally, in panel (c) there are both pay inequities at the time of hire and they increase over the course of one's career.

** Figure 1 Here **

The empirical evidence is mixed as to which of these competing explanations of the origin of the unexplained wage gap is correct. The preponderance of early evidence on gender found that pay inequities are smallest near the time of hire. Bayer and Astin (1968) compared mean salaries for male and female faculty by broad categories of field, institution type, and experience level (1-2 years versus 5-6 years). They found that the wage gap existed for the recently-hired faculty and that the gap did not expand with experience. Johnson and Stafford (1974b) used data from the National Science Foundation in 1970 to examine the unexplained wage gap between men and women in selected fields in academia. By interacting gender with experience, they observed that there was an unexplained wage gap by gender for faculty in the beginning of their career, and that the unexplained wage gap grew at a time when women would normally stop out of the labor market for family responsibilities. Jusenius and Scheffler's (1981) analysis of PhD economists supported the conclusions of Johnson and Stafford.

Later studies relied on a variety of approaches to examine the gender pay disparity for newly-hired faculty, and the results from these studies varied considerably. Hirsch and Leppel (1982) interacted gender with experience, but found no evidence of a widening unexplained wage gap (however, see Jackson and Lindley, 1989). Brewton and Freiberg (1995), Formby, Gunther, and Sakano (1993), and Toumanoff (2005) used entry-level salaries for faculty as the dependent variable of interest. Formby, Gunther, and Sakano (1993) found no evidence of pay inequities for economists at the time of hire, and yet Brewton and Freiberg (1995) and Toumanoff (2005) did find significant gender pay differences for faculty at the institutions they studied.

Two additional studies approached the problem by estimating separate salary models for faculty based on years of experience. Toutkoushian (1998a) used cross-sectional data from the 1988 and 1993 NSOPF surveys to compare the unexplained wage gaps for “artificial cohorts” of faculty in different age categories. He found that the unexplained wage gaps for faculty in different age groups in 1988 (such as ages 30 to 40) were similar to those for faculty five years older in 1993 (such as ages 35 to 45), and concluded that the unexplained wage gaps do not increase as faculty gain experience. His results also showed that the unexplained wage gaps for younger faculty were statistically significant, but smaller than those for older faculty. Similarly, Perna (2001) estimated separate salary models for each of six groups of faculty from the 1993 NSOPF based on their rank and years of experience. She observed that female Assistant professors with 1-2 years of experience earned about 10 percent less than their male counterparts, and yet the total gender wage gap for Full Professors with more than 20 years of experience was not much higher (13 percent). After removing the effects of human capital, productivity, race/ethnicity, and structural characteristics, however, she found no evidence of an unexplained wage gap for Assistant Professors with 1-2 years of experience. Furthermore, her results showed that the unexplained wage gaps within each rank are smallest for faculty with less experience and then expand with experience.

There are two substantial gaps in the literature on this topic that our work addresses. First, there have been no studies that have examined the racial unexplained wage gaps for newly-hired faculty. This is not surprising given the extremely small numbers of minority faculty that are typically hired in a given year. Nonetheless, the question is of equal importance to that if gender-based pay differentials for policy makers who are interested in ensuring that all faculty are compensated in a fair and equitable manner at the time of hire and throughout their career.

Second, no study in the literature has examined whether the unexplained wage gaps by gender and race for newer faculty have changed over time. This is important because Equal Pay legislation may have led institutions to implement policies at the time of hire. By examining data on a large number of faculty over time, we hope to help address these deficiencies in the literature.

Data and Methodology

Our study uses data from the 1988, 1993, 1999, and 2004 iterations of the National Study of Postsecondary Faculty. The NSOPFs are nationally representative samples of faculty and instructional staff conducted by the National Center for Education Statistics, and are the most comprehensive studies of faculty available to researchers. The surveys gathered information regarding the backgrounds, responsibilities, workloads, salaries, benefits, attitudes, and future plans of both full-time and part-time faculty. In all of the analyses that follow, we weighted the data using the appropriate NSOPF survey weights, and used hierarchical linear models with a randomized intercept and grand-mean centering. Hierarchical linear models explicitly take into account the nesting of faculty within institutions; ignoring such nesting can result in biased regression coefficients and standard errors (Thomas and Heck, 2002).

Because we were interested in studying changes in pay differences over time, it was crucial that the faculty used in each dataset and the control variables in the salary models were as similar as possible to avoid having changes in variable definitions or sampling strategies affect the results. Due to several changes in the NSOPF surveys over the four iterations, however, there will inevitably be some differences in the faculty selected for the analyses and the control variables used in different salary models. First, we only included full-time tenured or tenure-

track faculty who indicated that part of their duties included instructional activities related to credit courses (Selfa et al., 1997, pp. 101-102). In addition, we excluded faculty listing a field of teaching in the areas of vocational training to help focus on faculty in more traditional academic fields, and faculty in the health sciences due to comparability issues between the 1988 and 1993 surveys (Selfa et al., 1997). We also restricted the analysis to faculty employed at Carnegie Research I/II, Doctoral I/II, Comprehensive I/II or Baccalaureate I/II institutions who indicated that their appointments were full-time, on the tenure track, and were not on sabbatical when the survey was administered.

To identify the subgroup of “recently-hired faculty,” we first restricted the sample to faculty with the rank of assistant professor who were hired by their current institution during the three years prior to the NSOPF survey administration. For example, the 2004 faculty sample consisted of faculty hired at the NSOPF institution in 2001, 2002 or 2003. Thus, our subgroups were comprised of faculty in the first, second or third years of their job. We then identified faculty within each subgroup who have not previously held a tenure-track faculty position. With this approach, we excluded assistant professors who may have switched jobs at the very beginning of their careers, or were assistant professors in the fourth, fifth or sixth years of rank. Different selection processes had to be used in the four surveys to determine this group of faculty because of changes in the NSOPF survey questions over time.³ As a comparison sample, we also combined more senior tenured and tenure-track faculty together with recently-hired faculty. We refer to this sample as the “full” sample, as opposed to the “recently-hired” sample. Because the full sample includes all faculty regardless of time of hire, it is similar to the typical sample used by most of the literature on faculty salary equity.

Our dependent variable was the amount of gross compensation before taxes that faculty listed as their “basic salary.” This amount does not include additional compensation for activities such as administrative work or summer courses. We deleted a small number of outliers in each year who reported annual salaries of less than \$20,000 (in 2004 dollars). Similar to other studies, we expressed the dependent variable in natural logarithms because of the implicit assumption that wages grow at an exponential rate due to compounding (Mincer, 1974).

To examine the gender pay difference, we created a dichotomous variable indicating that the faculty member was female. Likewise, we used three dichotomous variables to measure race and ethnicity: Asian, Blacks and Latinos, and non U.S. citizens. Due to the small sample sizes of the recently hired faculty samples, we combined two historically underrepresented groups, Blacks and Latinos, into one group.

Our salary models also included a number of additional control variables. We created separate dummy variables for the faculty member’s highest degree earned, either a doctoral degree (e.g., Ph.D. or Ed.D.) or a professional degree (e.g., M.D., L.L.B.). We also controlled for the number of career publications in 1) articles published in refereed professional or trade journals; creative works published in juried media and 2) textbooks, other books; monographs; research or technical reports disseminated internally or to clients.⁴ For faculty beginning their position at the time of the survey, these counts are a relatively accurate measure of publication performance at time of hire, although the counts are less accurate for faculty in their second and third years.⁵ In addition to a faculty member’s educational attainment and publications, we also used measures of prior labor market experience outside of academe to control for salary differences by gender and race. Because it was not possible to directly measure the total years of

experience in the same way across all four surveys, we measured prior labor market experience by the number of years since a faculty member's bachelor's degree was earned.

Second, we looked at the type of most recent job reported by the faculty member as a measure of prior labor market experience. All four NSOPF surveys asked faculty to list the sector of their most recent position using several different categories. We created a dummy variable to measure whether a faculty member had previous experience in higher education, and another dummy variable for whether the faculty member reported experience in another sector (such as elementary or secondary school, hospital, government, or the private sector). Because experience and salaries may vary between faculty in their first, second, and third years of employment as an assistant professor, we included cohort dummy variables indicating faculty who were in their second or their years of employment.

Finally, we included three additional sets of variables as additional labor market controls: Carnegie institution type, public status of the institution, and primary teaching field, which has been shown to affect salaries (Umbach, 2006). The Carnegie type was indicated by three dummy variables for research, doctoral, and comprehensive/masters institutions, with baccalaureate institutions as the reference category. Public status was represented by a dummy variable that takes the value of one if an institution is public, zero otherwise. Academic field was based on the discipline that faculty listed as their principal field of teaching. Due to changes in the survey questions across time and the limited sample sizes for recently-hired faculty, we grouped faculty into eight field categories for agriculture, business, education, engineering, fine arts, humanities, social sciences, and other fields, with the natural sciences as the reference category.

As with any research, our analysis has several limitations that should be noted. First, some of variables are not measured exactly as we would wish, due to how the NSOPF surveys were structured. For example, we were forced to rely on proxy variables for prior work experience, number of years since bachelor's degree and sector of most recent position, rather than a more specific measure such as the total number of years of prior work experience and job titles of previous positions. As noted above, attempts to compute variables that are identical across the four NSOPF surveys were also hindered due to changes in survey designs over time. In addition, our sample sizes were still somewhat small, especially for 1988. We tried to address this issue by also including junior faculty in their second or third years in our definition of recently-hired faculty, but future research should attempt to collect larger samples of first-year faculty for this type of analysis. This is particularly important for assessing pay equity by race/ethnicity, where small sample sizes precluded us from examining more detailed breakdowns of faculty.

Results

In Table 1 we provide descriptive statistics for selected variables from each survey for recently-hired faculty. Note that because the NSOPF is not a longitudinal survey, the same individuals were not included in each survey. Descriptive statistics for the entire set of faculty in our samples are available from the authors upon request. Looking at the intercepts, it is interesting to note that the growth rate in average salaries for recently-hired faculty declined from 24% from 1988 to 1993 to 17% from 1999 to 2004.

Table 2 shows the average difference in log salaries in each survey year and cohort. The recently-hired sample has been broken down into several different groups: Year 1 only, Year 2 only, Year 3 only, Years 1 and 2 combined, and Years 1-3 combined (i.e., the entire recently-

hired sample). Total wage gaps are shown for females-males and Blacks/Latinos-Whites. For most of the gender differentials calculated, recently-hired female faculty on average earned less than recently-hired male faculty, although these differences are statistically significant only for selected cohorts. There is no clear pattern in the total wage gaps by gender across surveys, perhaps due in part to the small numbers of faculty in each cohort. When we combined cohorts for faculty with one to three years of experience, however, the total wage gaps were all statistically significant ($p < .05$), and varied from a low of 6% in 2004 to a high of 11% in 1988. As noted by the bottom row in the top panel of Table 2, the total wage gaps for recently-hired faculty are much lower than the total wage gaps observed for all faculty.

The bottom panel of the table shows the total wage gaps for historically underrepresented minorities (i.e., Blacks and Latinos combined). For the recently-hired sample, only one difference is statistically significant (in 2004), and it is positive, indicating higher average wages for Blacks and Latinos. Given the small numbers of these faculty, one explanation for this result is small sample sizes. However, looking at the size of the differences, we can see that most of the are positive, and the differences for the entire recently-hired sample are fairly small (-2%, +1%, +2% and +4%). The last row in the table shows the race/ethnicity gap for the full sample of faculty, and the results here tell a different story. For all four survey years, historically underrepresented minorities make less than White faculty, with the total wage gaps ranging from -6% to -9%. In sum, the unadjusted wage differences shown in Table 2 indicate substantial wage gaps for females and underrepresented minorities in the full sample, but only for females in the recently hired sample. In addition, the differences for females were smaller in the recently-hired sample than the full sample.

In the next part of our analysis, we estimate the salary models with the independent variables described above to determine how the unexplained wage gaps by gender and race for recently-hired faculty have changed from 1988 to 2004 (see Table 3). The salary models for each of the four surveys control for gender, race, highest degree earned, career articles and books, years since bachelor degree, whether the faculty member had prior experience in academia or other sectors, academic discipline, Carnegie classification of the institution, and public/private status of institution. The intra-class correlation coefficient shows the amount of variation in salaries between institutions, and varies between 21% and 42% during the time period of this study.

The results for the non-demographic factors reveal that the salaries for recently-hired faculty are largely determined by educational attainment, academic discipline, and Carnegie classification of the institution. Recently-hired faculty with PhDs or professional degrees tend to earn more, while faculty in business and engineering earn higher salaries than faculty in the natural sciences, and faculty in the fine arts, humanities, and social sciences earn less. Not surprisingly, the results also indicate that salaries for recently-hired faculty varied considerably by institution, with higher salaries at both private and research-intensive institutions. Interestingly, neither years since bachelor's degree nor prior experience in academia or other sectors had a statistically significant positive effect on salary.

Turning to issues of equity, we found that the unexplained wage gaps by gender varied 2%-3% across all four surveys, but that these differences were not statistically significant ($p < .10$). Accordingly, there little support for the conjecture that gender pay inequities originate at the time of hire. In contrast, we did find substantial and statistically significant unexplained wage gaps by race in two of the four NSOPF surveys. The unexplained wage gaps by race

varied from a low of 3% in 1999 to a high of 11% in 1988, and all of the unexplained wage gaps favored nonwhite faculty.

To determine how these results compare to the faculty at large, in Table 4 we report the findings from a similar salary model estimated over the entire sample under consideration, which includes recently-hired faculty as well as faculty with more experience. In addition to the regressors used in the recently-hired faculty salary model, we also added controls for a faculty member's current rank, and excluded the cohort year 2 and year 3 variables. Inclusion of rank will most likely lead to lower estimates of the unexplained wage gaps by gender and race.

The full salary models reveal many of the expected relationships between independent variables and faculty salaries. Faculty salaries are determined by an individual's educational attainment, faculty rank, research productivity, experience level, and academic discipline. Similarly, the type of institution plays an important role in faculty salaries, with higher salaries at more research-intensive institutions.

With regard to equity concerns, we can see that across all four surveys female faculty earned significantly less than their male counterparts. The estimated unexplained wage gaps by gender varied from a low of 4% in 1999 to a high of 6% in 1993. Consistent with the findings of Toutkoushian and Conley (2005), the unexplained wage gap by gender decreased from 1993 to 1999, but did not continue to decline in 2004 as might have been expected. We also interacted the gender variable with years since the bachelor's degree was earned. We found that the coefficient on the interaction term was negative for two of the four surveys, suggesting that female salaries grow more slowly than male salaries with experience, but the interaction term was not statistically significant ($p < .10$, results not shown).

The combined results therefore suggest that the difference in pay disparity by gender between recently-hired and all faculty emerges very slowly over time or is due to different treatments of cohorts of faculty that are not reflected in the years since bachelor degree. Turning to race, the results show that for all faculty there is no strong evidence of an unexplained wage gap between white and nonwhite faculty in the four NSOPF surveys.

Finally, it should be borne in mind that the results in Table 3 for recently-hired faculty are averages estimated across all disciplines and Carnegie classifications. In other words, gender or race/ethnicity gaps may exist in certain types of disciplines or institutions, but would not be detected in the models estimated in Table 3. We use the most recent NSOPF to explore whether the unexplained wage gaps vary by the type of institution or discipline (see Table 5). We divided the 2004 NSOPF into four different samples by Carnegie classification, and we also divided it into three different samples based on the academic discipline of the faculty member: 1) natural sciences and engineering, 2) arts, humanities and social sciences, and 3) all other fields. This latter division allows us to see if the unexplained wage gap is greater in STEM fields versus other academic disciplines. Models similar to those in Table 3 were estimated for each sample, with the relevant independent variables (Carnegie classification and academic discipline) excluded from the appropriate sample.

The unexplained wage gaps are shown for recently-hired faculty as well as the full sample. For recently-hired faculty, the unexplained wage gap for gender is still quite large at research institutions (-9%), but not other institution types. A substantial gender gap still exists for all faculty, with a similar gap of about 5% across institution types. The unexplained wage gaps for gender did not vary according to academic discipline for recently-hired faculty, but it did for the full faculty sample (-5% to -9%).

Although we found a positive unexplained wage gap of +10% for Blacks and Latinos in the 2004 recently-hired sample, for the most part this result seems to be driven by a positive gap at comprehensive institutions. However, we should mention that with the number of statistical tests being conducted in the paper, there will likely be a few Type I or Type I errors, so we should probably not read too much into this finding. Similarly, a small negative wage gap was found for the full sample at liberal arts colleges.

Discussion

Pay equity by gender and race remains an important, and unresolved, issue in academe. Our study contributes to the literature on this topic in several different ways. First, we focus attention on the unexplained wage gaps by gender and race for recently-hired faculty to determine if there is evidence of inequitable treatment at the time of hire. There have been relatively few studies that have examined pay equity between recently-hired men and women in academia, and no such study conducted for faculty in different racial groups. Second, we provide an updated look at the relative pay status of all faculty by gender and race using the 2004 NSOPF. Finally, by analyzing similar salary models across all four NSOPF surveys, we can determine whether the relative treatment of faculty by gender and race has changed over the past decade and a half.

Beginning with gender, we found that although the average starting salaries of male faculty were generally higher than for female faculty, the vast majority of the total wage gap could be attributed to human capital, institutional, and discipline-related differences between recently-hired men and women. Nonetheless, a gender-based pay disparity does emerge over time as reflected in the significant unexplained wage gaps by gender for the whole samples in

each of the four NSOPF surveys. With regard to race, the data show that there is actually an unexplained salary advantage for nonwhite faculty over white faculty who are near the time of hire. However, the difference fades over time to the point where there is no aggregate pay advantage or disadvantage for faculty based on race in the larger samples.

Taken together, our findings suggest that on the whole there are fewer gender differences in pay for recently-hired faculty than is true for the entire academic labor market. Not only is the total wage gap by gender about one-third of what is typically found when faculty across multiple cohorts are considered at one time, but there is no evidence of an unexplained wage gap by gender after taking into account factors that are traditionally used in studies of faculty salaries. These findings are consistent with the notion that the average unexplained wage gap between male and female faculty in cross-sectional studies is driven primarily by larger unexplained wage gaps for more senior faculty. What is not known is whether the larger gaps for older faculty are due to unequal treatment over the course of their academic careers, or their starting out at larger pay differentials relative to more recent cohorts, or perhaps most likely, a combination of both.

The institutional and discipline analyses indicate some problems with pay equity at research institutions. Taking into account a variety of human capital and disciplinary variables, we found that in 2004, recently-hired females received salaries that were 9% less than their male counterparts. Clearly this is an issue that needs to be addressed, and suggests that future work in this area should focus on research-intensive institutions to understand more about what issues drive pay inequity. Interestingly, we did not find evidence of a pay gap in STEM fields, suggesting that recent gender equity efforts in this area are working, at least for junior faculty.

Our results do not lend support to several of the arguments commonly advanced to explain the gender pay gap in academe. If women were less likely than men to negotiate their

salary at the time of hire, then we would have expected to find an unexplained wage gap in favor of men early in their careers. Our findings are in line with research indicating that the probability of negotiating a higher salary at time of hire is similar for female and male faculty (De Riemer, Quarles, & Temple, 1982). In addition, the results presented here are not consistent with the conjecture that institutions can more easily discriminate against women at the time of hire. The fact that the unexplained wage gaps for the entire samples of faculty are substantially larger than for recently-hired faculty suggest that either the unexplained wage gaps for faculty hired prior to the mid 1980s were greater than for faculty hired after the mid 1980s, or that unexplained wage gaps emerge over the course of one's career. Because the interaction of experience and gender on salary was statistically insignificant, the evidence suggests that the larger unexplained wage gaps for older faculty is a cohort effect rather than a widening of the pay differential over one's career.

Finally, and most importantly, this study highlights the need for a longitudinal analysis of faculty to better isolate how salaries change over the course of one's career. Some of the most interesting questions about faculty careers, such as the impact of faculty attributes on salary and promotion, can best be investigated with a panel study of faculty over a ten- or twenty-year period. To our knowledge, no such nationally representative study exists, yet such a study is very much needed.

¹ Economists argue that the wages paid to workers reflect their marginal revenue product, which is the additional revenue that they can bring to their employer (Ehrenberg and Smith, 2000). This marginal revenue product will be affected by the worker's human capital, which represents the skills and attributes possessed by employees that make them valuable in the labor market (Becker, 1964; Ehrenberg and Smith, 2000; Rees and Schultz, 1970). Workers are thought to acquire human capital through their education and experience in the labor market. Therefore, a worker's experience level and educational attainment are frequently used as proxy measures for human capital and used as independent variables in salary models (Ferber and Loeb, 2002; Mincer, 1974). Employees may also differ in the types of work that they do and the

wages that they could earn in other labor markets depending on their skills and training. Structural theorists such as Youn (1988; 1992) further posit that differences across organization types could influence the compensation and treatment of workers. Therefore, if there are differences between men and women or majority and minority workers in their average levels of human capital and other factors that may legitimately affect wages, then this could explain some or all of the total wage gaps between them.

² There are also other approaches such as two- and three-equation methods that can also be used for measuring the unexplained wage gap (Neumark, 1988; Reimers, 1983). These methods require analysts to estimate separate equations for each of the groups, and have the advantage of not requiring the effects of the independent variables on salary to be the same for both groups. However, these methods can only be used when there are sufficient degrees of freedom for the models to be estimated for each subgroup of workers.

³ For 1993 and 1999, we included only faculty whose year of achieving the rank of assistant professor equaled the year they began the job they held at the NSOPF institution. In 1988, the starting year of position question was not directly asked, while in 2004, the year achieved rank of assistant professor question was not asked. We used other questions in the surveys to isolate assistant professors in the first three years of their rank. For the 1988 sample, if faculty reported that their current job ran uninterrupted from the year they achieved assistant professor rank to the year of the survey, and this job was at a four-year college or university, they were kept in the sample. For the 2004 sample, we included faculty if they reported that 1) their current job was the first faculty position they had held at a postsecondary institution, or 2) they had held a previous faculty or instructional staff position at a postsecondary institution, but the job was either part-time or a full-time non-tenure track position. The second criterion retains assistant professors who may have previously worked as adjunct faculty.

⁴ One problem with this approach is that later NSOPF surveys combined together several categories of publications that were asked separately in earlier surveys. We combined responses to these categories in the earlier surveys to match the later surveys. Although this may seem innocuous, it is possible that responses to a detailed set of questions about publications may differ from a single question that asks about multiple categories. This is one of the limitations to using the NSOPF surveys across multiple administrations.

⁵ However, we note that the time to publish can take several years, so career publications listed by second and third year faculty likely include publications that were listed on their curriculum vitae at time of hire as under review, or revised and resubmitted.

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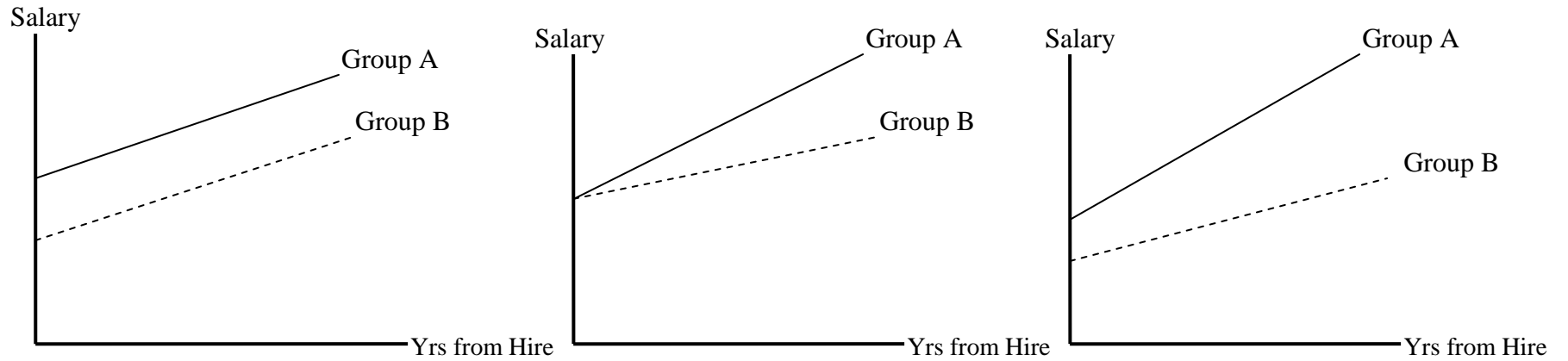
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Figure 1

Alternative Depictions of Sources of Pay Inequity between Two Groups of Faculty



Panel (a): Unexplained wage gap occurs at time of hire.

Panel (b): Unexplained wage gap rises over time.

Panel (c): Unexplained wage gap occurs both at time of hire and rises over time.

Table 1

Descriptive Statistics for Recently-Hired Faculty

	1988		1993		1999		2004	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Ln(salary)	10.29	0.27	10.53	0.32	10.67	0.25	10.84	0.34
Female	0.29	0.45	0.40	0.49	0.41	0.49	0.39	0.49
Asian	0.04	0.19	0.01	0.08	0.02	0.15	0.06	0.25
Black/Latino	0.06	0.24	0.06	0.25	0.05	0.21	0.08	0.28
Non-U.S. citizen	0.12	0.33	0.15	0.36	0.16	0.37	0.20	0.40
Degree: Ph.D.	0.84	0.37	0.79	0.41	0.89	0.31	0.88	0.32
Degree: Professional	0.03	0.18	0.07	0.26	0.01	0.08	0.01	0.12
Articles	4.96	7.07	5.20	8.60	8.00	17.75	6.68	12.84
Books	2.76	8.11	3.89	15.53	1.05	2.85	1.25	4.15
Years since B.A.	12.96	5.01	14.66	6.12	15.32	6.40	15.34	7.16
Experience: higher ed	0.51	0.50	0.58	0.49	0.50	0.50	0.51	0.50
Experience: other	0.31	0.46	0.26	0.44	0.20	0.40	0.35	0.48
Field: agriculture	0.04	0.19	0.03	0.18	0.03	0.16	0.03	0.16
Field: business	0.10	0.29	0.10	0.30	0.09	0.29	0.07	0.26
Field: education	0.11	0.32	0.10	0.31	0.11	0.31	0.10	0.31
Field: engineering	0.13	0.34	0.07	0.25	0.07	0.25	0.08	0.27
Field: fine arts	0.09	0.29	0.07	0.25	0.08	0.27	0.09	0.28
Field: humanities	0.11	0.32	0.13	0.34	0.18	0.38	0.16	0.37
Field: social sciences	0.13	0.33	0.17	0.38	0.16	0.37	0.13	0.34
Field: other	0.07	0.26	0.09	0.28	0.09	0.29	0.09	0.29
Cohort: year 2	0.32	0.47	0.35	0.48	0.38	0.48	0.35	0.48
Cohort: year 3	0.32	0.47	0.36	0.48	0.28	0.45	0.34	0.47
Carnegie: research	0.38	0.49	0.37	0.48	0.33	0.47	0.35	0.48
Carnegie: doctoral	0.20	0.40	0.19	0.39	0.17	0.37	0.15	0.35
Carnegie: comprehensive	0.29	0.45	0.35	0.48	0.33	0.47	0.38	0.49
Public	0.59	0.49	0.61	0.49	0.66	0.47	0.69	0.46

Table 2

Total Wage Gap for Females and Blacks/Latinos, by Cohort Years

<i>Female-male</i> <i>wage gap</i>	1988		1993		1999		2004	
	Difference	N	Difference	N	Difference	N	Difference	N
Year 1	-0.148 +	99	-0.055	212	-0.081 *	189	0.002	280
Year 2	-0.047	99	-0.098 **	253	-0.096 **	205	-0.131 **	304
Year 3	-0.106 +	90	-0.116 **	267	-0.025	149	-0.063 +	308
Years 1-2	-0.114 *	198	-0.076 **	465	-0.077 **	394	-0.066 *	584
Years 1-3	-0.109 **	288	-0.087 **	732	-0.067 **	543	-0.061 **	892
Full sample	-0.177 **	3,619	-0.180 **	6,267	-0.170 **	3,824	-0.160 **	7,476
<i>Black/Latino-</i> <i>White wage gap</i>	1988		1993		1999		2004	
	Difference	N	Difference	N	Difference	N	Difference	N
Year 1	0.084	99	0.081	212	-0.028	189	0.057	280
Year 2	-0.159	99	-0.027	253	-0.003	205	0.203 **	304
Year 3	0.166	90	0.041	267	-0.072	149	-0.013	308
Years 1-2	0.026	198	0.018	465	-0.003	394	0.059	584
Years 1-3	0.010	288	0.022	732	-0.024	543	0.043	892
Full sample	-0.086 **	3,619	-0.063 **	6,267	-0.092 **	3,824	-0.072 **	7,476

+ $p < .10$. * $p < .05$. ** $p < .01$.

Table 3

Salary Models, Recently-Hired Faculty Sample

	1988	1993	1999	2004
Intercept	10.2180 **	10.4843 **	10.6795 **	10.7596 **
Female	-0.0280	-0.0348	-0.0244	-0.0305
Asian	-0.0346	0.1109	0.1140 *	-0.0636
Black/Latino	0.1148 *	0.0669	0.0284	0.0998 **
Non-U.S. citizen	0.0174	0.0800 *	0.0027	0.0317
Degree: Ph.D.	0.0646 +	0.0766 *	0.0674 *	0.0382
Degree: Professional	0.1458 *	0.2358 **	0.0438	0.2761 **
Articles	0.0030 +	0.0022	0.0002	-0.0002
Books	0.0035 *	-0.0005	0.0021	0.0029
Years since B.A.	-0.0028	0.0017	0.0003	0.0011
Experience: higher ed	0.0197	-0.0407	-0.0136	-0.0510 +
Experience: other	0.0838 *	-0.0389	0.0202	-0.0065
Field: agriculture	0.0272	0.0702	0.0437	-0.1320 +
Field: business	0.3679 **	0.1812 **	0.3681 **	0.3090 **
Field: education	-0.1501 **	-0.0302	-0.0592 *	-0.1062 **
Field: engineering	0.2171 **	0.1451 **	0.0829 *	0.0241
Field: fine arts	-0.0710	-0.1158 *	-0.0927 **	-0.2053 **
Field: humanities	-0.1422	-0.1461 **	-0.1012 **	-0.1738 **
Field: social sciences	-0.0330 **	-0.0930 **	-0.0101	-0.0960 **
Field: other	-0.0145	0.0458	-0.0503	-0.0954 *
Cohort: year 2	0.0273	0.0033	0.0140	0.1403 **
Cohort: year 3	0.0546 +	0.0394	-0.0008	0.0849 **
Carnegie: research	0.3146 **	0.1639 **	0.2108 **	0.1884 **
Carnegie: doctoral	0.2375 **	0.1285 **	0.0763 *	0.0891 +
Carnegie: comprehensive	0.2129 **	0.0221	0.0394	0.0252
Public	-0.0282	-0.0557 *	-0.0329	-0.0930 **
Intra-class correlation	0.33	0.21	0.42	0.29
Var. explained: level 1	0.45	0.14	0.45	0.24
Var. explained: level 2	0.59	0.46	0.46	0.36
N	288	732	556	892

+ $p < .10$. * $p < .05$. ** $p < .01$.

Table 4

Salary Models, Full Faculty Sample

	1988	1993	1999	2004
Intercept	10.5116 **	10.7209 **	10.9513 **	11.0945 **
Female	-0.0574 **	-0.0605 **	-0.0385 **	-0.0520 **
Asian	-0.0263	-0.0522 *	0.0017	-0.0088
Black/Latino	-0.0109	0.0169	0.0026	-0.0045
Non-U.S. citizen	-0.0171	0.0260 +	-0.0030	-0.0038
Degree: Ph.D.	0.0205 *	0.0330 **	0.0413 **	0.0170
Degree: Professional	0.0911 **	0.1255 **	0.2573 **	0.2378 **
Rank: full	0.3371 **	0.3381 **	0.3565 **	0.3137 **
Rank: associate	0.1406 **	0.1499 **	0.1337 **	0.1113 **
Articles	0.0011 **	0.0013 **	0.0012 **	0.0016 **
Books	0.0003 *	-0.0001	0.0011 **	0.0008 +
Years since B.A.	0.0028 **	0.0037 **	0.0032 **	0.0026 **
Experience: higher ed	-0.0073	0.0279 **	0.0214 **	-0.0033
Experience: other	-0.0184 +	0.0260 *	0.0022	-0.0210 *
Field: agriculture	0.0622 **	0.0613 **	0.0245	-0.0096
Field: business	0.1287 **	0.1638 **	0.2181 **	0.2194 **
Field: education	-0.0451 **	-0.0218	-0.0431 **	-0.0496 **
Field: engineering	0.1212 **	0.1382 **	0.1034 **	0.0740 **
Field: fine arts	-0.1104 **	-0.0980 **	-0.1154 **	-0.1378 **
Field: humanities	-0.0828 **	-0.0771 **	-0.0870 **	-0.0913 **
Field: social sciences	-0.0303 **	-0.0119	-0.0070	-0.0175 +
Field: other	-0.0022	0.0272 +	-0.0007	-0.0241 +
Carnegie: research	0.2917 **	0.2494 **	0.2642 **	0.2415 **
Carnegie: doctoral	0.2202 **	0.2221 **	0.1363 **	0.1234 **
Carnegie: comprehensive	0.1280 **	0.0879 **	0.0694 **	0.0588 **
Public	0.0454 *	-0.0461 **	-0.0310 *	-0.0445 **
Intra-class correlation	0.40	0.25	0.31	0.23
Var. explained: level 1	0.50	0.36	0.54	0.38
Var. explained: level 2	0.54	0.55	0.62	0.65
N	3,617	6,436	3,962	7,585

+ $p < .10$. * $p < .05$. ** $p < .01$.

Table 5

Unexplained Wage Gaps by Institution Type and Discipline, 2004

	<u>Recently-hired sample</u>		<u>Full faculty sample</u>	
	Coefficient	N	Coefficient	N
<i>Female-male wage gap</i>				
Research	-0.089 *	310	-0.050 **	2,885
Doctoral	0.005	125	-0.048 *	1,087
Comprehensive	-0.010	291	-0.053 **	2,174
Liberal arts	0.000	166	-0.049 **	1,330
Natural sciences and engineering	-0.045	269	-0.055 **	2,349
Arts, humanities, and social sci.	-0.020	360	-0.048 **	2,909
All other fields	-0.039	263	-0.093 **	2,218
<i>Black/Latino-White wage gap</i>				
Research	0.041	310	0.011	2,885
Doctoral	0.198	125	-0.060	1,087
Comprehensive	0.135 **	291	0.014	2,174
Liberal arts	0.073	166	-0.063 *	1,330
Natural sciences and engineering	0.213 +	269	0.002	2,349
Arts, humanities, and social sci.	0.061	360	-0.004	2,909
All other fields	0.116 +	263	-0.020	2,218

Note. Coefficients taken from models similar to those in Tables 3 and 4, except that institutional type dummy variables are not included for the institution subgroup analyses, and academic field dummy variables are not included for the academic field subgroup analyses.

+ $p < .10$. * $p < .05$. ** $p < .01$.