This chapter examines glass ceiling effects through the metric of salary equity.

Using Salary as a Measure of Glass Ceiling Effects: Lessons for Institutional Researchers

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Glass ceiling effects have been at the center of controversy within academia for years. No topic is more sensitive or anxiety-inducing than salary-equity issues, namely how salaries are fairly calculated according to faculty members’ comparative worth for their work and productivity experiences. Salaries are among the most manipulated and measured variables (Hearn, 1999), with little consistency within and among disciplines, institutional types, colleges, and departments. As such, Cotter, Hermsen, Ovadia, and Vanneman (2001, pp. 657–661) provide four equity glass ceiling criteria that warrant investigation. This chapter filters these criteria through the discourse of current issues in higher education as they relate to glass ceiling effects on salary levels. The four criteria concern: (a) differences not explained by other job-relevant characteristics of the employee (e.g., experience, performance, and productivity); (b) greater differences at higher levels of an outcome than at lower levels (e.g., academic rank and tenure status); (c) inequalities in the prospects for advancement into higher levels, not merely the proportions of each gender or race currently at those higher levels (e.g., promotion and salary increases); and (d) inequalities that increase over the course of a career (e.g., cumulative impact of entry salaries, position, and compression).

Given these four criteria, this chapter will first highlight methodological considerations, including data use and research techniques that best facilitate an understanding of faculty members’ salaries. Second, it will provide key institutional decision makers with useful profile characteristics and guidelines to contextualize the need for and the proposed use of salary-equity policies.
Salary-Equity Studies: Methodological Considerations

In the past four decades, numerous studies have focused on examining and explaining salary differentials. Since the mid-1970s, with the increased availability of multi-institution and national salary data, researchers have begun to employ sophisticated methodological approaches to provide accurate estimates of salary gaps (Barbezat, 2002). Consequently, the use and application of advanced statistical procedures allowed researchers to ask more complicated questions regarding salary equity. Over the past four decades, institutional researchers have devoted considerable attention to three primary methodological issues when designing salary-equity studies: who to study, what variables to include in the model, and what data analysis techniques to use (Barbezat, 2002; Ferber & Loeb, 2002; Luna, 2006; Toutkoushian & Hoffman, 2002). The section that follows will address these three considerations and provide an overview of findings from relevant faculty salary-equity studies.

Sample Selection in Salary-Equity Studies. The first important factor that researchers have considered is who should be included in salary-equity studies. The most frequent disagreements on the subject often concern the inclusion of part-time, temporary, and/or non-tenure-track faculty in samples (Luna, 2006). Some researchers believe that these individuals should be included in analyses on the premise that women are disproportionately overrepresented in nontraditional faculty appointments. As such, they argue that it is just as important to estimate and correct pay disparities for part-time, temporary, and non-tenure-track faculty members as for traditional, tenure-track faculty (Hamermesh, 1996). On the other hand, others contend that these groups are distinctive, and the inclusion of part-time, temporary, and/or non-tenure-track faculty in the study will lead to biased results (Snyder, Hyer, & McLaughlin, 1994). Luna (2006) concludes that courts tend to agree with the latter argument, namely that those with nonregular appointments ought to be regarded as separate from full-time faculty.

Variable Selection in Salary-Equity Studies. In addition to the question of who should be included in the studies, researchers also disagree on what variables should be accounted for in their analyses. Variable selection is crucial in salary-equity studies. In order to correctly estimate how much of the unexplained pay disparity exists between groups of faculty, differences in background and qualifications need to be accounted for (Toutkoushian & Hoffman, 2002). Thus, determining whether and to what extent gender discrimination exists in salary depends on the predictors that are included in a given analysis (Becker & Toutkoushian, 2003; Boudreau et al., 1997; Luna, 2007). After reviewing 24 faculty salary-equity studies, Becker and Toutkoushian (2003) identified the following variables as commonly used predictors in salary models: seniority, years in current rank, education, research productivity, administrative experience, and field.
Ferber and Loeb (2002) discuss the challenges in identifying potential explanatory variables that should be included in institutional salary-equity studies, such as experience, training, discipline, merit, productivity, and rank. Using data from full-time faculty ranks of assistant to full professor at four-year institutions in the state of Illinois, they demonstrated how the omission or inclusion of key variables—productivity and academic rank in particular—could affect the selection of individuals for salary-equity review. Their investigations consequently suggest that the inclusion of rank and the omission of productivity might be appropriate for investigating unexplained pay differences for all faculty members at an institution. When identifying a particular subset of faculty for salary adjustment review though, information about both productivity and rank must be considered together.

The overview of salary-equity studies suggests that the inclusion of academic rank as a variable in such analyses has been the most contested issue in these debates. Some researchers have favored omitting the rank variable from analyses on two assumptions. The first considers that the process of awarding rank may be influenced by institutional biases, and the second proposes that the inclusion of this gender-correlated variable could diminish existing salary differences according to gender (Moore, 1993). Alternatively, some researchers support the inclusion of rank in salary gender-equity studies (Becker & Toutkoushian, 2003; Boudreau et al., 1997). For example, Boudreau and colleagues (1997) present two illustrations to demonstrate that the omission of faculty rank as a predictor can lead to inaccurate conclusions. Becker and Toutkoushian’s (2003) study also argues that exclusion of the rank variable results in biased gender coefficients because “the effects of the omitted rank variable are captured in the error term, which is then correlated with the included gender variable” (p. 6).

Yet another contested issue is the omission of market discipline—typical factors in faculty salary studies (Herzog, 2008; Luna, 2007). Salary studies (Bellas, 1997; Herzog, 2008; Luna, 2007; Umbach, 2007) have included various types of measures to capture market differences in faculty pay, such as categorical variables for disciplines, geographical location, and market ratio, which is defined as “the ratio of the discipline salary average to the aggregate salary average of all disciplines” (Luna, 2007, p. 2). Using data from 20 southeastern state system, four-year institutions, Luna’s (2007) study concluded that the field in which faculty members are employed serves as a significant predictor of salary variability. Despite evidence suggesting that more females are choosing higher market disciplines than in the past, Luna (2007) reports that female faculty members are still disproportionately earning their degrees in disciplines with low market value, consequently earning lower salaries.

Another study, Umbach (2007), also explores to what extent labor market conditions of academic disciplines explain the gender-wage gap.
Based on the data from the 1999 National Study of Postsecondary Faculty (NSOPF-99) and the Survey of Earned Doctorates (SED), Umbach (2007) employed hierarchical linear modeling (HLM) to examine the effects of disciplinary and individual characteristics on academic salaries. The study found that, when controlling for human capital factors including experience, education, seniority, research productivity, and teaching, females earned about 8% less than males. When disciplinary labor market conditions and an individual discipline’s structural characteristics were accounted for, however, the gap reduced to 6.8%, which equates to a $5,400 difference in annual salary. Additionally, faculty in female-dominated disciplines earned less than their counterparts in male-dominated disciplines.

Issues associated with variable omission and selection biases, especially with regard to career progression measures, present challenges to institutional research analysts in salary compensation studies as well. Specifically, these issues make it difficult for analysts to identify faculty who are genuinely underpaid. As a result, Herzog (2008) proposed a comprehensive four-step process to identify and control for some of these biases, for the sake of arriving at a more parsimonious salary adjustment model. Herzog’s (2008) proposed faculty compensation model consists of the following four steps: (a) canonical correlation to detect biases related to personal attributes, such as gender, race/ethnicity, age, marital status, etc.; (b) binary logistic regression to detect biases in tenure award processes; (c) multinomial logistic regression to discover biases in rank promotion; and (d) multiple linear regression to identify inequities in faculty salary (p. 52). According to Herzog (2008), the first three steps are necessary to determine what personal and professional faculty characteristics are related to pay inequities. After identifying what variables should be included or excluded from the analysis, researchers can proceed with the final step in the compensation model to determine cases of salary adjustment as well as the amount of said adjustment (Herzog, 2008).

**Choice of Data Analysis Techniques in Salary-Equity Studies.**

The third and final methodological issue to consider in salary-equity studies is the choice of an appropriate data analysis technique. Earlier studies have tended to examine mean differences in male and female faculty salaries, mostly within a single discipline or rank, failing to take into account other factors that might have affected faculty salaries. But Loeb’s (2003) review of salary-equity methodological approaches indicates that the studies range from simple estimations of salary means to complex statistical analyses.

One concern that Loeb (2003) raises in regard to using Ordinary Least Squares (OLS) in salary-equity studies, however, is that it treats all observations as independent from each other, ignoring the data’s nested nature. Typically, faculty members in salary studies do not act independently of one another, but are clustered within their departments, disciplines, or
institutions. If this clustering of observations is ignored, it might lead to inaccurate estimates (Loeb, 2003; Perna, 2003; Umbach, 2007). In turn, Loeb recommends the use of HLM to compensate for this shortcoming, and, up until now, few studies have applied the technique to salary data. Umbach’s (2007) study, as previously mentioned, is in fact one of the first studies to employ HLM to examine the effects of a broad range of individual and disciplinary characteristics on faculty salary. Additionally, Loeb argues that HLM presents clear advantages, the most obvious of which is that it accounts for the clustering of observations within disciplines or institutions, providing unbiased significance tests (Loeb, 2003; Umbach, 2007). In addition, HLM accurately determines what disciplinary or institutional characteristics are responsible for gender-based earning inequalities (Haberfeld, Semyonov, & Addi, 1998).

While no salary-equity studies method can be labeled as indisputably superior, researchers have proposed a range of alternatives for analyzing these data (Bereman & Scott, 1991; Hagedorn, 1996; Herzog, 2008; Loeb, 2003; Toutkoushian & Hoffman, 2002). For example, Bereman and Scott suggest using the compa-ratio, a technique widely used in the corporate sector to detect gender biases in faculty salaries. Calculated by dividing the actual faculty pay by the midpoint salary, or the average salary by rank and discipline for a specific faculty group (Bereman & Scott, 1991), the compa-ratio is an efficient way to determine whether an individual is paid above or below the midpoint. By analyzing salary data from a Midwestern university using both OLS and compa-ratio techniques, Bereman and Scott illustrated that the compa-ratio could effectively identify individual cases for salary review and adjustment. They concluded that, because of its simplicity and ease of utility, compa-ratio can provide useful information about institutions’ salary level in relation to national or regional academic labor markets.

Individual growth modeling (IGM) is another effective technique that can be applied to studying changes in faculty salary over time. Bellas, Ritchey, and Parmer (2001) used this method to observe gender differences in salary and salary growth rates between 1985 and 1995 using a sample of 306 faculty members at a large public research university. Three important findings emerged from their study that could inform policy discussions on salary equity. First, after controlling for a range of factors, the study found a gap of about $2,000 between female and male faculty members in the base year of 1985. Second, the results suggested that, over the ten-year period, women showed higher rates of salary increases than men. Finally, the study indicated that faculty members with higher salary growth were more likely to leave their institutions. Equally as important, the study demonstrated that IGM could be used effectively in conjunction with longitudinal data to capture “the dynamic nature of gender differences in faculty salaries and the mechanisms that contribute to these differences” (Bellas et al., 2001, p. 179).
A number of factors affect the choice of methodology for salary data analysis, including how a given institution discriminates. Toutkoushian and Hoffman (2002) provide three different scenarios of salary discrimination, each of which requires the use of a different technique—that is, single-, two-, or three-equation methods. The single-equation method, the most commonly used in institutional salary-equity studies, assumes that an institution discriminates by overpaying all members of a specific employee group, for example, all male faculty members. Toutkoushian and Hoffman (2002) criticize this method as limiting because “it restricts each of the independent variables to having the same impact on salary for workers in either group” (p. 74). In contrast, a two-equation model allows the independent variable to have differential impacts on salaries of employees in two different groups. Alternatively, when an institution discriminates by simultaneously overpaying its employees in one group and underpaying individuals in another group, Toutkoushian and Hoffman (2002) suggest using a three-equation method to measure the unexplained wage differentials. Despite the complexities associated with computing multiple-equation models and assumptions pertaining to certain institutional practices of discrimination, the authors recommend these models as best practices for measuring unexplained wage gaps in institutional salary-equity studies.

Review of Relevant Research Findings

So far, this chapter has identified several methodological issues researchers encounter when designing salary-equity studies. This review demonstrates that, over the past four decades, progress has been made in advancing methodological approaches to more accurately estimate existing wage gaps. A larger question remains, however. How much progress has been made in actually reducing wage gaps and eliminating salary discrimination in higher education institutions? Using data from NSOPF:99, Toutkoushian and Conley (2005) provide empirical support for the contention that progress has been made, concluding that there has been a decrease in pay disparities between male and female faculty members, especially at doctoral-level and liberal arts institutions. But the study also reveals that, on average, even after accounting for a broad range of human capital and structural characteristics, such as experience, education, field, rank, and institutional type, a 4%–6% gender gap in faculty salaries persists.

The fact that the wage gap is smaller among younger cohorts of female and male faculty can also be interpreted as a sign of progress. Using the data from two NSOPF surveys, 1988 and 1993, Toutkoushian (1998) found that the unexplained wage gap among faculty of younger age groups in 1992 was smaller than that of the older faculty age groups. Similar conclusions can be drawn from Perna’s (2001a) study that examined sex differences in salary among six cohorts of faculty using the data from NSOPF:93. The
study found that, after controlling for human capital investment, productivity, and structural characteristics, there were no differences in male–female faculty salaries for new assistant professors, associate professors with 7–12 years of experience, and full professors with 13–24 years of experience. On the other hand, women faculty earned 8% less at the rank of assistant professor with 3–6 years of experience, 9% less at the associate professor rank with 13–24 years of experience, and 6% less as full professors with more than 20 years of experience in comparison to their male counterparts in the same cohorts. According to Perna (2001a) then, “the absence of unexplained sex differences in salaries among the ‘younger’ faculty at each academic rank is a sign of progress” (p. 301).

These studies should be read as definite signs of progress, but much work remains to eliminate pay disparities. Gaps persist not only in base salaries but also in supplemental incomes, which further disproportionately benefit male faculty who show bigger gains in overall earnings (Perna, 2002). Furthermore, even when no evidence exists of inequitable treatment at the time of hire, significant gender-based pay disparities emerge over time (Porter, Toutkoushian, & Moore, 2008). Moreover, Toutkoushian and Conley (2005) argue that salary studies using national data only explain half of salary variation, even after controlling for a wide range of personal, disciplinary, and institutional characteristics.

Salary-Equity Policies: Profiles and Guidelines

Tensions relating to salary often play out in three general ways: parity, equity, and longevity (Rosser, 2009). Parity involves salary equivalences across groups, while equity refers to principles of fairness and justice in the context of correcting or supplementing disparities. Longevity, on the other hand, encompasses the cumulative impact of individuals’ time and experience within an organization or throughout their career. Studies focused on longevity examine those areas that create the most tension regarding salary equity. The individual profile characteristics, more commonly referred to as demographic variables, that most often affect salary equity include: sex, age, disability, race, religion, national origin, marital status, and sexual orientation.

While common sense dictates that full professors should be paid more than associates and associates more than assistants, intrarank salary variation is another matter. There is considerable debate whenever rank is used as a control variable because women and ethnic minorities tend to be overrepresented in junior positions. As such, the policy issues and institutional concerns that comprise the relationship between women and lower salary levels warrant greater empirical understanding. The gender salary gap may be reduced in some cases over time when women attain full professor status (Toutkoushian & Conley, 2005), although women tend to be more
represented at junior ranks, so their numbers are sparse at the higher level (Perna, 2001a, 2001b).

Another area of concern is the interplay between individuals’ work status, whether part-time or full-time, and their tenure status, namely tenure-track, non-tenure-track, tenured, or untenured. Research continues to show that the majority of women and ethnic minority faculty members are overrepresented in early-career ranks and are nontenured. Similarly, type of institution—for example, research university, liberal arts college, or community college—might also produce a direct or indirect impact on salary levels (American Association of University Professors, 2008; Fairweather, 1993; Perna, 2003). In terms of direct impact, pay levels are clearly different among institutional types, but indirect glass ceiling disparities often occur with respect to gender in the same institutional type.

Numerous scholars have identified a wide range of issues requiring further empirical work, specifically around the career prospects for ethnic minority women (Ards, Brintnall, & Woodard, 1997; Johnsrud & Sadao, 1998; Lee, 2002; Perna, 2001b, 2003; Porter et al., 2008), as well as pipeline problems, market forces, and chilly climates (Turner, Myers, & Creswell, 1999). While some studies find little connection or effect between Caucasian and ethnic minority women (Cotter et al., 2001), previous empirical work has shown that women and ethnic minorities have been, and continue to be, underpaid over time, particularly among individuals securing their first academic position (Clery & Christopher, 2008). The impact of lower-than-average entry-level salaries may be extremely detrimental to women and ethnic minorities over the course of their careers.

Just as parity and equity are important to the quality of faculty work life, issues surrounding institutional longevity are critical as well. Longevity, rarely discussed within salary-equity policies, encompasses salary compression issues for those senior faculty members who have chosen to stay at one institution. Colleagues often refer to this commitment as a “loyalty tax” in which faculty members are penalized for their loyalty to stay at their current institutions rather than securing base salary increases elsewhere.

As noted throughout the relevant empirical literature, there remains a need for clear and consistent salary-equity policies. While numerous tensions continue to exist throughout academia regarding the fair and equitable nature of these policies, discussions must continue to progress for the sake of enhancing faculty members’ professional and institutional work lives. To guide these policy discussions, Hearn (1999) provides nine broad criteria upon which salary systems can be judged: (a) deemphasizing the external marketplace, (b) adopting the core-salary approach, (c) tying annual salary changes more directly to annual performance, (d) standardizing salaries in association with career ladders, (e) decoupling merit evaluation for salary increases and faculty development efforts, (f) pursuing internal consistency in the determination of salaries, (g) welcoming faculty participation in determination of merit-based increases, (h) facilitating public
scrutiny of salaries, and (i) evaluating teaching and public service as criteria for salary adjustment. These criteria provide a minimum overview of primary parameters for institutional researchers to examine, encompassing the full range of faculty members' profile and demographic characteristics used in equity analyses.

Faculty salaries, and, more specifically, equitable salary compensation, remain an important aspect of academia and the professional work life. Accordingly, the annual salaries for all faculty members should be consistently monitored, assessed, and evaluated within an established time frame mutually agreed upon by faculty and administration. While the advancement of methodological procedures is beginning to catch up with questions regarding salary and equity issues, future research is required to uncover what remains unknown about salary inequities in higher education in order to improve practices and policies involving salary-equity issues.

References


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