Wage disparity: A comparison of residual differences in predicted and actual faculty wages by gender at Iowa State University

by

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A dissertation submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Education (Higher Education)

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Ames, Iowa

2003

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For the Major Program

DEDICATION

This dissertation is dedicated

to the memory of my father:

Edwin E. Lee

to my mother:

Mary E. Lee

to my loving wife:

Vickie L. Lee

and to the memory of my close friend:

Kristen L .Friedman, R.N.

Each in his or her own way provided

me with the needed inspiration

and hope to reach this goal.

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ABSTRACT

This research project outlines the rigorous and detailed methods used in conducting a gender-related salary equity study. Specifically, this study looks into the question of whether salaries received by female faculty members are significantly different from the salaries received by Caucasian-male faculty members. In this study, data for five academic years are analyzed to judge whether salary levels for female and Caucasian-male faculty members within selected disciplines, departments, and/or colleges at a major land-grant academic institution are impartial across gender after controlling and/or accounting for variations in individual faculty characteristics.

After assembling the data, the author uses a five-step analytical model to ascertain whether gender-related wage disparities exist at the institution:

1. Select independent clusters of faculty members for comparison.
2. Generate autonomous salary regression equations for each faculty cluster chosen.
3. Compute the predicted wage for each faculty member in the independent clusters.
4. Compute the salary residuals (i.e., subtract the predicted annual wage from the adjusted wage) for faculty members of each cluster.
5. Compare the salary residuals of the Caucasian-male faculty members to the salary residuals of the female faculty members in each of the selected clusters.

For the five-year study, 95 faculty cluster comparisons were performed using the five-step process.

Initial results of comparing the salary residual means of female faculty members with Caucasian-male faculty members in the 95 independent comparison clusters exposed five significant ($\alpha \leq .05$) cases of gender-related wage disparity and ten noticeable ($.05 \leq \alpha \leq .15$) cases of gender-related wage disparity at the university.

Final computations, measuring for the magnitude of gender-bias in the wage compensation system, revealed that the wage dispensing practices at the university favored female faculty members in four of the five years studied. These apparent findings are tempered with the suggestion that sporadic factors could have caused the study results to be misleading or inaccurate. In closing, nine melded statements are presented to provide advice and direction to those working and doing research in the field of higher education.

CHAPTER 1

THE INTRODUCTION

Chapter Preface

Job, work, vocation, employment, occupation, practice, and profession are broad terms used to describe the occurrence of faculty performing various activities, services, or duties on college and university campuses. Similarly, salary, earnings, wages, pay, stipend, compensation, and reimbursement are fairly common terms used to describe the monetary rewards faculty members receive in exchange for the diversified services they provide at institutions of higher learning. Generally speaking, the topic of work inevitably leads to the subject of pay. Therefore, it should not be surprising to hear that faculty pay has been a subject receiving frequent attention and considerable discussion in a wide range of media venues. Also, it should be even less surprising to hear that over the past two decades the literature encompassing the field of higher education has been inundated with research and discussion emphasizing the subject of salary equity between male and female faculty members.

The Des Moines Register provides one example of such media coverage in a press release by Santiago (2000), in which she gave a report on how "Six female professors at Buena Vista University in Storm Lake [Iowa] are suing the school, claiming they are paid less . . . than their male counterparts" (p. 4b). Similarly, *The Chronicle of Higher Education* provides another example of the media talking about pay in a news article when Nicklin (2000) states: "A federal appeals court ruled on Friday that Kent State University had unfairly paid a retired female professor less than a male colleague with similar experience, duties, and performance" (p. 1). A more recent example showing wage differentials as a topic of discussion in media occurred when Bartlett (2001), reporting for *The Chronicle of Higher Education*, stated "Samford University agreed . . . to settle a law suit brought by three female professors who charge that they were paid less than their male counterparts at the

Birmingham, Ala. [*sic*] institution" (p. 1).

The comparison of wages of individual faculty members or groups of faculty members with the wages of other faculty members appears to be the ingrained theme within the literature on faculty earnings. Boudreau, Sullivan, Balzer, Ryan, Yonker, Thorsteinson, and Hutchinson (1997) add validation to this claim when they state, "gender equity in faculty salaries is a volatile and controversial issue on college and university campuses" (p. 297). Snyder, Hyer, and McLaughlin (1994) seem to share this same opinion when they state, "it is hard to miss media attention focused on gender equity issues for faculty" (p. 1). Hagedorn (1995) makes an even stronger and more focused statement by saying "the literature is replete with evidence that male and female faculty members have historically been compensated differently" (p. x).

The overall objective of this dissertation is to investigate and provide information about the subject of salary equity between female and male academic members. The next part of this chapter provides brief background information on legislation that has played a pivotal part in making the commentary and concerns regarding faculty salary parity/disparity a primary issue on campuses for many years now. The third part of this chapter will delineate and define the academic problem to be addressed in this dissertation. The fourth section of this chapter will describe the exact nature and purpose of this research endeavor. The fifth section in this chapter contains the substantive research questions and hypotheses to be tested in this study. Additionally, the following section outlines the limitations and delimitations of this research work. The final section of this chapter is a discussion on the importance of this research study.

Background Information

As pointed out by Lusk, Hewitt, Donnell, and Barnes (1970), in the United States the Constitution is the basic law of the land. The provisions of the United States Constitution define the powers and organizational plan of the federal government. Legislative acts passed by Congress, deemed as legal and not in violation of the Constitution, are the foundation of law throughout the United States.

Over time Congress has passed many acts defining and instituting law. One act of immense importance was the Equal Pay Act of 1963. This act, as stated by Heneman, Schwab, Fossum, and Dyer (1980), "requires that employers pay men and women equally for work that requires equal skill, effort, and responsibility and which is performed under similar working conditions" (pp. 397-398). Another act of similar significance was the Civil Rights Act of 1964. As noted by Burtt (1979), Title VII of the Civil Rights Act of 1964 was amended through the Equal Employment Opportunity (EEO) Act of 1972. The enactment of Title VII and its subsequent amendments essentially prohibits discrimination in the work place on the basis of race, sex, color, religion, and national origin. Osborne (1990) points to the fact that the amendments in the EEO Act of 1972 removed clauses in the Equal Pay Act of 1963 and the Civil Rights Acts of 1964 which excluded educational institutions and the academic profession.

Another parcel of law with considerable meaning and important ramifications is *Title IX, Educational Amendments of 1972*. As presented by the United States Department of Labor (2000), Title IX states "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance" (p. 1). As stated by Stacy (1983), "the ban on sex discrimination written into Title IX of the Education Amendments Act of 1972 does cover salary disparities" (p. 348). According to Stacy and Holland (1984), the Supreme Court has ruled that Title IX covers faculty members as well as students. Accordingly, Title IX has been construed by the courts to be applicable in wage disputes of faculty members and students within institutions of learning that are supported by specific government funds.

As put forth by the United States Comptroller General (1985), "together, these . . .

laws have been the basis for numerous attempts to address wage discrimination against women" (p. 1). Hagedorn (1995) supports this statement by saying, "despite the fact that equal pay for equal work has become the law, many litigants have charged that female compensation is frequently deficient when compared to male compensation" (p. 5). As noted by Stacy and Holland (1984), in the years immediately following these landmark legislative acts most of the complaints brought in the field of education were from housekeepers and other non-academic employees. Eventually, complaints and grievances began to be voiced and/or filed by faculty members at many college and university campuses. Evidence that faculty salary equity was becoming a momentous problem in the field of education emerged when a study compiled by LaNoue (1981), established that an estimated 6,000 charges were pending with the Equal Employment Opportunity Commission (EEOC) against institutions of higher learning. Safely speaking, the aforementioned legislation and these events have been visualized and interpreted by many in the halls of education as being of great importance. Simultaneously, it is also safe to say that the effects of these events have been far-reaching, so much so that many educational institutions have been forced to examine and correct wage polices and procedures which are discriminatory with regard to gender. An instance of this transpiring at the University of Arizona is depicted in the following excerpt of a report from Association for Faculty Women (1998):

> The issue of pay equity became a unifying issue for the Association for Faculty Women in the early 1980's. Indeed, one of the first actions taken by the AWF was to implement a salary study in 1982. The study revealed that, with academic rank and years of employment held constant, the average salary for men was $36,600 and for women $32,300. . . . This study was a monumental achievement for this organization as it forced administrative recognition of salary inequities, prompting the administration of the University of Arizona to begin a salary adjustment process. It also eventually prompted the Arizona Board of Regents (with a continuing pressure

from the AWF members) to create a *Commission on the Status of Women.* Additionally, it raised awareness among women campus-wide that these inequities existed, and they existed blatantly (p. 1).

The Academic Problem

As noted by Beer, Spector, Lawrence, Mills, and Walton (1984), "changing demographics, particularly the entry of women and minorities into the work force, has raised many questions about fair employment practices" (p. VIII). As put forth by Locke, Fitzpatrick, and White (1983), "In the realm of pay, people want equity or fairness" (p. 345). Bereman and Scott (1991) tender testimony of this being the case in education when they state, "sex equity has been one of the most troublesome issues in academic salary administration" (p. 556). Why salary equity issues effectuate difficulties within the realms of academe cannot be explained briefly nor effortlessly. Moore (1993b) tenders one explanation for the troubles when she says, "faculty salary equity is a hot political issue that may have severe legal, financial, and human consequences" (p. 107).

"Appropriateness" appears to be an underlying thread in the tapestry of issues faced by those wanting to do research on the equatability of faculty wages. Is it appropriate to compare the mean salaries of female faculty members with the mean salaries of male faculty members? Is it appropriate to compare faculty wages of females to males across various educational institutions? Is it appropriate to compare the salaries of all male faculty members to female faculty members when there is chance that the inclusion of salaries from male minority members might skew the comparisons? Is it appropriate to compare the wages of female faculty members with that of male faculty members when they work within different departments or disciplines at a given institution? Is it appropriate to compare the wages of a given female with the wages of a male faculty member when their individual attributes are not the same (e.g., seniority difference, educational background difference, etc.)? When comparing faculty salaries, is the use of one analytical model more appropriate than another?

Is it appropriate to use statistical inference when analyzing the differences in wages between female and male faculty members? This list is not exhaustive nor exclusive in nature; questions delving into the appropriateness of wage levels for female versus male faculty members could be increased ad infinitum.

Moore (1993a) provides substantive reinforcement to this postulation on appropriateness when she says, "in conducting a salary equity analysis, an analyst . . . must decide on the *appropriate* [italics added] statistical methods to use" (p. 2). According to Moore (1993b), research publications to guide researchers on model selection for faculty salary equity studies are not numerous. She believes that this phenomenon is "due in part to the sensitive nature of the subject [i.e., administrators at institutions of higher education are wary about divulging improprieties in their pay practices]" (Moore, 1993b, p. 121). In a statement concerning methods for examining salary equity among faculty members, Stapleton (1999) says, "no single method of undertaking such studies has been embraced by the research community" (p. 1). This same opinion was also expressed by Allard (1984) when she stated, "there is no single correct method for performing a faculty salary analysis" (p. 3).

As stated by Sokol (1992), "historically, higher education has been a white male [*sic*] dominated field, with small concentrations of women in only a few disciplines" (p. 3). Having found no data to the contrary, it is the author's firm belief that, on average, Caucasian-males have received higher wages than their counterparts (any group considered being a minority) in most occupations. The National Committee on Pay Equity (1990) offers some credence to this declaration when they state, "since 1955, the female-male (average) annual earnings ratio of full-time, year-round workers has hovered at 60 percent" (p. 2). Regarding pay at institutions of higher education, Milem and Dey (1993) reported that traditionally the average salary for female faculty members is less than that of male faculty members. Yet, these statements actually tell very little about the true condition of wage disparity in the United States. For the most part, average wages alone do not provide a credible measure for checking on wage disparity between female and male employees, even within a given occupation. In the November 13, 2000, issue of *The Chronicle of Higher Education*, Cox (2000) reported the following information, which delineates the problems of comparing average pay increases without accounting for variations in the group analyzed:

> The California State University System released a report Friday that rejects an assertion by its faculty union that the system's merit-pay program is biased against women. Although the system's report does not challenge the union's contention that men on average received larger raises than women, it shows that within each faculty rank, men and women are treated similarly. The California Faculty Association and the National Education Association found in a study in July that California State's merit-pay system had resulted in an average raise for women in 1999 that was 8 percent lower than the average raise for men.
>
> The system's own study, which was conducted by Resolution Economics, a labor-economics consulting group, examined individual data for 1999 and 2000 from all 23 California State campuses and broke down the distribution of raises by faculty rank, from full professor to lecturer. It found that average merit-pay raises for women were higher in every rank except for that of lecturer. . . . The system's study also found that women on average received larger percentage increases, except, again, at the lecturer level, where women received smaller increases than men (p. 1).

Variations in group characteristics (e.g., number of years employed, education/training level of employee, and accomplishments of an employee) often have a notable effect on the integrity of comparing the average salaries within various occupational groups. Therefore, in the opinion of this author, it is not appropriate to conduct studies of faculty wages without examining individual variants that affect the wages of the groups studied.

Bentil (1999) noted that in the early years of analyzing faculty equity, analysts used an approach called matching or counter-pairing. In this method "a female faculty's salary was compared to the closest matched male" (p. 22). This method, as defined by Braskamp (1978), "involves the one-to-one comparison of a member of the minority group with a member of the majority group (usually Caucasian males)"(p. 1). As Bentil (1999) indicates, this approach was debatable in nature and almost impossible to perform due to the difficulty of finding a pair of faculty members that were indeed matched. Notwithstanding, numerous researchers adept in the subject of faculty salary equity (Allard, 1984; Balzer, Boudreau, Hutchinson, Ryan, Thorsteinson, Sullivan, Yonker, & Snavely, 1996; Haigenere, Eisenberg, & McCarthy, 1996; Moore, 1992; Scott, 1977; Simpson & Rosenthal, 1982) believe that at minimum the use of a multivariate statistical model is appropriate. Balzer et al. (1996) provided a rationale for the use of such a model by reminding analysts that this type of model safeguards against many of the erroneous conclusions made by novice researchers (e.g., a researcher claiming female faculty members are discriminated against because their wages on average are significantly less than male faculty members). Bentil (1999) suggested the strongest reasons for using multivariate statistical methods in analyzing salary equity for faculty when he made the comment, "the (United States) Supreme Court accepted Regression Analysis in a pay discrimination case" (p. 24).

Nature and Purpose of Study

The analytical study performed in this dissertation is analogous to a longitudinal trend study in that it is an examination of faculty salary data at Iowa State University (ISU) over several years. However, this study is somewhat different from most trend studies in that no analytical comparisons are made between the year-to-year data sets. In this study, data for each academic year are analyzed to determine if salary levels for female and Caucasian-male faculty members within selected disciplines, departments, and/or colleges at ISU are equitable after controlling and/or accounting for variations in individual faculty profiles.

The primary purpose of this study is to provide intelligible information on the disposition of gender equity with regard to faculty pay in hope that the conclusions of this study may extend the knowledge base of those interested in the fields of salary administration and higher education. Additionally, this study should provide information regarding whether the pay practices of ISU (a large land-grant academic institution) are discriminatory in nature or not.

Research Question and Hypotheses

As with many research projects of this nature, there is one basic question propelling the research. This research project looks into the question of whether salaries received by female faculty members at the university are or are not significantly different than the salaries received by Caucasian-male faculty members (the majority group at ISU). To be fair in addressing this question, a regression model for comparing salaries is used to control for variations in faculty attributes and experience. The regression model is used to produce salary residuals for each faculty member studied. These salary residuals are calculated by subtracting the predicted salary from the actual salary for each faculty member. In the final phase of this regression model, comparisons of the wage residuals for various groups of faculty are examined to see if average-residual-differences are or are not statistically significant.

The global null hypothesis being tested in this research study is: There is no significant difference in the mean salary residuals of female faculty members at ISU and the mean salary residuals of Caucasian-male faculty members at ISU. In all, 19 independent null hypotheses will be tested for each of the five academic years studied (i.e., a total of 95 hypotheses will be tested). These analytical tests will range from comparing the mean salary residuals of female faculty members to those of Caucasian-male faculty members on a university-wide basis to comparisons made within various colleges, departments, and/or combinations of colleges and departments at ISU. Presented below are the 19 null hypotheses to be tested for each of the five years of study:

Hypothesis 1. There is no significant difference in the mean regression residuals of female faculty members at ISU and the mean regression residuals of Caucasian-male faculty members at ISU.

Hypothesis 2. There is no significant difference in the mean regression residuals of female faculty members holding rank in the College of Agriculture at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the College of Agriculture at ISU.

Hypothesis 3. There is no significant difference in the mean regression residuals of female faculty members holding rank in the College of Design at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the College of Design at ISU.

Hypothesis 4. There is no significant difference in the mean regression residuals of female faculty members holding rank in the College of Education at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the College of Education at ISU.

Hypothesis 5. There is no significant difference in the mean regression residuals of female faculty members holding rank in the College of Engineering at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the College of Engineering at ISU.

Hypothesis 6. There is no significant difference in the mean regression residuals of female faculty members holding rank in the College of Family and Consumer Sciences at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the College of Family and Consumer Sciences at ISU.

Hypothesis 7. There is no significant difference in the mean regression residuals of female faculty members holding rank in the College of Family and

Consumer Sciences combined with the College of Education at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the College of Family and Consumer Sciences combined with the College of Education at ISU.

Hypothesis 8. There is no significant difference in the mean regression residuals of female faculty members holding rank in the College of Library Services at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the College of Library Services at ISU.

Hypothesis 9. There is no significant difference in the mean regression residuals of female faculty members holding rank in the College of Library Services combined with the College of Education at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the College of Library Services combined with the College of Education at ISU.

Hypothesis 10. There is no significant difference in the mean regression residuals of female faculty members holding rank in the College of Business at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the College of Business at ISU.

Hypothesis 11. There is no significant difference in the mean regression residuals of female faculty members holding rank in the College of Liberal Arts and Sciences at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the College of Liberal Arts and Sciences at ISU.

Hypothesis 12. There is no significant difference in the mean regression residuals of female faculty members holding rank in the Bioscience Departments within the College of Liberal Arts and Sciences at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the Bioscience Departments within the College of Liberal Arts and Sciences at ISU.

Hypothesis 13. There is no significant difference in the mean regression residuals of female faculty members holding rank in the Humanities Departments within the College of Liberal Arts and Sciences at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the Humanities Departments within the College of Liberal Arts and Sciences at ISU.

Hypothesis 14. There is no significant difference in the mean regression residuals of female faculty members holding rank in the Mathematics Departments within the College of Liberal Arts and Sciences at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the Mathematics Departments within the College of Liberal Arts and Sciences at ISU.

Hypothesis 15. There is no significant difference in the mean regression residuals of female faculty members holding rank in the Physical Sciences Departments within the College of Liberal Arts and Sciences at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the Physical Sciences Departments within the College of Liberal Arts and Sciences at ISU.

Hypothesis 16. There is no significant difference in the mean regression residuals of female faculty members holding rank in the Social Science Departments within the College of Liberal Arts and Sciences at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the Social Science Departments within the College of Liberal Arts and Sciences at ISU.

Hypothesis 17. There is no significant difference in the mean regression residuals of female faculty members holding rank in the "Soft" Sciences Departments within the College of Liberal Arts and Sciences at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the "Soft" Sciences Departments within the College of Liberal Arts and Sciences at ISU.

Hypothesis 18. There is no significant difference in the mean regression residuals of female faculty members holding rank in the "Hard" Sciences Departments within the College of Liberal Arts and Sciences at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the "Hard" Sciences Departments within the College of Liberal Arts and Sciences at ISU.

Hypothesis 19. There is no significant difference in the mean regression residuals of female faculty members holding rank in the College of Veterinary Medicine at ISU and the mean regression residuals of Caucasian-male faculty members holding rank in the College of Veterinary Medicine at ISU.

Limitations and Delimitations of Research

As with any research project, there are a number of limitations to this study. Each limitation should be a point of consideration when evaluating or applying the findings of this research study. The control of the data for this study spawns various issues that may not arise in other research studies. Several reasonable concerns about the data used in this study are listed below:

1. The methods used by ISU to collect personal data from its faculty members is of

concern to this author (i.e., ISU allows for self-reporting of many variables entered into the data set without doing full-fledged checks on the accuracy of the self-reported information). The extent to which the accuracy of reported information is not correct correlates with the extent to which we could or maybe should be suspect of the results of the findings made.

2. Over the past fifty years, the methods for inputting data at ISU (e.g., hand entry, punch card entry, scanned entry, etc.) have changed considerably. Each method of data entry has entry error rates that vary, thus creating error rate inconsistencies that were not accounted for during this study.
3. Internal audits and verification of data entry accuracy emerge as a limitation to this study because the author found erroneous data in the two pilot studies (e.g., the reported dates that employment began for two faculty members were before the faculty members were born). When these errors were reported to university staff members, no action was taken to correct the errors noted. The results of this study are therefore limited by the willingness of university administrators and supportive staff to produce accurate data.
4. The level of missing data was an issue of concern for the author in doing this study. During the pilot studies performed in the early 1990's, the author noticed that certain employment characteristic variables had levels of missing data that seemed excessive (e.g., date of tenure for faculty member in various departments at ISU was not available for up to 40% of the faculty members). This study and its results are limited proportionally to the amount of complete data supplied via ISU data downloads and the author's individual efforts to obtain and extrapolate missing data for the study.

Since this study is performed at only one institution, there are some limitations on how far the results can be generalized to other educational institutions or to the higher educational arena as a whole. There is a chance that ISU, as an employer of faculty, has been more or less aware of the issues surrounding faculty salary equity than other institutions, thereby causing the results to be skewed one way or another when compared to other schools. In fact, the author would be hard pressed to advocate that the same results would be found at similar institutions (e.g., a land grant institution, a university located in an agricultural-based economy and environment, a university with a student enrollment at 25,000 plus, and so forth). The number of internal variables that come into play in the salary structure at any given college or university gives rise to the notion that this same study would need to be performed at numerous institutions before the results should be extrapolated to the whole of higher education.

Absence of productivity measures for teaching and/or research (e.g., number of papers published, ability to provide quality lectures, etc.) in this study poses another limitation to the applicability and integrity of these results. Some conditions and ramifications to this limitation are exemplified by Regan and Volkwein (1993) when they state:

> To the extent that men and women collectively differ in their academic productivity or any other salary determinant omitted from the analysis, then some of the variance attributed to the independent variables . . . may be a function of these factors. However, it seems reasonable to assume, in the aggregate, research and teaching productivity are distributed equally among comparable males and females. (p. 232)

With this statement in mind, the absence of productivity measures limits the applicability of the results found in this study only to the extent that faculty productivity in research and teaching are not distributed equally among the male and female ISU faculty groups compared in each test of this study.

The inclusion of rank as a predictor variable within this study creates another limitation of the accuracy and the applicability of the results of this study. The difficultly with including rank is explained by Billlard, Cooper, and Kaloupa (1993):

> Clearly, if in a particular case (department, college, unit, etc.) there is no bias in promotion, the inclusion of rank will not be inappropriate. If there is bias however, then its inclusion would . . . produce predicted salaries that are still biased downward. (p. 3)

Since the author did not have the resources nor means to verify the absence or presence of bias in promotional procedures at ISU, there is some reason for concern as to whether inclusion of rank in each predictor model is justified and correct. Boudreau et al. (1997), after doing landmark research on the inclusion and exclusion of rank in faculty salary models, state, "it is recommended that faculty rank be included as a predictor variable in any model used to study gender equity relating to salary" (p. 309). According to E. C. Stanley (personal communication, July 1990), at ISU faculty rank is tied directly to various performance measures and the amount of time a faculty member is employed in a given position. Stanley believed the use of faculty rank and its chance for downward bias were outweighed by the mere fact that rank was the best and possibly the only available data variable to use as a performance measure in the pilot studies of salary equity at the university. Given the set of circumstances and this information, it is this author's belief that since there is no knowledge base showing the university as a whole and/or any of its departments biased in their promotional practices, the inclusion of rank in this study is tolerable and useful. Additionally, the author believes that the exclusion of faculty rank would be harmful to this study in that it would be unrealistic to compare an assistant professor's wages to that of a fully tenured professor's wages, given that the university does not have any readily available data that measure productivity-related advancements. The facts that productivity is tied to advancement in rank at the university and that salary increases are directly tied to these advancements necessitate the use of rank in building the regression models used in this study.

Importance of Study

It is this author's view that this study is important for several reasons. The foremost reason is that this study will provide decisive information as to whether or not there are gender-related salary disparities at ISU generally and/or inside any of the chosen divisions of faculty within the university. The information obtained in this study can help university administrators determine if corrective actions need to be taken to remove any inequities found. If it is found that faculty salaries are equitable at ISU and/or any of the faculty divisions, this study may help university administrators to determine whether current efforts at monitoring for gender-related salary equity within a given faculty division or at the university as a whole should be preserved or abated.

This study is important because it endeavors to fill a void in the literature surrounding the discussion of issues related to faculty salary equity. As mentioned previously, very few academic institutions divulge the results of their internal studies regarding whether salary inequity exists among the faculty groups compared. This study will make public, via equivalent replication, the results compiled in two years of a three-year internal salary equity study performed at the university. In an effort to validate and add merit to the findings of this internal pilot study at ISU, an additional three years of university faculty data will be analyzed to see if corresponding results are found. The results of this study will be available via a multitude of library sources (e.g., dissertation abstracts). The author also plans to submit a few articles spun off from this research to various journals in the education field. Additionally, the results of this study will be supplied to several news organizations for general reporting purposes.

This study is also important because it provides educational institutions with a viable model for conducting faculty salary equity studies. Administrators and/or concerned individuals at institutions of higher learning will be able to use this study as a guide for conducting baseline studies and subsequent studies at their institutions to determine if any past salary or present salary disparities existed or exist. The model used in this study is also flexible, as it allows for comparisons between Caucasian-male and female faculty members. Also, the model would allow for comparisons between Caucasian-male faculty and faculty of other backgrounds such as people that are not Caucasian, people with disabilities, and/or many other combinations of comparison. Each institution will find that this model and spinoffs of its method for comparison are compatible with what has been used and can become the standard for analyzing wage data for disparity among various groups of faculty.

Given the fact that the knowledge base for the study of gender equity is relatively new and technically incomplete in appropriate methodology, it is apparent that all augmentations to the current knowledge base are important in their own right. Even though no single study can address all the questions about gender equity among faculty members or provide the perfect model for making decisions in the realm of higher education, the additional information provided by this study contributes a meaningful understanding to the interrelation between gender and wages at institutions of higher learning. Additionally, this study provides a foundation of knowledge on how a statistical regression model functions in the pursuit of measuring and reporting on the equity of wages among faculty members.

CHAPTER 2

REVIEW OF LITERATURE

Chapter Preface

As noted in chapter one, this study is a replication and continuation of a pilot study looking into gender-related salary equity issues among faculty members at a major land grant institution. The first section of this chapter will introduce and examine several human behavior (organizational behavior) theories in the field of management. This application of organizational behavioral (OB) theories should provide a partial foundation in understanding the development of, crusade for, and implications of salary equity studies in the domain of education, especially with regard to faculty members. The second section of this chapter will overview several models used in measuring salary equity among faculty members. Since this study is guided primarily by the research model developed during the 1989 pilot study at Iowa State University (ISU), the inspection of literature reflected on in the third section of this chapter, for the most part, will focus on the fundamental information that was used to develop this model for studying gender equity. In the fourth section of this chapter, a review of the results found using various approaches to analyze faculty salary equity in several selected studies will be summarized. In the last section of this chapter, various brief visages on how the design and information obtained from analyzing faculty salaries with regression models could be used or useful in fortifying faculty reward systems in higher education are discussed from an OB viewpoint.

Human Behavior and Management Theories

As stated by Shermerhorn, Hunt, and Osborn (1985), "motivation to work is a term used . . . to describe the forces within an individual that account for the level, direction, and persistence of effort expended at work" (p. 89). As discussed and advocated by Blumberg and Pringle (1982), performance in the work place is a result of the work effort expended by an individual, the organizational support provided to an individual in the work place, and any personal attributes of an individual affecting her or his capacity to do the work. Many scientists working with OB theories try to explain motivation and its linkages to performance in the work place. Since whole books and sections of libraries have been written to analyze the linkage between motivation and performance, it is this author's belief that even though most of the research in this domain is useful to those studying and working in the field of higher education, to investigate at length such a wide-ranging and complicated issue would be beyond the scope of this study. Accordingly, the discussion of OB in this chapter will be focused on providing brief outlines of distinct motivational theories, followed by condensed interpretive examples of their application to those working in and studying the field of higher education.

Reinforcement Theory

As quoted by Hamner (1983), "one of the major premises of reinforcement theory is that all behavior is learned" (p. 118). Early on, in the developmental phase of reinforcement theory, Thorndike (1911) came up with an axiom that became the foundation for most of the postulates of reinforcement theory. Thorndike's Law of Effect basically says, behavior that results in a gratifying outcome in all likelihood will be repeated, whereas behavior that results in an unpleasing outcome probably will not be repeated. As articulated by Hamner, Ross, and Staw (1983), "reinforcement theory is founded on the idea that voluntary human behavior (e.g., task accomplishments) is environmentally determined" (p. 53). Schermerhorn et al. (1985) generalize this position similarly, by saying, "reinforcement theory views human behavior as being determined by its environmental consequences" (p. 168).

Conceivably known as the strongest advocate of the reinforcement paradigm, B.F. Skinner (1969) states,

> stimulus does not act as a goal; it does not elicit the response . . . in the sense of forcing it to occur. It is simply an essential aspect of the occasion upon which response is made and reinforced. . . . The class of responses upon which a reinforcer

> is contingent is called an operant, to suggest the action on the environment followed by a reinforcement. (p. 7)

Skinner believes that the consequences of an action determine whether a given operant will be exercised in the future. Hamner et al. (1983) declare that "operant conditioning presupposes that human beings explore their environment and act upon it" (p. 53). As suggested by Hamner (1983), this exploratory behavior, which is usually random at first, can serve as an operant by making a reward contingent on that response.

Bandura (1969) advocates that for leaders of an organization to be successful in the application of reinforcement theory they should select rewards that are sustainable and powerful enough to "maintain responsiveness while complex patterns of behavior are being established and strengthened" (p. 225). Under the umbrella of reinforcement theory, it is important that organizations make sure their reward systems are designed so that employees see that their performance (operant) in the work place is tied to the rewards they receive. According to Lawler (1971), "overall . . . studies suggest that . . . organizations do not do a very good job at tying pay to performance" (p. 157). As stated by Hamner and Hamner (1983), "Skinner in 1969 warned managers that a poorly designed monetary reward system may actually reduce performance" (p. 192). Accordingly, if an educational institution establishes a pay system based on performance measures, but fails to monitor the system's veracity for making and maintaining the linkage between reward and desired actions, then problems could and probably will occur. A scenario showing how an institution can develop problems if the linkage of reward to desired actions is not maintained is presented as follows:

> Let us postulate that a university has not monitored its pay practices with regard to equity following the equal rights legislation of the 1960's. Let us also assume that the university's female faculty members, while examining their environment, notice that they are not being paid the same salary as that of their male counterparts. These same

female faculty members file lawsuits in the court systems that are adjudicated in their favor, to the extent that they receive large pay increases and other forms of compensation.

> Under the precepts of operant conditioning, the university has failed to design a pay system that maintains a desirable linkage of actions (e.g., doing research for the institution) with the reinforcement of pay. In fact, in its neglect to monitor and adjust pay practices, the university's neglect has created an environment that has the female faculty now spending their time looking for ways to get rewards through court actions rather than performance at work.

In reviewing several studies on faculty performance with regard to rewards, Sandler (1986) found that males in academe frequently were given rewards based on their potential, in contrast to female faculty members, who had to prove themselves worthy of similar rewards. As indicated by Hagedorn (1995), gender-related discrimination, such as wage disparities between male and female faculty members, is costly to educational institutions. Most of these costs come from related litigation. Hensel (1991) estimates that these costs are easily in the hundreds of millions (in 1990 dollars).

Expectancy Theory

It can be argued that faculty members (people) decide to participate in an activity if it will supply them with something they value. As indicated by Landy and Trumbo (1983), people use logic to rationalize that specific activities are instrumental in realizing valued outcomes. A classic model used to explain the dynamics of this cognitive behavior is expectancy theory. Schermerhorn et al. (1985) state, "Expectancy theory argues that work motivation is determined by individual beliefs regarding effort-performance relationships and desirabilities [*sic*] of various work outcomes that are associated with performance levels" (pp. 143-144).

In their unfolding of the various forms of expectancy theory, Vroom (1964), Galbraith and Cummings (1967), Porter and Lawler (1968), and Lawler (1973) basically assert that people act after rationally evaluating the multiple outcomes of an action available to them with regard to their perceptions of effort involved and sensed value of the outcome. As stated by Hamner et al. (1983):

> The implications of such a theory to practitioners are substantial. By training and illustration, employees can be shown that effort will lead to performance. Managers [higher education administrators] should take steps to strengthen the perceived relationship between performance and outcomes. Last, the organization should recruit individuals who find a high instrumentality between organizational rewards and personal goals. (p. 57)

In considering the possible implications of the schemata of expectancy theory, administrators at institutions of higher education need to find ways to make sure male and female faculty understand what specific efforts will lead to the performance of services desired by the institution while making sure that faculty members also comprehend the necessity of performing these services to receive the rewards (financial compensation) offered by the institution.

Communication by the institution appears to be a key element in implementing and maintaining a reward system that is effective in the motivation of all faculty members. In his book entitled *Strategic Pay*, Lawler (1990) states, "If the organization is silent in terms of what it is doing, it may cause individuals to develop less functional beliefs than they would have if the organization had stated principles that effectively guided individual beliefs" (p. 38). From his research in the field of human motivation, Lawler (1971) determined that people have a propensity to view their own pay as worse than that of their associates, even when paid on a comparatively equal basis. He discovered that these predilections result in part because employees are in an information vacuum. Lawler (1990) asserts that, "organizations often fail to do a good job of explaining their pay practices . . . [which results in individuals] making their own sense out of isolated actions" (p. 39). In writing about missions statements at educational institutions, Tierney (1989) reinforces this concept when he states that "ideological tensions constantly arise as people interpret the mission in a manner different than intended" (p. 53). An example of how this model pertains to education follows:

> Let us say an institution of higher learning has established a robust reward system based on multiple performance measures. Let us also assume that one of the indices used to measure performance at the institution is based in the belief that long-term commitment by employees at the institution is a pivotal element in the achievement of institutional goals. Furthermore, the administrators at the school believe the number of publications produced by a faculty member after achieving tenure is an operative way to measure productivity of its faculty. Thus, the institution determines it will use the number of years a faculty member has been employed at the institution and number of publications following tenure as some of the primary measures in determining the distribution of rewards to be provided to tenured faculty members at the institution.
>
> Next, let us now assume that the institution has a written pay policy that declares the longevity of faculty members at the institution is indispensable and that the number of publications produced by faculty is a major determinant in receiving financial rewards from the institution. Yet, the written policy fails to mention that only the number of publications by a faculty member following tenure will be given consideration in determining reward distribution.
>
> Now, let us say that a female and a male faculty member, who have worked in the same department at a university for an equal number of years, obtain tenure at relatively the same time and both have fundamentally the same number of publications. However, the female faculty member published twice as much work

prior to becoming tenured as the male faculty member and the male faculty member published twice as many papers as the female faculty member after both had received tenure. Because his publication rate following tenure is higher than that of the female faculty member, the male faculty member is rewarded with substantially more pay than is the female faculty member.

Under the model of expectancy theory the female and male faculty members will perceive publication rates and longevity at the institution as instrumental in receiving rewards from the institution. However, due to lack of information (the female and male faculty members not knowing publication after tenure is the key to rewards), the female faculty member will see herself as unsuitably rewarded, and in all probability will feel she has been treated unfairly by the institution. In all likelihood, the female and the male faculty member will start seeing some other factor (e.g., how well they get along with the dean) as the effort they need to expend to receive the rewards they desire. What was to be a practical application for administering rewards to motivate faculty members now has become a dysfunctional pay system for the university.

Reporting for *The Chronicle of Higher Education*, Frogg (2002) provided a real-world example of the above type of problem by sharing how a female faculty member had been denied rewards primarily because of her inability to demonstrate collegiality. Frogg reported that the female faculty member claimed that her school never previously had used collegiality as a measure of productivity in the performance assessment process. Unnecessary costs (i.e., costs of dealing with grievances and lawsuits filed over this matter) were shouldered by the university because administrators had failed to explain their assessment system process and modifications effectively to faculty members.

Past research (Chamberland, 1988; Cole, 1979; Persell, 1983) has determined that quite often female faculty members who had worked hard (exceeded or met necessary performance measures) were not rewarded equitably or appropriately. Deterioration of performance can be one of the side effects resulting from not following the constructs of expectancy theory. In trying to understand why female faculty members tend to have lower publication rates than male faculty members, Cole and Zuckerman (1984) concluded that women receive lower rewards for equivalent work when compared to the rewards given to their male counterparts. They postulate that this failure to reinforce properly (failure to motivate) affects the effort expended at work, thus retarding the performance rate (number of publications) of female faculty members.

Equity Theory (Social Comparison Theory)

In discussing the pay-for-performance linkage, Beer et al. (1984) submit the notion that the "motivational and satisfactional [*sic*] value of a reward system is a function of the perceived equity of the reward system" (p. 124). They contend that when employees do not perceive rewards as equitable, "trust in the reward system will be low and the contingent linkage between performance and pay will not be accepted" (p. 124). In their book, titled *Managing Human Assets*, Beer et al. advocate that employees perceive pay as a valued reward for behavior performed. This position is confirmed when they state:

> Virtually every study on the relative importance of pay to other potential rewards (extrinsic and intrinsic) has shown pay is important: it is consistently ranked among the top five rewards. In fact, in more than one-third of 45 studies conducted, pay was ranked number one as a valued reward. (p. 118)

Consequently, a cornerstone to building an understanding of the classical work-for-pay motivational models is the accumulation of a working knowledge on equity from the employees' perspective. According to Hamner et al. (1983), the theorist responsible for formulating the foundation of what was to become known as equity theory was Leon Festinger. In his work on what was then called social comparison theory, Festinger (1954) hypothesized that people have a propensity to evaluate their opinions and attitudes and that they often choose to compare themselves with other people having attributes similar to their own.

Piggybacking on Festinger's social comparison theory, Adams (1963) developed and refined these ideas into a theory about the employer-employee exchange relationship, which he called equity theory. As indicated by Mowday (1983), two components (inputs of things contributed to the exchange process and outputs of things resulting from the exchange process) form a ratio of comparison upon which employees gauge their relative equity with others in the work place. As indicated by Adams (1965), the research on equity and social comparison theories suggests that workers have a strong tendency to compare their earnings with the earnings of other workers in their work place and that this is the type of comparison they first make. In developing equity theory, Adams (1965) embraced four principal postulates about employee behavior:

1. Perceived inequity in the work place produces stress in the worker.
2. The amount of stress experienced is proportional to the extent of the inequity.
3. The stress felt by the worker will stimulate him or her to reduce the sensed inequity.
4. The extent of the stimulation in the worker is proportional to the amount of perceived inequity.

In his interpretation of the work presented on equity theory, Dove (2002) asserts that this theory tells us "that human beings hate inequity and work to restore equity to inequitable situations" (p. 1). Dove (2002) believes that workers perceive themselves as having control over their own behavior, as opposed to others having control, and that any sensed state of inequity must be changed by the worker embarking on a course of action. Accordingly, the course of action an employee will take to adjust for any perceived inequity is dependent on what inputs the employee believes are most likely to bring affairs back in balance.

For educational institutions, the implications and ramifications implied by the equity theory model are multifaceted. Leaders at educational institutions may find they have the option of being able to manipulate faculty performance and ideals by changing the levels of pay provided to faculty members. Conversely, administrators might find that faculty publication rates at the institution have tumbled downward because the institution had not been paying close attention to what employees perceive as equitable rewards at their institution. University officials may find they are able to exercise control over the performance the university gets out of a given faculty member by exploiting whom the faculty member visualizes as the comparative other in the equity equation. On the other side, if faculty members see that other workers outside the educational arena have gained a financial advantage over all other workers via the formation of a union with national affiliations, university boards might find themselves being forced to cope with all of the events that unfold as a result of faculty unionization.

Information on inequities in faculty pay and pay systems are reported often in various publications. In the *Chronicle of Higher Education*, Magner (2000) reported that the salary gap between professors and other highly-educated professionals has continued to widen in favor of those outside academe (using 1997 data, average salaries were 24% less for faculty members than other highly-educated professionals). In the same report he also shares that the salary gap still exists and has widened between female and male faculty members, between faculty members at public versus private educational institutions, and between faculty members of research universities versus other institutions of higher learning. Obviously, reports of this nature can create a feeling of perceived inequity for almost all faculty members who obtain and internalize these types of information. Thus, it is not surprising to hear that there is stress and concern among faculty members as to amount of pay they receive for the amount of work performed.

In her *Chronicle of Higher Education* report, Evelyn (2002) gives an example of how equity comparisons have caused stress among faculty members and played a key role in how institutions of higher education need to examine the factors that go into the equity equation for individuals they employ. She explains how the Washington State Technical and Community College system had tendered an offer of settlement to disgruntled faculty members after having lost a lawsuit initiated by adjunct professors. The adjuncts, in their quest to be treated equitably, had filed a lawsuit in 1998. Evelyn states,

> The adjuncts claimed they were unfairly denied retirement benefits from 1990 to 1999 because the state's community and technical colleges did not count many of their out-of-class hours toward retirement benefits. The colleges count hours spent in and out of class for full-time faculty members. (p. 1)

She noted that in February of 2000, the court had ruled against the school system and in favor of the adjuncts. The equity equation came into play for these adjuncts, so much so that the stress of inequity pressured them into taking an action to find relief for the inequity felt about compensation received for work performed outside of the classroom. Because the Washington State institutions involved and many like them never or rarely have given much thought to the comparison parameters of Equity Theory, they were forced and will continue to be forced to respond to the dynamics of its implications.

In closing, under the auspices of human behavior and management theories it is apparent that educational institutions could and should use proactive approaches to analyzing how OB models can be used in the realm of higher education. By looking at how these theories are a practicality for improvement in the work for pay equation, colleges and universities will be able to build compensation programs that faculty perceive as equitable, that create a sense of belonging for faculty, and that help to motivate faculty members. In addition to acclimating the compensation package to a better fit with the faculty, these OB theories offer institutions of higher learning the opportunity to fine-tune their pay systems so that they are more cost-effective and conducive to the goals of the educational institution in the long run.

Statistical Models

To deal with the ramifications of female faculty lodging complaints and/or initiating legal actions, many administrators at institutions of higher learning were and continue to be impelled to find techniques to test salary structures for integrity and legality (Snyder, Hyer, & McLaughin, 1994). In fact, over the past thirty years several statistical models for analyzing salary equity have been introduced, scrutinized, and used by those doing research within and outside the field of higher education (Astin & Bayer, 1972; Balzer et al., 1996; Gray & Scott, 1980; Haignere et al., 1996; Krallman, 1993; Moore, 1993a; Oaxaca, 1973; Scott, 1977). The models used by researchers for determining the existence of wage disparity among faculty members vary from the simple comparisons of salary means to analysis via multi-level regression models (Bentil, 1999; Stapleton, 1999). As noted by Stacy and Holland (1984), simple group differences and comparisons on a single or bivariate analysis level inadequately deal with the decisions of complex salary structures used in governing faculty pay. As submitted by Haignere et al., many studies prior to the 1990's made use of statistical models on aggregate levels (e.g., comparison studies of faculty salaries on a nationwide basis, studies of salary disparities at the regional level, or faculty wage equity at the statewide institutional level). What emerges as most evident in the literature is that models using some form of multivariate analysis (e.g., analysis of covariance or regression analysis) are the accepted norm for litigating and studying faculty salary equity (Astin & Bayer, 1972; Balzer et al., 1996; Moore, 1993b; Snyder et al., 1994; Sokol, 1992; Stacy & Holland, 1984).

With the sanctioning of the American Association of University Professors (AAUP), Scott (1977) introduced the *Higher Education Salary Kit* (Kit) to help universities analyze and determine if female and/or minority faculty members are paid equitably when compared to other faculty members with similar attributes and experience. In the Kit, Scott describes a pilot study to compare several analytical models that were being used by various institutions members. With very little elaboration on this comparison study or how it was performed, Scott recommends the regression model she perceives as the most practical method (cost-efficient and relatively effective) for determining if female and minority faculty members are being underpaid.

In the Kit, Scott (1977) suggests that researchers use a statistical model that utilizes regression analysis to determine what mathematical formula and given set of best predictors (attributes of the faculty) can be used to predict salaries for Caucasian-males. In the kit, she explains the process for determining the manner in which the faculty members should be grouped in the search for salary inequities. Next, Scott presents what types of data (e.g., actual salary of faculty member, year faculty member received highest degree, gender of faculty member, etc.) should be gathered for each of the faculty members included in the equity study. Once the data have been gathered, it is suggested that the researcher(s) use a computer to find the regression equation that best predicts Caucasian-male salaries for each grouping of faculty members.

As outlined in the Kit, Scott (1977) proposes that the formula obtained from the regression equation for predicting the salary of Caucasian-males be used to estimate what the salary of female and minority faculty members would be given that their attributes are plugged into the formula. Upon obtaining the results from estimating the salaries of female and minority faculty members, Scott suggests that the estimated salary for each of the female and minority faculty members then be subtracted from the actual salaries these faculty members receive to form residuals. Scott recommends that if any of these residuals are found to be negative then they should be flagged as female or minority faculty members who are underpaid. Scott augments this approach by stating that each flagged case should be "referred to the faculty personnel committee and/or the administration or other authority for special review" (p. 5).

As with any new methodology, in the years following the introduction of the Kit, As with any new methodology, in the years following the introduction of the Kit, several pragmatic issues developed in its application. To address some procedural problems with using the Kit and problems associated with the method of individually flagging wage recipients with negative residuals, Gray and Scott (1980) authored the article, *A "Statistical" Remedy for Statistically Identified Discrimination*. Gray and Scott state, "several common abuses in the use of the regression methodology . . . have been observed or reported" (p. 174). They note that the selection of the appropriate population for formulation of a regression model has been and can be problematic. They contend that many schools of higher education do not have enough faculty members in certain departments, sections, and disciplines to make statistical analysis meaningful. As a solution, they suggest that when faculty size is low, analysts should try to combine faculty data in groups of related disciplines within an institution (e.g., sociology and anthropology). Gray and Scott proclaim, "what should not be done is to group departments across various campuses of a statewide system" (p. 175).

The difficulty analysts have in obtaining complete information is another problem that Gray and Scott (1980) discuss. They report that researchers often are faced with the dilemma of what to do when less than complete information is available on a given faculty member or numerous faculty members for a given variable. They assert that if the analyst "has less than all the desirable information for all faculty who should be included, then one should proceed with fewer variables in the study" (p. 176). In other words, Gray and Scott believe it is better to drop a variable (e.g., number of publications) from the regression model than to use it when data for any variable are less than complete. They argue that the dropping of one or two variables should have little effect on the overall ability of the salary regression model to be useful in extrapolating cases of pay inequity.

Gray and Scott (1980) bring forth several other problems and issues of using the Kit. A partial list of these issues is presented in an inquisitive style format below:

study?

2. Should rank be used as one of the determinants in the regression model?
3. Do faculty members and administrators need to be in agreement as to what faculty attributes/determinants should be incorporated into the model?
4. How do we remedy the existence of any inequities found via this process?
5. Is raising the salary of a whole class of faculty members (e.g., all female faculty members with negative residuals in the college of business at a university) justifiable in light of the fact that some members of the comparative group (e.g., Caucasian-male faculty members with negative residuals in the same college of business) could and should also be classified as underpaid?

These questions and many other issues discussed by Gray and Scott lend evidence to the fact that doing a study on the equatability of faculty wages is not a simple task nor one easily realized.

Simpson (1981), in his research on faculty salary comparison methods, noted that many academic administrators rely or have relied on salary surveys to validate or adjust wages at their institutions. Simpson proposed that administrators are overlooking how faculty attributes effect the salary evaluation process. He maintained that when administrators use simple averages as a comparative measure they do not account for the variance in salaries emanating out of individual faculty qualifications and accomplishments. To address the question of whether or not it is appropriate to use data from a typical salary survey (salary averages) in assessing salary equatability at institutions of higher learning, Simpson compared this simplistic practice to a process that incorporates the use of mathematical regression to study salary equity.

In reporting on the results of his comparative study, Simpson (1981) makes the following comments:

The results of this study may come as a surprise to many . . . the distribution of

> The results of this study may come as a surprise to many . . . the distribution of faculty qualifications is not uniform across departments, the difference in qualifications and salaries do not average out when aggregated, and the results of the regression analysis are in some instances drastically different from the results derived from average salaries [typical salary assessments]. . . . These results suggest that the comparison of average salaries may lead to completely erroneous conclusions about the adequacy of an individual's . . . salary level. (pp. 16-17)

In summary, Simpson recommends that academic administrators try the use of regression techniques in assessing the equity of faculty salaries at their institutions. He advocates that institutions need to exchange data on faculty members at a much deeper level (e.g., rank, time in rank, department, etc.), so comparative regression studies can be performed.

Bentil (1999) advocates that most researchers tend to favor the use of multiple regression in the analysis of salary equity because it provides flexibility in accounting for variables that determine or might influence faculty wages. Stacy and Holland (1984) make the following statement regarding this phenomenon:

> It is interesting to speculate as to why multiple regression analysis has become the method of choice . . . even though the logic of controlling for nuisance variables is more completely developed in the analysis of covariance literature.
>
> First, given the availability of "canned" computer programs, multiple regression analysis appears to be easier to conduct and to understand.
>
> Second, the problem of equal numbers of observations in various groups, which may be troublesome in covariance analysis, somehow seems to disappear with multiple regression analysis.
>
> Finally, few if any of the assumptions [e.g., randomization, error-free fixed covariates, normality of conditional dependent measures, etc.] associated with covariance analysis . . . are mentioned in standard text book treatments of multiple

regression analysis. (p. 166)

In their perspective on the legal issues associated with analyzing faculty salary equity, Stacy and Holland indicate that the use of regression techniques for those wanting to do investigations in this domain emerges as the acceptable/admissible practice.

In analyzing the 1992-1993 salaries of 860 full-time faculty members at Miami University-Oxford, Ohio, Krallman (1993) employed two techniques to discern whether wages were equitable on the basis of gender and on the basis of ethnicity. Describing the first technique, Krallman states, "two models were used within stepwise regression to determine salary equity at each individual rank and then again using the four ranks as dummy variables" (p. 140). The first regression model used all full-time Caucasian-male faculty members from the main campus, while the second model used all full-time faculty members. The regression equations formulated from these examinations were used to compute predicted salaries, so residuals (subtracting actual salaries from predicted salaries) could be calculated for use in significance tests via analysis of variance.

A tested and tried practice developed by business corporations (compa-ratio analysis) was the second technique Krallman (1993) used to check for salary equity among faculty members at the university. As described in her paper, this technique utilizes a ratio calculated by dividing the actual salary of a given faculty member's pay by the midpoint salary for those faculty members employed in the same pay grade. Krallman states, "two methodologies were utilized using the compa-ratio concept to evaluate salaries at the university" (p. 146). In the first method, the compa-ratio values for each faculty rank were compared on a basis of male to female, main campus to regional campus, and minority to non-minority. In the second method, she again implemented the use of regression analysis with a new twist, by substituting the compa-ratio of each faculty member as the criterion variable in the equation instead of salary. Additionally, she removed rank and disciplinary market factor as predictor variables in the regression analysis.

Krallman (1993) found that both the traditional regression model and the simple compa-ratio method showed a gender-related wage disparity at the associate professor level. Additionally, when using the regression model with compa-ratio as a predictor variable, a gender-related disparity was found to exist for assistant as well as associate professors. An intriguing finding of this study was the fact that all inequities found were in the reverse direction of what most would assume. Generally speaking, male faculty members as a group in the assistant and associate level positions were being paid less than female faculty members in the associated groups. Krallman maintains that the compa-ratio method offers an expanded level of insight into salary equity analysis. On the downside, Krallman fails to provide any technical evidence or offer any empirical arguments for using the compa-ratio method that would substantiate her claims at a scientific level.

Billard, Cooper, and Kaluba (1993), in their studies on faculty salary equity, evaluate the use, viability, and pitfalls of the Kit developed by Scott (1977). First, Billard et al. summarize and elaborate on what they consider are the salient aspects of doing a study with the Kit. They maintain that when using the Kit two major issues need to be addressed (viz., the selection of the predictor variables and clustering the faculty members studied into appropriate homogeneous groups upon which the predicted salaries are to be calculated for).

Billard et al. (1993) elaborate on these two major issues by advocating that "whatever set of variables is deemed to be relevant for any given situation, it is important that for each choice of indicator variable the relevant information must be available for all individuals (male and female)" (p. 3). Billard et al. put forth the position that "it is important that the calculations are based on homogeneous groups" (p. 6). In an attempt to clarify what they mean when they speak of homogeneity, Billard et al. state:

> By homogeneity, we mean expectations (including market salary levels) for individuals within a group are comparable. Thus, for example, those who have 'made it' in the group probably publish at comparable rates (so that adding this variable

> doesn't really provide any additional predictive power). (p. 6)

When talking about group formation characteristics, Billard et al. (1993) state the following:

> For statistical reasons it is important that each group contains at least fifteen males [arbitrary - not a scientifically determined fact]. Ideally, such a group is an academic department. For departments with fewer than fifteen males [again arbitrary], groups should be determined by aggregating cognate disciplines. . . . This type of grouping also utilizes the fact that salary-making decisions are usually made at the department level, thereby making the groups as homogeneous as possible with respect to salary definition. (p. 6)

Additionally, they forewarn that it may be difficult to attain homogeneity of the faculty group if too many departments are combined in the attempt to have adequate numbers of faculty (Caucasian-males) in the regression model.

Next, Billiard et al. (1993) discuss the salary adjustment process suggested by Scott (1977) in the Kit which they interweave with suggestions from Gray and Scott (1980) in what they call the "Gray-Scott Remedy" to the Kit. Billard et al. criticize the efforts of Scott by saying:

> The so-called Kit adjustment method of moving the salaries of those women falling below the men's regression line up to that line, not only produces an overadjustment [*sic*] but is also unfair to the exceptional women and to the men whose salaries are below the average. (p. 16)

Billard et al. contend that in rectifying the problem wage disparities on case-by-case analysis it is nearly impossible to do because the method is intrusively discriminatory in nature.

As alluded to by Billard et al., the "Gray-Scott Remedy" sidesteps the problems arising out of the one-on-one approach by adjusting female salaries upward as a class rather than individually. Billard et al. note that one pitfall to this approach occurs when salary increases are given to some women who are unworthy (e.g., less productive than the counterparts in the study) of a salary raise. In an obscure manner, Billard et al. summarily propose that the "Gray-Scott Remedy" encompasses increasing the salaries of "all female faculty" in a given group when it is shown that these women as a class have lower salaries than the comparative male group. In other words, Billard et al. suggest that the "Gray-Scott Remedy" would give raises to all female faculty members when the calculated average of the salary residuals for women is less than the average residuals of the men in the groups being compared.

In criticizing the "Gray-Scott Remedy," Billard et al. (1993) believe that the remedy fails to provide a formula for distributing the wage increases when deficiencies in female faculty salaries are found. In their research for solutions on how to make the Kit more applicable, Billard et al. propose using an across-the-board statistical adjustment to eliminate salary inequities found after doing a Kit-type salary analysis. In simplified terms, Billard et al. suggest that the "regression line calculated from the women's salaries be rotated so as to coincide with that regression line based on the men's salaries" (p. 1). To accomplish this adjustment, they begin by calculating a regression equation for males only in a given homogeneous faculty group of males and females combined. Next, they suggest that the researcher calculate a regression equation specifically for the female faculty of that defined group. This is followed by the suggestion that the researcher calculate the predicted salaries of the female faculty members using both equations. By subtracting the all-women model predicted salary for each female faculty member from what their predicted salary is using the male model, Billard et al. assert that this calculated difference can be used as a fair incremental adjustment for females on a class type basis. Interestingly, they say that female faculty wages should be adjusted downward for women when this type of analysis indicates that the female faculty members are being overpaid. Billard et al. believe this is a situation that is very difficult to administer, and they offer very little input in addressing the problems that arise from making the suggestion to decrease wages of a given class of faculty.

provides considerable information and insight into using and choosing a statistical model for analyzing faculty salaries with regard to the equatability pay on the basis of gender. In her inquiry of the current practices used in determining salary equity by institutional researchers, Moore concluded:

> There seem to be two predominant models applied in analyzing salary equity: (1) the AAUP method of applying the male formula to females and flagging females with negative residuals and (2) combining males and females in the same group and determining the statistical significance of the coefficient for the sex variable.
>
> Most studies use only full-time tenure and tenured track faculty in the analysis. The commonly used variables are rank, highest degree, years since doctoral degree (experience), years since hire (seniority), and discipline (market). Although there is sometimes mention of the issue of possible bias in rank, and despite the AAUP's recommendation to exclude it, rank is included in every case. (p. 31)

Moore criticizes the fact that analysts have relied heavily on the use of stepwise regression in doing faculty salary equity studies. She advocates that in a non-political environment researchers should pick and choose the variables according to what regression model fits in a given study. Additionally, Moore denounces the fact that measures of productivity and merit have been absent from institutional studies on wage equity over the previous twenty years.

Moore (1993a) implemented a two-stage study in her attempt to gain a better understanding of the intricacies involved in developing a model for analyzing salary equity. In the first stage of this quest, Moore reviewed considerable information about faculty salary equity analysis from the fields of economics, institutional research, law, and statistics. In stage two of her study Moore evaluates three methods for analyzing wage equity among faculty members with regard to what she classifies as the four essential elements (i.e., population, data, model, and outcome measures) of building an appropriate salary equity model.

In her discussion of the elements on the designing of a salary equity model, Moore (1993a) states:

> The worst cases of discrimination may well be found among the seldom examined group of non-tenure-track faculty. Typically [*sic*] women and minorities are hired into these low status, temporary positions more readily than regular faculty ranks. . . . Statistically, the use of homogeneous groups will improve the ability of the model to predict salary because the effect of the predictor variables will be more uniform across members of the group. . . . Small institutions or institutions that have hired very few female faculty members may find their results to be highly sensitive to small changes in selection criteria or specification variables. (p. 41)

Moore advocates that the choice of which variables to use in a regression model should be grounded in the notion that the variables chosen have some effect on the wages of the faculty members being analyzed. With regard to what data to include in a salary study, Moore found that "different variable sets can produce different results" (p. 116). These findings are tenuous when you consider the fact that Moore was unable to show that changing variable sets would produce significantly different conclusions about the nature of salary equity. In a somewhat negating way Moore then indicates that the field of law provides the most appropriate guidelines of what variables to include in designing a model for studying salary equity.

In summary, Moore (1993a) advocates using a statistical model that includes gender in the regression equation. She maintains that the gender coefficient obtained from this kind of analysis "is a robust measure of the magnitude of inequity and provides an objective and fair method of remedying salary inequity" (p. 121). Subsequently, she asserts that inadequacies in pay due to gender discrimination can be eliminated/rectified by simply increasing all female faculty salaries by an amount equal to that of the gender coefficient ascertained in the regression analysis.

Twenty years after the introduction of the Kit by Scott (1997), capstone arguments over the theoretical constructs of the Kit were presented when Boudreau et al. (1997) published their research findings in the *Research in Higher Education* journal. Boudreau et al. conducted a study to determine if, in fact, faculty rank should or should not be included as a predictor variable in the regression models used to study if there are any salary disparities between male and female faculty members in a given higher education institution. Boudreau et al. make the following statements about the importance of rank as a predictor variable:

> At most universities faculty rank influences salaries in two ways; first, the initial salary level is determined based on the rank [of a faculty member] at the time of appointment; second, promotion in rank [of any given faculty member] carries a continuing stipend added to current salary. (p. 299)

To provide backbone for their claim that faculty rank is pertinent in the studies of salary equity, Boudreau et al. refer to the fact that many researchers have unilaterally found that faculty rank is the very best predictor of faculty salary.

In summarizing the rationale of those who advocate for the exclusion of faculty rank in salary equity studies, Boudreau et al. (1997) state:

> excluding rank as a predictor of faculty salary is based on the argument that both rank and salary decisions by the university carry the same potential for bias, and a salary model with rank included may underestimate salary bias due to gender. (p. 301)

They then note this type of reasoning was the compelling force that piloted the designers and supporters of the Kit to recommend that rank be excluded from any model used in testing salary disparities among faculty members.

In exploring and interpreting the arguments for inclusion of rank in models used for analyzing salary equity, Boudreau et al. (1997) contribute the following information:

> rank must be included because gender discrimination in pay is limited to differences within job level; that is, it makes no sense to lump full and assistant professors into

> the same job level at universities as it would to lump supervisory and nonsupervisory employees in the private sector, police sergeants and lieutenants in the public sector, and so forth. . . . A second argument for including rank in faculty salary studies is that omitting important predictor variables from salary studies may result in an under-specified model. . . . Specifically, if a meaningful predictor variable has been left out of a salary model, the effect of this predictor on the dependent variable is often shifted inappropriately to other predictors that have been included in the model, leading one to underestimate the influence of the omitted predictor and overestimate the influence of those related and included predictor variables. (pp. 301-302)

Also noted by Boudreau et al., eliminating rank from a study can cause problems because there are disproportionate numbers of male and female faculty in senior positions at most universities due to the pooling factors of faculty availability several decades ago. They indicate that findings have shown that when rank is left out of the analysis the average disparity in salaries can be double that of when rank is included in the analysis.

To validate their contention that faculty rank should be used as a predictor in models for analyzing salary equity, Boudreau et al. (1997) present two comparative studies showing where rank is used in the analysis and then omitted from the analysis. In one study they used hypothetical data and in their other study they used actual data from Bowling Green University. Using hierarchal regression in each study they analyzed the effects of having rank in the models as compared to having rank removed from the models. The evidence they obtained overwhelmingly suggests that the use of faculty rank as a predictor in analyzing salary equity is a must. Boudreau et al. conclude by stating "it is recommended that faculty rank be included as a predictor variable in any model used to study gender equity relating to salary" (p. 309).

The above literature lends evidence to the reality that the performance of a salary study is not an effortless endeavor nor always smooth. The evidence does show that many study is not an effortless endeavor nor always smooth. The evidence does show that many researchers use and continue to use regression models identical to, similar to, or built from, the Kit model developed by Scott (1977). Of the many steps necessary in conducting a gender-related salary equity study, several constructs appear to be salient. Researchers need to determine which faculty members are to be studied and how they are going to be grouped. Next, researchers should collect/obtain faculty data on as many variables as is reasonably possible in their given situation. Next, researchers need to make sure that they have complete data for each faculty member who is included in their study of salary equity. Fourth, researchers need to present the findings of their salary analysis without inserting any bias they may have toward the outcomes or situations of the study. Summarily speaking, the literature demonstrates that statistical models using regression techniques are and can be used to determine if gender-related disparities are present in the wages distributed among comparable faculty members.

Review of Selected Statistical Studies

In their study, *Sex Discrimination and Academe*, Astin and Bayer (1972) analyzed salary data of nearly 6,000 faculty members randomly selected from a national pool of 60,000 faculty members representing approximately 300 institutions of higher learning. Their study primarily was focused on determining whether there was equity in the salaries of female faculty members when compared to those of male faculty members. In their model, Astin and Bayer used 33 predictor variables (faculty attributes and organizational characteristics) in a regression analysis. The proportion of variation in salaries that was attributable to the multiple predictors in their model was approximately 64% ($R^2 = .64$). In this model they determined faculty rank, productivity, and the type of employing institution to be the most influential determinants of faculty salaries.

Generally speaking, Astin and Bayer (1972) found that female faculty members employed at larger institutions of higher learning were paid less than their male counterparts.

women was higher than the proportion held by women in large institutions. This result alone was a major factor in the wage disparities they found between male and female faculty members. Globally speaking, after controlling for various faculty attributes (credentials of faculty members), Astin and Bayer found the wage disparity (in 1968-69 dollars) between female and males to be approximately $1,040.00 in favor of the males.

Early on in studies of salary equity among faculty members, Darland et al. (1973) examined the differences in faculty pay between men and women using type of institution, field of instruction, educational experience, job experience, productivity, and various other variables (up to 25 variables in all). With regard to their research by institutional type, Darland et al. discovered that the proportional number of female faculty members with negative wage disparities (underpaid when compared to male faculty members) was greatest at large research institutions. When looking at all institutional types, they found that female members on average received lower pay (approximately $1,500.00 less in 1969 dollars) than their male counterparts, even when controlling for qualification and productivity. By doing a break down analysis of data with regard to job experience, they found that, on average, male faculty members received virtually double the wages of their female comparison groups.

In her paper, on the review of faculty salary equity at the University of Colorado at Denver (UC-Denver), Sokol (1992) describes the efforts and process university researchers and administrators used in developing a viable method of scrutinizing faculty salaries for possible cases of inequity. Using the regression model suggested by Scott (1977) in the Kit, UC-Denver researchers scrutinized the salaries of tenure and tenure-track faculty. Because there were only 184 Caucasian-male faculty members at UC-Denver, the research team ascertained they should use an aggregate-style regression model rather than a model based on a departmental basis or similar type grouping.

As stated by Sokol, "the model constructed for UC-Denver in 1990-91 produced an R^2 of 68%" (p. 14). By using the regression equation to estimate the expected salaries of female and minority faculty members, the research team members at UC-Denver were able to calculate residuals for a comparative analysis. Interestingly, instead of flagging all women and minorities with negative residuals, as suggested by Scott, they chose to flag only women and minorities with actual salaries calculated to be $500.00 or more below the predicted salary produced by the regression equation. The results from the analysis of data from the 1990-91 academic year indicated that 50 members of the faculty were flagged as having salaries that were questionable. Of the 50 faculty members flagged in the study, 18 chose to participate in a counterpart review process used at UC-Denver to determine if any equity adjustments were required. Using the same regression analysis on the 1991-92 salary data, preliminary results indicated that 49 faculty members were in the flagged group. Final results from the 1991-92 study were not made available in the report because the counterpart review process had not yet been finalized prior to this paper being released.

Hyde and Jones (1992) provide the details of a gender-based equity study of faculty salaries conducted at the University of Wisconsin at Madison (UW-Madison). In their university-wide preliminary analysis of data for the academic year 1990-1991, Hyde and Jones found that annual male faculty salaries exceeded female faculty salaries by an average of $7,000 (a salary gap of approximately 13%). They believed that most of this gap could be attributed to the uneven distribution of male and female faculty members across the various disciplines at the university and that the salaries for faculty members in these various disciplines is disproportionate due to market forces (e.g., the supply forces and demand forces that dictate salaries for engineering professors in the education employment market are not the same as those of fine-arts professors).

With consulting guidance from Dr. Mary Gray (a renowned expert in gender equity studies), Hyde and Jones (1992) designed a regression model study of salaries for the medical school faculty and the remaining faculty at UW-Madison as separate groups. In designing the study, they decided to employ multifaceted regression models based on the Kit.

medical school faculty and the remaining faculty at UW-Madison as separate groups. In designing the study, they decided to employ multifaceted regression models based on the Kit. First, they used a regression model that included faculty rank as a variant. In keeping with some of the tenants of Gray and Scott (1980), rank and years of experience in the related rank were excluded as covariates in the second regression model. To make the analysis more exhaustive a cohort variable and a market factor variable were constructed and added to the data in the study. Additionally, when analyzing the salaries for the medical school faculty it was decided to incorporate a variable into the model to account for salary increments paid according to each faculty member's departmentally related Clinical Practice Plan (CPP).

In speaking about the non-medical school faculty at UW-Madison, Hyde and Jones (1992) found that there was a 1.64% gap in salary between male and female faculty attributable to gender when rank was included in the model, and that a 6.03% gender-related salary gap existed when rank was excluded from the model. In both of these cases the findings showed that the wages paid to the female faculty members in this group were on average significantly less than their male counterparts. Regarding the medical faculty at UW-Madison, the results when the CPP was not included in the study showed salary gap estimates of 1.58% in the model including faculty rank and 4.63% in the model excluding faculty rank. Neither of these gaps was found to be significant, even though both gaps were determined to be unfavorable toward females. When the CPP variable was included in the analysis, highly significant gender-related salary gap estimates were present in both variations of the regression model (13.1% with rank included and 16.6% with rank excluded).

Hyde and Jones (1992) offer several recommendations as to what corrective actions the administrators at UW-Madison should take in adjusting for the salary disparities found in their study. Additionally, they recommend that studies of this nature be continued at the university and that pay equity committees should become more visible and accessible to appear to be thorough and at the same time somewhat illogical. In their grouping of faculty members from all disciplines except for the medical school, the study appears to have transgressed from the suggestions that Gray and Scott (1980) made regarding the grouping of faculty members into like disciplines (i.e., assigning law professors and music professors to the same group violates the strategy of analyzing data from homogeneous groups). This violation implies that the findings of this study may be somewhat tenuous, and weakens the integrity of Hyde and Jones' recommendations regarding pay adjustments.

In a report distributed to the academic deans at UW-Madison, Harrigan (1999) shares the details of an update study designed to determine if gender-related salary disparities were still present five years after their initial study. Even though this study was similar to the 1992 salary study at UW-Madison, several technical differences are noteworthy. First, the 1997 salary equity study did not exclude faculty rank or any related variables from the regression models used. Second, in studying the salaries of non-medical school faculty at UW-Madison, researchers analyzed faculty salaries on a school/college basis within the university as well as the university as a whole. Finally, the1997 study expanded the original analysis by examining the salary data after separating faculty members into groups defined by which divisional committee supervises the tenure of a given faculty member at UW-Madison.

Comprehensively speaking, the results obtained in the 1997 UW-Madison salary study were quite different than those obtained in earlier studies. Regarding the salary data for the medical school, the model revealed there were no significant differences in the estimated salary between male and female faculty members. Concerning the salary analysis of non-medical school faculty members, it was found that the estimated gender gap had reversed in direction, to -0.5%. Although this difference is not statistically significant, this difference does favor female faculty members. Harrigan (1999), in discussing the results of the analysis by school/college, states, "the gender gap in salaries varies somewhat by college, although for none of the schools or colleges are the differences statistically significant" (p. 3). When for none of the schools or colleges are the differences statistically significant" (p. 3). When the analysis was performed using the faculty members' divisional committee as a grouping variable, no significant differences were found in the percentage gap estimate used to measure salary disparity between male and female faculty members within any of the divisions. Broadly speaking, the results of this study show that UW-Madison pay male faculty and female faculty members on an equitable basis.

More recently, Ruark (2002) reported that analysts at UW-Madison had completed faculty salary equity studies in 1992, 1995, 1998, and 2000-2001. Following the studies, UW-Madison administrators determined it was necessary to increase the wages of numerous female faculty members to remove gender-related pay disparities (e.g., 372 female faculty members received pay increases after the 1992 study and 42 female faulty members received pay increases after the 2001 study).

In her report, Ruark (2002) appears to have captured the significance of faculty employee perceptions in a quote from Mary L. Charms, a female faculty member from UW-Madison. After having received a pay increase, Charms stated the following:

> It is wonderful that UW-Madison is examining the issue of gender discrepancy in salaries and discussing how this issue can be monitored and addressed. Is this one exercise going to be an enduring, and permanent solution? Probably not – but the fact that institutional resources have been devoted to this exercise . . . is certainly a positive step in the right direction. (p. 1)

The feelings and perceptions expressed here lend support to my earlier position that the study salary equity can be an effective element in utilizing the ideas of OB theories in the higher education employment arena.

Bentil (1999), in his dissertation, entitled *Gender-Pay Equity from Selected State and State-Related Commonwealth Universities Business Faculty Members in Pennsylvania*, investigated several issues related to the reward structure of faculty members in numerous business faculty members of the statewide higher education system. Of those surveyed, only 92 respondents provided useful data for the study. By using individual characteristics, job characteristics, and institutional characteristics as points of reference, Bentil fashioned an elaborate model that incorporated the use of regression techniques to discern if there were gender-related salary disparities among faculty members at the twelve universities included in his study.

Using five separate hypotheses as the foundation of his analysis, Bentil (1998) was able to ascertain the following:

Test #1. Faculty rank explained a significant amount of variation in differences in the mean basic salaries of male and female faculty members.

Test #2. No significant differences were found between male and female basic salaries among business faculty.

Test #3. There were no significant differences found between male and female faculty members with regard to job and institutional characteristics.

Test #4. No significant differences were revealed in mean promotional rates of male and female faculty.

Test #5. No significant differences were found between salaries of business faculty members at doctoral granting institutions and salaries of business faculty at non-doctoral granting institutions.

Generally speaking, Bentil found little evidence to suggest that the faculty members in his study were being paid unfairly, and found that the single largest influence on salary differences among faculty members was the professional rank of the faculty member. However, these findings may be somewhat spurious because this study used data over a statewide system, rather than for homogenous group of faculty members. As was noted earlier in this chapter, Gray and Scott (1980) advocate that analysts should not combine statewide system data for a given discipline into a group on which to test for salary statewide system data for a given discipline into a group on which to test for salary disparities because faculty groupings of this nature are not consistently homogeneous.

Statistical models using regression techniques are a quintessential part of gender-related salary equity research in the field of higher education. The literature presented above suggests that, when researchers follow the constructs of sound model building, regression models can reveal in an efficient and effective way whether the wages of male and female faculty members are different while still accounting for the various attributes of the faculty members being compared. Conversely, this literature illustrates that analysts doing research in the educational employment field sometimes fail to adhere to the suggestions of other researchers in their community (e.g., even though many authors strongly suggest that homogeneity of the group is essential in developing a viable regression model, analysts continue to compare salaries of dissimilar groups).

Equity Comparisons and Fortifying Educational Pay Systems

By measuring for salary equity with a model that controls for individual attributes of faculty members, higher education decision makers will be able to ascertain the efficiency of the wage distribution practices of educational institutions. From a reinforcement theory perspective, the useful information acquired from measuring for salary disparity affords administrators with opportunities to repair or enhance the educational compensation systems at their institutions. If decision makers in higher education find an inequity in the pay system and make the needed changes promptly, the linkages between rewards and faculty member performance will not be weakened to the extent that faculty members find it necessary to utilize different operants (e.g., court litigation) to maintain pay equity.

From an expectancy theory vista, by using an instrument that accurately measures salary equity, decision makers may be able to discern what elements in the current pay system cultivate healthy employee expectancies. Moreover, higher education decision makers may be able to learn how to establish salary equity measurement systems (i.e., to the equitably disbursed rewards desired by faculty members at a given institution. Finally, from an Equity Theory perspective, by making use of regression models that appropriately measure salary equity among faculty members, higher education decision makers may effectively create an orderly and consistent approach upon which faculty members will be able to evaluate the equity of rewards received on a better basis than presently practiced. If administrators at schools of higher learning consistently use and publish the results of salary disparity studies using multiple regression models that control for individual variations among faculty members, cogent documents will be available for each faculty member to make comparisons about the relative state of the rewards he or she receives. This would eliminate various forms of conjecture often made by faculty members when comparing their workload-reward situation. Generally speaking, it appears that there are many possible advantages and legitimate reasons for using regression models to study for wage disparity among faculty at institutions of higher learning.

CHAPTER 3

RESEARCH METHODOLOGY

Chapter Preface

This chapter is written to provide novice researchers and interested readers with information on the rigorous and detailed research methods used in conducting this study of faculty salaries at Iowa State University (ISU). This research project is patterned in part on much of the material provided by the benchmark work in the *Higher Education Salary Evaluation Kit* (Kit) from the American Association of University Professors developed by Scott (1977). The study is also modeled on many subsequent opinions provided by researchers (Allard, 1984; Billard, Cooper, & Kaluba, 1993; Boudreau et al., 1997; Comptroller General of the U.S., 1985; Gray & Scott, 1980; Moore, 1993b; Snyder, Hyer, & McLaughlin, 1994) writing on the perspectives of using regression techniques to analyze wage equity among faculty members. In 1990, the director for the Office of Institutional Research (E. C. Stanley) contacted the author to request aid in conducting an investigative study on faculty salary equity at the university. In 1991 and 1992 the author provided the university two technical reports outlining the results of the pilot research project. As a result of this work, it was decided to replicate this portion of the pilot research project and make the results public. Additionally, the author and some members of his graduate committee believed it would be prudent to include some current perspectives on the condition of salary equity at the university. Therefore, this study examines five years of ISU salary data for the academic years 1990-1991, 1991-1992, 1997-1998, 1998-1999, and 1999-2000 (referred to hereafter as 1991, 1992, 1998, 1999, and 2000 salary data). The first section of this chapter describes the data base source with respect to what data would be needed, who was to be included in the study, and how the data were to be obtained/collected. The next section describes the taxing and detailed process used to organize and verify the integrity of the data used in this study. Summary characteristics of the data studied are presented and discussed in the following section. The final section of this chapter furnishes information on the statistical methods used to examine the data in this study.

Data Source

The selection criteria with regard to who was to be included and what information was to be included in this faculty wage equity study were determined previously in three unpublished pilot studies performed in 1990, 1991, and 1992 at ISU. In the fall of 1989, under the guidance of E. C. Stanley (Director of Institutional Research) and R. D. Warren (Director of the Research Institute for Studies in Education), A. A. Holland (personal communication, March 1, 2000) launched an investigative study into the theme of gender-based salary equity for faculty at ISU. During the following two academic years, E. C. Stanley, R. D. Warren, and I refined the salary study into what we considered to be a viable investigative model for comparing wages of Caucasian-male faculty members with wages of faculty members outside this group (viz., female faculty, faculty of color, and faculty with disabilities) at ISU.

What Information to Include?

Determining what variables to include in the pilot studies was guided by previous studies undertaken by Ahern and Scott (1981), Allard (1984), Bereman and Scott (1991), Billard et al. (1993), Boudreau et al. (1997), Gray & Scott (1980), Koehler (1988), McLaughlin, Smart, and Montgomey (1978), Moore (1993a, 1993b), Scott (1977), Stacy (1983), and Stacy and Holland (1984). By reviewing the efforts of these researchers, obtaining input from staff at the Institutional Research Office of ISU, and examining the exploratory efforts of Holland, Warren, and Stanley (1990), it was determined that many of the variables necessary for a salary study using the regression analysis outlined by Scott (1977) were reasonably and readily available (e.g., faculty tenure status, faculty gender, faculty salary, highest degree earned by faculty member). After further review of university pilot studies (Holland et al., 1990; Lee, Warren, & Stanley, 1990, 1991), the author decided to obtain some of the relevant variables needed for this regression analysis via a series of calculations from data already present within the ISU data base (e.g., age was calculated by subtracting birth year from the beginning year date for the fiscal period of each data set, number of years employed was calculated by subtracting date hired from the beginning year date for the fiscal period of the each data set, years of tenure for a faculty member was calculated by subtracting date of tenure from the beginning year date for the fiscal period of each data set, and years since receiving highest degree was calculated by subtracting degree year from the beginning year date for each fiscal year of each data set). These steps were the foundation for determining which data were to be used in this study (i.e., what data to include).

Who to Include?

Determination of which faculty members to include in this study was another step in the process of obtaining data for this study. As disclosed by R. D. Warren (personal communication, August, 1990), in the initial pilot study the question was, do we include data from all faculty members at ISU or do we include the data from selected groups of faculty members? As insinuated by E. C. Stanley (personal communication, July, 1990) the answer was reasonably simple. After further elaboration, Stanley disclosed that sound research along with comprehensive knowledge and common sense about the internal workings of the employment system used at ISU were the key to determining who would be included in their salary study. In their initial study, Holland et al. (1990) determined it would be prudent to obtain data on all faculty employees who were considered to be full-time staff. For replication purposes, in this study it was necessary to obtain data on all faculty who were employed in A-base or B-base salary appointment levels at ISU. As defined by R. C. Bergmann and E. C. Stanley (personal communication, July, 1990), A-base faculty members are paid at a salary level established on eleven months of employment per fiscal period, whereas B-based faculty members are paid at a salary level based on nine months of employment per fiscal period.

Download Procedures

Antecedent to the actual data download, in the summer of 1999, numerous meetings were held with various ISU staff members to discuss the method of acquiring the data to be used in this study and any anticipated hurdles that would need to be surmounted. In representing the Office of Institutional Research at ISU, R. C. Bergmann (personal communication, May 28, 1999) shared how it would be necessary to obtain permission from the President's office at ISU prior to his working on a download of data. During a meeting with R. N. Mukerjea (Assistant to the President) on June 11, 1999, a formal request was presented to obtain faculty data for a salary equity study. At the end of this meeting Mukerjea stated that he would review this request with other staff and provide an answer within two weeks. On June 25, 1999, R. N. Mukerjea (personal communication) granted full authorization to proceed with the study and authorization for the staff in the Office of Institutional Research at ISU to download any data needed for this faculty salary study.

The data files for this study were provided by the Office of Institutional Research at ISU through two downloads of information on July 12, 1999 and June 9, 2000. According to R. C. Bergmann (telephone communication, December 20, 1999) the data file for each year of study is obtained by running a computer query of the Institutional Research Information System (called IRIS) database for faculty and staff. As explained, the IRIS database was created by taking snapshots (capturing point in time data) of the ISU Department of Human Resources data base in October and/or November of each academic year. The ISU Human Resources data base is constructed by combining data elements needed for the personnel master records file, the academic master records file, the graduate college master records file, and the payroll master records file.

The Department of Human Resources at ISU obtains the data for their master records through two primary means (K. J. Thom, personal communication, February 7, 2000). As explained by Thom, during the initial phase of employment each employee is required to fill out an Employment Packet. The Employment Packet contains a questionnaire that asks for voluntary as well as required information about the employee (e.g., inquiries regarding Social Security number, date of birth, citizenship, ethnicity, and other demographics). The second means of obtaining data for the ISU Human Resources database is the Electronic Personal Action Form (EPAF), which is initiated by the individual departments at ISU. Employee information required by the Office of the Provost, individual colleges, and other units is collected on the EPAF and then uploaded to the ISU Human Resources master file. This upload of data contains information collected by the individual pay departments with respect to tenure status, tenure date, appointment base, rank, etc. In a conference at the ISU Office of the Provost, B. K. Behling (personal communication, August 8, 1999) pointed out that some of the data elements entered on the EPAF are bits of information that have been specifically requested because the administrative files at the university invariably have missing information on an individual faculty member.

According to R. C. Bergmann (personal communication, July 19, 1999), the original data (for academic years 1991, 1992, 1998, and 1999) provided for this study were initially downloaded to form a data set within Microsoft Excel Version 4.0. Next, the data were categorized and collated into files for each academic year. Finally, each academic year data file was converted from a Microsoft Excel file to a Statistical Package for the Social Sciences Version 7 (SPSS-7) file. These data files then were copied onto three floppy diskettes and presented to the author for use in this study.

Upon completing a preliminary examination for inconsistencies in the initial data, the author met with L. H. Ebbers, then the Associate Dean for Research in the College of Education at ISU (personal communication, February 21, 2000), and subsequently with M. C. Shelley, then the Coordinator of Research in the Research Institute for Studies in Education at ISU (personal communication, February 28, 2000), to discuss results from the initial examination. During these meetings it was decided that the existing data files needed to be upgraded and another academic year's data should be included in this study. The author made contact with the ISU Office of Institutional Research to see if it would be possible to download an additional year of data (for academic year 2000) and to upgrade (primarily obtaining missing tenure dates) the previously supplied data files. The liaison during this contact, R. C. Bergmann (personal communication, March 29, 2000), stated he would need additional approval from R. N. Mukerjea prior to fulfilling the request for supplemental data or data upgrades. Via the telephone on April 2, 2000, the author placed a formal request for supplemental faculty salary data and data upgrades of the previously supplied faculty salary data for ISU.

Shortly after receiving approval from R. N. Mukerjea, R. C. Bergmann (personal communication, June 9, 2000) upgraded the faculty salary data files for the academic years 1991, 1992, 1998, and 1999. As requested, Bergmann also constructed a new data file for the academic year 2000. According to Bergmann, the upgrade task was accomplished by running a cross-check of data on individual employees for all years employed and filling in any missing data fields (e.g., tenure dates) with essential information. Bergmann then compiled the new data for use in an SPSS-7 format and attached the data sets as file attachments to an electronic letter sent to the author via an internet mailing on June 9, 2000. Upon receiving these data sets, each individual file was given a name reflective of what academic year the data file represented and stored on floppy diskettes as well as the hard drive of the author's personal computer.

Data Screening Methods

Several steps were taken to insure the integrity and usability of the 1991, 1992, 1998, 1999, and 2000 faculty salary data files received from the university. Since the data were received in an SPSS-7 format, the first stage of the process was to upload the data file for each academic year into the SPSS-10 data editor on the author's personal computer. Upon accomplishing the upload of the data, it was necessary to make a general examination of content. During the initial inspection of data content it was revealed that each variable in the data files had been given variable names that were not always symbolic of what was wanted for use in this study. Additionally, as provided in their original SPSS-7 format, the variables in the data files did not have labels describing the names that had been assigned to the variables. Therefore, some variable names were changed and variable labels were added to each data file.

The process for changing the variable names and labels was completed in several time-consuming simple steps. First, a data set for a chosen year was uploaded into the data editor of SPSS-10. Next, the variable view mode window of the SPSS-10 data editor was opened. Within this window, each variable name was then examined and either left as is or changed to one that the author thought to be more descriptive and politically correct. Once this process was completed, the data set for the chosen year was saved under a new file name (note: saving all changes to original files under new file names provided a safety net for maintaining data and model design integrity). Finally, by uploading each of the remaining data sets and using the SPSS-10 Apply Data Dictionary function, the variable names were modified to be uniform in each academic year data file. Two variables (viz., aptbase2 and equityad) downloaded in each data file from the IRIS master record were not included in the above process. In keeping with the suggestions of Gray and Scott (1980), Moore (1993a), and Scott (1977) about using complete data, these variables were excluded from this study because the data obtained were not complete and/or not available for all years studied. Additionally, three other variables (viz., pdfte1, pdfte2, and pdfte3) downloaded from the IRIS master record were excluded from this study because they were not useful in building the analytical comparison model.

A comparable technique was used for attaching a variable label to each of the variables in the data files. First, a chosen data file was uploaded into the variable view mode of the SPSS-10 data editor. Next, while in the variable view mode, distinctive descriptive labels were selected and entered for each variable in the data file. Subsequently, the faculty data files for each of the other years in this study were uploaded and then modified using the SPSS-10 Apply Data Dictionary function. Finally, each file was again saved under a new file name to maintain probity in model design. These identifying variable names and the descriptive labels assigned to each data file used in this study are presented in Table 3.1 (on page 60).

As recommended by R. D. Warren (personal communication, August, 1990) and confirmed by M. C. Shelley (personal communication, June, 2001), the second stage of the data inspection process involves checking to see if the data entered for each of the individual variables is statistically friendly (i.e., determine if the variables were entered in numeric form compatible for use in mathematical equations or statistical calculations). To do this inspection, the four steps of analyzing (screening) data as suggested in the SPSS-10 program tutorials were utilized. In the first step, each year's data set was loaded into the data editor for SPSS-10. The second procedure for screening the data was completed by using the Analyze feature of the Menu bar in the SPSS-10 editor. After opening the Analyze pull-down menu, the pull-down category of Descriptive Statistics was selected. Then, within the Descriptive Statistics category, the Frequencies function was selected, thus creating a pop-up window. In the third step of the SPSS-10 screening process, after the pop-up window appeared, each variable was highlighted and then moved to the Variables box. Next, by selecting the OK button, SPSS-10 produces an output window that contains individual frequency tables for each of the selected variables. Finally, each of the frequency tables was examined visually for content (e.g., numeric coding, valid values, unexpected values, missing values, consistency in codes, etc.).

This examination process was repeated for each of the five faculty data sets obtained. When obvious errors (e.g., age 00 of a faculty member in the 2000 data set) were detected,

Table 3.1

Variable Names and Variable Labels Used to Define Faculty Member Data in Salary Study

Variable Name	Variable Label
id	Scrambled Social Security Number
gender	Gender of Individual
age	Age of Individual
ethnic	Ethnic Background
citizen	United States Citizen Status
handicap	Classification with Regard to Disability
bsalary	Base Salary of Individual
hireyear	Year Hired
highdegr	Highest Degree Earned
degreyr	Year Received Highest Degree
rankc1	Classification of Periodic Faculty
rankc2	Rank of Regular Faculty
rankdate	Year Appointed to Current Rank
fraction	Appointment Ratio (see note)
aptbase1	Appointment Base Status
rankdept	Department Where Ranked
collrank	College Where Individual Holds Rank
pd1	First Pay Department of Individual
pdfte1	Fraction of Salary Paid by First Department
gradfac	Graduate Faculty Member Status
admincd1	Administrative Position Status
tenure	Tenure Classification Status
tendate	Date of Full Tenure Status
pd2	Second Pay Department
pdfte2	Fraction of Salary Paid by Second Department
pd3	Third Pay Department of Individual
pdfte3	Fraction of Salary Paid by Third Department

Note: This fraction defines the proportional workload and pay standard of faculty in A-base or B-base employment positions.

the author used several approaches to correct and verify the information. In one approach, as noted earlier in this chapter, staff members in the Office of Institutional Research, the Office of the Provost, and the Department of Human Resources were contacted to see if the problems with missing data could be rectified. Additional efforts were made by pointing out specific errors in the data and having them inspect and correct any cases that they deemed needing change. In a few cases, efforts to correct the data were thwarted because various staff members at the university did not want to take the time out or expend the energy and resources necessary to make changes in the institutions data files and/or data collection system.

Faculty Data Characteristics

To streamline reporting the results of the data inspection process, summary information for each of the variables downloaded from the IRIS database will be discussed briefly. Selected variables will be presented in tabular format as well. In examining the data files, it was determined that all faculty members had unique identification numbers and for each of the five data files there were no duplications of data in the faculty identification variable column.

Gender of faculty member, a categorical variable, was the next faculty characteristic examined during this screening of data. Table 3.2 (on page 62) presents the summary information obtained on gender for each year of the study. As shown, the total number of faculty members employed at the university declined considerably (from 1,877 to 1,777 members) between the academic years of 1991 and 1992. Noticeably, the proportion of faculty members whose gender is female increased continuously (ranging from 25.4% of the faculty in 1991 to 29.0% of the faculty in 2000) throughout the span of years included in this analysis. Since data pertaining to gender were not obtainable for two of the faculty members in the 1998 data file, the author decided to eliminate these cases from the comparison model built in this study.

Table 3.2

Faculty Member Frequencies and Percentages at University by Gender and Year Studied

	1991		1992		1998		1999		2000	
By Gender	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Females	477	25.4	433	25.5	483	27.6	507	28.5	507	29.0
Males	1,400	74.6	1,344	75.6	1,266	72.3	1,269	71.5	1,242	71.0
Not Coded	0	00.0	0	00.0	2	00.1	0	00.0	0	00.0
Total	1,877	100.0	1,777	100.0	1,751	100.0	1,776	100.0	1,749	100.0

Note: Percentage calculations are based on the intact faculty data files prior to the elimination of unusable cases.

Presented in Table 3.3 is the information obtained by examining the age characteristics of each faculty member over the five years of this study. The youngest faculty member in this study was 23 years of age, while the oldest faculty member in this study was 82 years of age. The mean age of the faculty varied little during the ten-year span, with 46.24 years as the lowest average age and 48.38 years as the highest average age. The standard deviation of each mean varied slightly (from 10.12 years to 10. 47 years) throughout the span years of this study. Importantly, since the data for the age variable were complete, no additional cases were eliminated from the analytical

Table 3.3

Age Descriptive Properties of Faculty Members at University by Year Studied

Year	Faculty Count	Minimum Age	Maximum Age	Mean Age	Standard Deviation
1991	1,877	23	75	46.24	10.29
1992	1,777	24	76	46.83	10.12
1998	1,751	24	82	48.38	10.37
1999	1,776	24	78	48.16	10.47
2000	1,749	23	76	47.91	10.45

Note: Age properties of faculty members are reported on information prior to the elimination of various impractical cases.

Table 3.4

Faculty Member Frequencies and Percentages at University by Ethnicity and Year Studied

	1991		1992		1998		1999		2000	
By Ethnicity	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Caucasian	1,715	91.4	1,618	91.1	1,559	89.0	1,563	88.0	1,519	86.8
Black	26	01.4	26	01.5	29	01.7	34	01.9	36	02.1
Asian/Pacific	110	05.9	110	06.2	120	06.9	132	07.4	147	08.4
Native American	2	00.1	1	00.1	5	00.3	7	00.4	7	00.4
Hispanic	23	01.2	19	01.1	30	01.7	32	01.8	29	01.7
Not Coded	1	00.1	3	00.2	8	00.5	8	00.5	11	00.6
Total	1,877	100.0	1,777	100.0	1,751	100.0	1,776	100.0	1,749	100.0

Note: Percentage calculations for each column are based on the intact faculty data prior to the elimination of unusable cases. Additionally, column amounts for percentage calculations are rounded to the nearest tenth, causing column totals to appear inaccurate when they are not.

model at this point.

Table 3.4 reveals that in all years of the study an overwhelming majority of the faculty members were Caucasian. It is noteworthy that the proportional amount of faculty members with ethnic roots other than Caucasian increased throughout all years of the study (with the total proportion ranging from 8.5% of the faculty in 1991 to 12.6% in 2000). Even though ethnicity codes for faculty members were missing in each year of this study, it was decided to purge from the data only the cases in which the faculty member's gender is male and ethnicity is unknown.

Table 3.5 (on page 64) presents a dissection of the faculty information with regard to citizenship status for each of the five study years. In all years of this research study, the university primarily employed citizens of the United States as faculty members (varying from 1,737 faculty members downward to 1,531 faculty members). Distinctly, the proportion of faculty members who were non-citizens increased continuously throughout the duration of this study (ranging from 7.5% to 12.5% of the faculty). Since one faculty member was listed in the data

Table 3.5

Faculty Member Frequencies and Percentages at University by Citizenship and Year Studied

	1991		1992		1998		1999		2000	
By Citizenship	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Citizen	1,737	92.5	1,648	92.7	1,586	90.6	1,582	89.1	1,531	87.5
Immigrant	99	05.3	90	05.1	127	07.3	138	07.8	137	07.8
Non-Immigrant	41	02.2	39	02.2	37	02.1	56	03.2	81	04.6
Not Coded	0	00.0	0	00.0	1	00.1	0	00.0	0	00.0
Total	1,877	100.0	1,777	100.0	1,751	100.0	1,776	100.0	1,749	100.0

Note: Percentage calculations for each column are based on the intact faculty data prior to the elimination of unusable cases. Additionally, column amounts for percentage calculations are rounded to the nearest tenth, causing column totals to appear inaccurate when they are not.

files as not having a citizenship code, the data for this individual would be removed from the analytical model used in this study.

In Table 3.6 the faculty data files were inspected with regard to whether or not a faculty member was listed as disabled. Relatively few faculty members were listed as being disabled in all years of the study. The total number (from 24, down to 17, members) as well as the percentage (from1.3%, down to 1%) of faculty listed as disabled decreased throughout the period of this study. Since the coding of this variable was limited to a code for disabled and no code for not

Table 3.6

Faculty Member Frequencies and Percentages at University by Disability and Year Studied

	1991		1992		1998		1999		2000	
By Disability	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Not Disabled	1,853	98.7	1,756	98.8	1,730	98.8	1,757	98.9	1,732	99.0
Disabled	24	01.3	21	01.2	21	01.2	19	01.1	17	01.0
Total	1,877	100.0	1,777	100.0	1,751	100.0	1,776	100.0	1,749	100.0

Note: Percentage calculations for each column are based on the intact faculty data prior to the elimination of unusable cases.

Table 3.7

Descriptive Features of Faculty Members Base Salary at University by Year Studied

Year	Faculty Count	Minimum Salary	Maximum Salary	Mean Salary	Standard Deviation
1991	1,877	$ 2,500.00	$164,000.00	$ 51,284.94	$ 23,393.78
1992	1,777	$ 2,250.00	$164,000.00	$ 52,185.68	$ 22,604.69
1998	1,751	$ 4,000.00	$205,920.00	$ 62,059.08	$ 29,146.28
1999	1,776	$ 4,700.00	$218,275.00	$ 63,039.15	$ 30,600.81
2000	1,749	$ 2,000.00	$227,443.00	$ 65,304.52	$ 31,578.95

Note: Amounts reflected include faculty appointments at the part-time adjunct level as well as at the full-time administrative level.

disabled, the data do not reveal any cases in which a faculty member may not have furnished this information or where university staff had not sought to collect complete information on the disability status of all faculty members.

Table 3.7 presents the salary means, standard deviations, and salary ranges of university faculty for each year of the years studied. The salary ranges of faculty for each year vary inordinately, with the largest gap being over $225,000 in the 2000 academic year. Very noticeable is the upward trend in mean salaries of faculty at the university during the decade (i.e., an increase in the mean salary of more than $14,000). Since the data files obtained from the university contain data on part-time faculty members, full-time faculty members, and faculty members holding administrative positions, the salary ranges and means presented at this point should be interpreted only as descriptive, not comparatively.

Table 3.8 (on page 66) provides information about the individual educational achievements of the faculty members in each year of the study. In all years studied, a healthy majority (ranging from 71.2% in 1991 to 77.1% in 2000) of the faculty had obtained a doctorate as their highest education credential. The increase in the number of faculty holding a doctorate degree was

Table 3.8

Faculty Member Frequencies and Percentages at University by Degree and Year Studied

	1991		1992		1998		1999		2000	
By Degree	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Bachelor	58	03.1	53	0.30	33	01.9	37	02.1	38	02.2
Master	415	22.1	345	19.4	306	17.5	312	17.6	300	17.2
Doctor	1,337	71.2	1,317	74.1	1,348	77..0	1,362	76.7	1,349	77.1
Professional	67	03.6	62	03.5	63	03.6	65	03.7	62	03.5
Not Coded	0	00.0	0	00.0	1	00.1	0	00.0	0	00.0
Total	1,877	100.0	1,777	100.0	1,751	100.0	1,776	100.0	1,749	100.0

Note: Percentage calculations for each column are based on the intact faculty data prior to the elimination of unusable cases. Additionally, column amounts for percentage calculations are rounded to the nearest tenth, causing column totals to appear inaccurate when they are not.

contrasted with decreases in the number of faculty holding either a bachelor's degree or a master's degree as their terminal degree. Throughout the span of this study, faculty members holding professional degree qualifications invariably held about 3.5 % of the faculty positions annually. Given that the educational credentials of faculty are considered to be an important factor in salary determination, one faculty member of the 1998 data file was removed from further study because of missing data for this variable.

Faculty holding positions that are classified as periodic, as opposed to faculty holding non-periodic positions, are depicted in Table 3.9 (on page 67). Approximately 75% of the faculty members employed at the university are classified as non-periodic. Faculty employed in adjunct and temporary positions hold a majority (about 20%) of the periodic faculty appointments at ISU. The category "University" (a similar classification to Emeritus and Distinguished-Emeritus) was created in 1988. All three classifications extend recognition to faculty for outstanding service or special achievements during their employment careers. Data from this broad classification system suggests that it is impractical to examine gender-

Table 3.9

Frequencies and Percentages of Periodic Faculty at University by Year Studied

	1991		1992		1998		1999		2000	
Classification	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Not Periodic	1,399	74.5	1,386	78.0	1,335	76.2	1,328	74.8	1,303	74.5
Adjunct	179	09.5	178	10.0	106	06.1	105	05.9	108	06.2
Collaborator	0	00.0	0	00.0	1	00.1	0	00.0	0	00.0
Distinguished	48	02.6	50	02.8	58	03.3	53	03.0	51	02.9
Emeritus	1	00.1	1	00.1	1	00.1	1	00.1	0	00.0
Affiliate	7	00.4	6	00.3	7	00.4	7	00.4	0	00.0
Dist.-Emeritus	1	00.1	1	00.1	0	00.0	0	00.0	0	00.0
Temporary	224	11.9	142	08.0	208	11.9	242	13.6	237	13.6
Visiting	18	01.0	13	00.7	8	00.5	11	00.6	13	00.7
University	0	00.0	0	00.0	27	01.5	29	01.6	37	02.1
Total	1,877	100.0	1,777	100.0	1,751	100.0	1,776	100.0	1,749	100.0

Note: Percentage calculations for each column are based on the intact faculty data prior to the elimination of unusable cases. Additionally, column amounts for percentage calculations are rounded to the nearest tenth, causing column totals to appear inaccurate when they are not.

related salary equity for all faculty at this university (e.g., it would be extremely difficult to make salary comparison of a Distinguished male professor to an Adjunct female instructor). Rather, by using certain factors of this classification system, explicit faculty characteristics can be accounted for in the final analytical model (i.e., it may be found that it is essential to control for faculty with special recognition status, as opposed to those who do not have such status).

Table 3.10 (on page 68) displays the breakdown information on faculty members by rank in each year of the study. When comparing the four levels of rank, in all five years of the study, more faculty members were retained in the rank of full professor than any of the other rank positions. Noticeably, the proportion of faculty members employed as full professor diminished continuously over the course of this study. As an offset to this decline, there was an overall increase in the

Table 3.10

Faculty Member Frequencies and Percentages at University by Rank and Year Studied

	1991		1992		1998		1999		2000	
By Rank	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Full Professor	719	38.3	705	39.7	682	38.9	672	37.8	640	36.6
Associate Professor	439	23.4	439	24.7	473	27.0	481	27.1	470	26.9
Assistant Professor	450	24.0	435	24.5	416	23.8	418	23.5	438	25.0
Instructor	289	14.3	198	11.1	180	10.3	205	11.5	201	11.5
Total	1,877	100.0	1,777	100.0	1,751	100.0	1,776	100.0	1,749	100.0

Note: Percentage calculations for each column are based on the intact faculty data prior to the elimination of unusable cases. Additionally, column amounts for percentage calculations are rounded to the nearest tenth, causing column totals to appear inaccurate when they are not.

Table 3.11

Frequencies and Percentages of University Faculty Members by Salary Appointment Base and Year Studied

	1991		1992		1998		1999		2000	
Appointment	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Year-Round	688	36.7	645	36.3	5.72	32.7	563	31.7	536	30.6
Retiree (Yearly)	4	00.2	4	00.2	11	00.6	12	00.7	20	01.1
Nine-Month	1,182	63.0	1,123	63.2	1,144	65.3	1,173	66.0	1,165	66.6
Retiree (9-Month)	3	00.2	5	00.3	21	01.2	25	01.4	27	01.5
A9 Code	0	00.0	0	00.0	2	00.1	2	00.1	1	00.1
AX Code	0	00.0	0	00.0	1	00.1	1	00.1	0	00.0
Total	1,877	100.0	1,777	100.0	1,751	100.0	1,776	100.0	1,749	100.0

Note: Percentage calculations for each column are based on the intact faculty data prior to the elimination of unusable cases. Additionally, column amounts for percentage calculations are rounded to the nearest tenth causing column totals to appear as inaccurate when they are not.

proportion of faculty members employed in the rank positions of assistant professor as well as associate professor. Since data for this variable were complete in all years, no cases were removed at this juncture of the study.

As shown in Table 3.11 (on page 68), in all years of this study, a majority of the university faculty members were employed on nine-month contracts (roughly 65% of all the appointments). The proportion of faculty employed on a year-round base (i.e., eleven-month contacts) declined gradually (viz., from 36.9% in 1991 to 31.7% in 2000) over the course of this study. In 1998, two new codes were created (A9 and AX) to set apart faculty employed under uniquely special circumstances. These faculty members were formerly employed under year-round contracts and now working were less than a full year or on a paid leave of absence. Given that these cases were unique in nature, the faculty members having a code of A9 or AX were eliminated from this study. Since all the data were complete for the appointment base variable, no other cases were eliminated from the study.

Breakdown characteristics for faculty with regard to the college where they hold rank are presented in Table 3.12. Information from the downloaded data files revealed that three of the nine colleges employ more than half of the faculty at the university. The College of Liberal Arts and Sciences (LAS) employs more faculty (i.e., averaging at about 36% of all faculty employed) than any other college at the institution. The College of Agriculture is the second largest faculty employer (i.e., averaging 17.5% of all faculty employed) at the university. Faculty members holding rank in the College of Engineering made up the third largest group of faculty employees at the university (i.e., about 13.6% of the university faculty). The remaining colleges each individually employ less than ten percent of the faculty at the university, with the smallest faculty group being employed in the Library Services College (i.e., about 2.5% of the faculty at the university). The group size for faculty holding rank at the newest college (viz., College of Business) on the campus fluctuated throughout the decade with a low of 66 faculty members in1998 to a high of 75 faculty members in 2000. Since two faculty members in 1991 and one

Table 3.12

Frequencies and Percentages of Faculty at University by College and Year Studied

	1991		1992		1998		1999		2000	
By College	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Agriculture	324	17.3	310	17.4	302	17.2	310	17.5	307	17.6
Design	104	05.5	108	06.1	121	06.9	120	06.8	121	06.9
Education	144	07.7	123	06.9	112	06.4	116	06.5	120	06.9
Engineering	255	13.6	255	14.4	234	13.4	234	13.2	235	13.4
FCS	124	06.6	106	06.0	97	05.5	90	05.1	91	05.2
Library	47	02.5	48	02.7	43	02.5	43	02.4	42	02.4
Business	70	03.7	67	03.8	66	03.8	73	04.1	75	04.3
LAS	681	36.3	640	36.0	647	37.0	665	37.4	640	36.6
Vet-Med	126	06.7	119	06.7	129	07.4	125	07.0	118	06.7
Not Coded	2	00.1	1	00.1	0	00.0	0	00.0	0	00.0
Total	1,877	100.0	1,777	100.0	1,751	100.0	1,776	100.0	1,749	100.0

Note: Percentage calculations for each column are based on the intact faculty data prior to the elimination of unusable cases. Additionally, column amounts for percentage calculations are rounded to the nearest tenth, causing column totals to appear inaccurate when they are not.

FCS = Family and Consumer Sciences; LAS = Liberal Arts and Sciences; Vet-Med = Veterinary Medicine.

faculty member in 1992 had no coding for this variable, these faculty members were eliminated from the later portion of this study.

Table 3.13 displays the different classifications for faculty with regard to their status in the Graduate College at the university for the five years of this study. The percentage of faculty members with graduate status credentials increased from 67% of the faculty in the 1991 group to over 78% of the faculty in the 2000 group. During the decade, the university changed its classification and definitions for being a faculty member who can serve as part of the graduate faculty. Therefore, it was decided to limit the use of this variable to that of a dichotomy (i.e., faculty will be grouped as either having graduate faculty credentials or not having graduate faculty credentials). Since the university used a blank code for individuals as not having graduate

Table 3.13

Frequencies and Percentages of University Faculty Members by Graduate Professor Status and Year Studied

	1991		1992		1998		1999		2000	
Graduate Status	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Not A Member[a]	621	33.1	508	28.6	332	19.0	370	20.8	374	21.4
Associate Member	497	26.5	487	27.4	0	00.0	0	00.0	0	00.0
Full Member	758	40.4	781	44.0	0	00.0	0	00.0	0	00.0
Member	0	00.0	0	00.0	1,318	75.3	1,318	74.2	1,295	74.0
Other Status	0	00.0	0	00.0	64	03.7	54	03.0	46	02.6
Term Status	0	00.0	0	00.0	16	00.9	22	01.2	29	01.7
Graduate Lecturer	1	00.1	1	00.1	21	01.2	12	00.7	5	00.3
Total	1,877	100.0	1,777	100.0	1,751	100.0	1,776	100.0	1,749	100.0

Note: Percentage calculations for each column are based on the intact faculty data prior to the elimination of unusable cases. Additionally, column amounts for percentage calculations are rounded to the nearest tenth, causing column totals to appear inaccurate when they are not.

[a] Some faculty with missing data may be included in this classification because all faculty members not having a code are included in this group.

credentials, there was no technique for the author to discern if there were instances of missing data for this variable in any of the years. Therefore, no new cases were dropped from the study at this point in the data inspection process.

The administrative status of faculty members during the course of this study are presented in Table 3.14. Roughly speaking, about 15% of the faculty members were assigned to some form of administrative classification in each year of the study. The data revealed that during four years of this study there were duplicate cases of faculty members registered as university president and in one year no faculty member was listed as being president. This confusing phenomenon occurred because budget appropriations for employee changes in this administrative position can create a double billing in one year and no billing in another year. Paramount is the fact that no individual

Table 3.14

Frequencies and Percentages of University Faculty Members Holding Administrative Positions by Year Studied

	1991		1992		1998		1999		2000	
Faculty Position	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
President	2	00.1	0	00.0	2	00.1	2	00.1	2	00.1
Vice President	3	00.2	2	00.1	0	00.0	1	00.1	1	00.1
Dean	29	01.5	30	01.7	30	01.7	32	01.8	32	01.8
Director	24	01.3	25	01.4	38	02.2	34	01.9	34	01.9
Head	12	00.6	8	00.5	4	00.2	3	00.2	3	00.2
Chair	50	02.7	49	02.8	44	02.5	45	02.5	46	02.6
Extension	91	04.8	86	04.8	81	04.6	80	0.45	76	04.3
Non-Teaching	55	02.9	65	03.7	42	02.4	43	02.4	41	02.3
Provost	6	00.3	7	00.4	7	00.4	7	00.4	6	00.3
Other Classification	0	00.0	0	00.0	2	00.1	2	00.1	2	00.1
Not Coded	1,605	85.5	1,505	84.7	1,501	85.7	1,527	86.0	1,506	86.1
Total	1,877	100.0	1,777	100.0	1,751	100.0	1,776	100.0	1,749	100.0

Note: Percentage calculations for each column are based on the intact faculty data prior to the elimination of unusable cases. Additionally, column amounts for percentage calculations are rounded to the nearest tenth, causing column totals to appear inaccurate when they are not.

faculty member is classified as having two administrative positions in one year. During the decade, university officials made changes in the administrative classification system and administrative structure at the university. The categorical coding provided by the university for this administrative variable does not differentiate between several of the administrative positions (e.g., assistant dean, associate dean, and dean are all coded as dean even though their salaries differ greatly). If a regression equation is obtained on faculty listed as Caucasian-males only and then applied to all females the equation may not predict females salaries accurately (e.g., if one of the females is dean and there are no male deans then female average residuals may be skewed by an outlier, etc.). Given the fact that several administrative positions at the university have pay systems that are unique, it was to decided eliminate all administrators that have supervisory type positions from the base study (i.e., faculty who are listed with administrative status of president, vice-president, provost, dean, director, head, chair, and dean emeritus will not be included in the regression and comparative portion of this study). Since the university used a blank code for individuals as not having administrative standing, there was no procedures for the author to discern if cases with missing data for this variable needed to be purged from each of the five data files.

The distribution breakdown of faculty by tenure status and year employed is exhibited in Table 3.15. In 1991, 1,448 faculty members (i.e., a little over 67% of the faculty) were classified as tenured or on tenure-track at the university. Even though the total number of tenured and tenure-track faculty decreased to 1,424 by the year 2000, the percentage of faculty having some type of tenure status had increased to over 71%. Given that the tenure standing of each faculty member is an essential element in the study of salary equity at almost all institutions of higher education, this variable will be utilized to define an important parameter of the model in this study. In keeping with the idea of maintaining homogeneity of the group, for the sake of consistency, and for the

Table 3.15

Tenure Status Frequencies and Percentages of University Faculty Members by Year Studied

	1991		1992		1998		1999		2000	
Tenure Status	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Not Eligible	427	22.7	300	16.9	295	16.8	333	18.8	325	18.6
Probationary	265	14.1	257	14.5	263	15.0	269	15.1	303	17.3
Tenured	1,183	63.0	1,174	66.1	1157	66.1	1,141	64.2	1,088	62.2
Continuing	0	00.0	46	02.6	36	02.1	33	01.9	33	01.9
Not Coded	2	00.1	0	00.0	0	00.0	0	00.0	0	00.0
Total	1,877	100.0	1,777	100.0	1,751	100.0	1,776	100.0	1,749	100.0

Note: Percentage calculations for each column are based on the intact faculty data prior to the elimination of unusable cases. Additionally, column amounts for percentage calculations are rounded to the nearest tenth causing column totals to appear as inaccurate when they are not.

Table 3.16

Created and Extrapolated Data Variables by Name and Label

Variable Name	Variable Label
caldate	Calendar Year Date of Study for Calculations
yrsnrank	Number of Years Faculty Member has Held Current Rank
yrsemply	Number of Years Faculty Member Employed at ISU
yrsdegr	Number of Years Since Member Received Highest Degree
yrstenur	Number of Years Faculty Member has Been Tenured
newpd1	The Five Primary Disciplines in the College of LAS
newpd2	The Two Primary Discipline in the College of Design
tempsal	Temporary Salary Calculations Equalizing Fractional Staff
newsal	Adjusted Salaries Making A-Base Comparable to B-Base

sake of trying to keep this study to something that is manageable in size, it was decided to limit this study to faculty who were classified as having some sort of tenure status. Therefore, all faculty catalogued as not eligible for tenure were eliminated from the analytical section of this research. An additional two cases were eliminated from the 1991 salary analysis because of missing data for tenure eligibility.

Since numerous variables provided in the initial download were not the exact variables desired for the salary regression model used in this examination, the variables listed in Table 3.16 were generated and added to each of the five data files. The beginning date for each fiscal period was the first variable created in each data file (note: this variable would be used to compute other needed variables). To create the Calendar Year Date of Study for Calculations (caldate) variable, the author opened the SPSS-10 data editor, the 1991 data file, and the SPPS-10 syntax editor. Then, within the syntax editor, the author typed the following syntax:

COMPUTE caldate = 1990

EXECUTE.

Next, by clicking on Run in the syntax editor pull down menu and then selecting the All function, the variable was added to 1991 data file. Similarly, to create a variable for the number of years a faculty member has been employed in their college of rank (yrsnrank), a new file was opened in the SPSS-10 syntax editor and the following syntax was typed into the editor:

COMPUTE yrsnrnk = caldate - rankdate.

EXECUTE.

Then, by clicking on Run and selecting All, the yrsnrank variable was added to the 1991 data file. This same technique was repeated to create variables for the number of years employed (yrsemply), the number of years tenured (yrstenur), and the number of years since receiving highest degree (yrsdegree). The above procedures were then executed within each of the data files to create these variables for each study year.

To account and/or control for some of the market force differences of faculty being employed in a diverse array of disciplines in both the College of LAS and the College of Design, it was decided to integrate faculty from various pay departments systematically into comparable pay groups. For the College of LAS, faculty members were categorized as being employed in the Biosciences, Humanities, Math-Sciences, Physical Sciences, or Social Sciences. For the College of Design, faculty members were classified as employed in the field of Fine Arts and Design or the field of Applied Arts and Architecture. To create the two College of Design variables, the following syntax was entered on the editor page:

Recode pd1 ('07050' =1) ('07100', '07150', '07200' =2) into newpd2.

To create the five College of LAS variables, the syntax editor of SPSS-10 was used as outlined previously with one exception, it was necessary to enter the following syntax on the editor page:

Recode pd1 ('04300', '04020', '04180' =1) ('04050' ,'04110', '04120', '04310', '04330', '04160', '04340' =2) ('04170', '04090', '04190' =3) ('04030', '04060', '04140' =4)

('04040', '04320', '04150', '04230' =5) into newpd1.

Finally, variable labels and value labels defining the new variables and groupings were added to the data file for the data created in this procedure.

As noted earlier in this chapter, faculty workloads are not a constant at the university. Several steps were taken to compensate for this, and in doing so two more variables were created and added to each of the data files. First, the base salary of each faculty member was multiplied by (1/the fraction appointment ratio of each faculty member) to create a variable called Temporary Salary Calculations Equalizing Fractional Staff (tempsal). To do this within SSPS-10, it was initially necessary to open one of the data files and the SPSS-10 syntax editor. To add the tempsal variable, the Run and All functions were utilized after entering the following syntax on the syntax editor page:

```
COMPUTE tempsal= basesalry* (1/fraction).
EXECUTE.
```

To produce and add the Adjusted Salaries Making A-Base Comparable to B-Base (newsal) variable to each of the data files required opening a new syntax file, then entering and running the syntax shown below:

```
IF (aptbase1=1 or aptbase1=2) newsal = tempsal * (9/11).
EXECUTE.
IF (aptbase1=3 or aptbase1=4) newsal = tempsal.
EXECUTE .
```

This newsal variable provided a comparative equalization for salaries of faculty with nine-month appointments to faculty with eleven-month appointments. As was the case with all created variables, variable labels and value labels were added to this data set. Additionally, this data conversion procedure was repeated for each year of this investigative project.

The next phase of the data inspection process involved compiling breakdown information on the newly created variables for tenured and tenure-track faculty at the university. The length of

Table 3.17

Number of Years Employed in College of Rank for Tenured and Tenure-Track Faculty Members at the University by Year Studied

Year	Faculty Count	Minimum Years	Maximum Years	Mean Years	Standard Deviation
1991	1,447	0	37	8.54	7.36
1992	1,477	0	38	8.69	7.26
1998	1,456	0	37	9.67	8.11
1999	1,443	0	38	9.53	8.28
2000	1,424	0	36	9.24	8.23

Note: Number of years at college of rank is based on data following elimination of non-comparable cases.

time a faculty member has been in the college where he or she holds rank is presented in Table 3.17. The average number of years employed in the college of rank for faculty varied little across the decade, with 9.67 years being the highest average. Seeing that the analysis did not produce any negative or unusual numbers (e.g., a faculty member employed in the current college of rank for 94 years of service), this variable was deemed as suitable for use in the study.

Table 3.18

Number of Years Employed at the University for Tenured and Tenure-Track Faculty Members by Year Studied

Year	Faculty Count	Minimum Years	Maximum Years	Mean Years	Standard Deviation
1991	1,448	0	43	14.68	9.69
1992	1,477	0	44	14.78	9.58
1998	1,456	0	48	15.85	10.57
1999	1,443	0	49	15.62	10.81
2000	1,424	0	50	15.11	10.91

Note: Number of years at ISU is based on data following elimination of non-comparable cases.

Table 3.18 (on page 77) presents the results from scrutinizing the longevity of faculty employment at the university. In examining the data with regard to duration of employment for tenured and tenure track faculty, it is noticeable that faculty are working at the university for longer durations (viz., maximum number years increased by 7 years and average number of years employed increased ½ a year). Since the data for this variable appear complete and no negative or unusual numbers emerged from any of the five analyses, it was decided it would be expedient to use this variable in the regression model.

Table 3.19 reveals the results of examining the data files with attention given to the number of years that have passed since each faculty member received his or her highest educational degree. Not surprisingly, the length of time and average length of time elapsed since faculty members had received their highest educational degree has increased in correspondence to the number of years employed. The analysis did not expose any unusual data nor any signs of the data being incomplete. Since years of employment at the university does not factor into the career experiences of faculty prior to becoming a faculty member at ISU, it was decided to use this variable in the regression model because of its potential for helping to account for career experiences of employees who

Table 3.19

Number of Years Since Tenured and Tenure-Track Faculty Members Earned Highest Educational Degree by Year Studied

Year	Faculty Count	Minimum Years	Maximum Years	Mean Years	Standard Deviation
1991	1,448	0	45	17.20	9.46
1992	1,477	0	44	17.45	9.42
1998	1,456	0	49	18.87	10.23
1999	1,443	0	50	18.89	10.30
2000	1,424	0	51	18.56	10.52

Note: Number of years since receiving highest degree is based on data following elimination of non-comparable cases.

have worked at other institutions prior to working at the university.

The number of years that have elapsed since reaching the faculty status of tenured is presented in Table 3.20. Information obtained from this examination suggests that tenured faculty members have remained in their positions somewhat longer at the end of the 1990s decade as opposed to the beginning of the decade. Because tenure-track faculty members had not achieved tenured status at the university, it was expected that cases would be missing from the data files. Unfortunately, close inspection of the data revealed that tenured faculty had numerous instances of missing information. Since effective use of this variable would substantially diminish the size of the faculty group in this study, the number of years since becoming tenured was eliminated as a potential predictor variable in the model of salary equity.

As indicated in Table 3.21, the total number of faculty employed in the various Humanities departments was greater than any other grouping of faculty within the College of LAS. The Physical Sciences faculty group showed the most growth in the decade, with an increase of 13 members (12.4 % of the LAS Faculty in 1991 vs. 14.7% of LAS faculty in 2000). Given that the numbers of faculty employed in some groupings are relatively low, it was decided to examine for salary equity on these groups individually and in newly-defined groups of faculty

Table 3.20

Number of Years Faculty Members Have Been Tenured by Year Studied

Year	Faculty Count	Minimum Years	Maximum Years	Mean Years	Standard Deviation
1991	1,028	0	37	11.74	7.76
1992	1,056	0	36	12.30	7.96
1998	1,126	0	42	14.05	9.15
1999	1,110	0	43	13.93	9.36
2000	1,059	0	43	13.86	9.34

Note: Because this variable had numerous incidences of missing data, it was eliminated from the salary equity models used in this study.

Table 3.21

Frequencies and Percentages of Tenured and Tenure-Track LAS Faculty Members by Discipline Groupings and Year Studied

	1991		1992		1998		1999		2000	
Discipline	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Bio-Sciences	49	11.9	46	10.6	48	10.7	51	11.3	50	11.5
Humanities	170	41.4	175	40.3	172	38.4	174	38.4	171	39.2
Math-Sciences	80	19.5	83	19.1	91	20.3	92	20.3	87	20.0
Physical Sciences	51	12.4	51	11.8	62	13.8	66	14.6	64	14.7
Social Sciences	61	14.8	79	18.2	75	16.7	70	15.5	64	14.7
Total	411	100.0	434	100.0	448	100.0	453	100.0	436	100.0

Note: Percentage calculations for each column are based on the intact tenured and tenure-track faculty data prior to the elimination of unusable cases. Additionally, column amounts for percentage calculations are rounded to the nearest tenth, causing column totals to appear inaccurate when they are not.

within the College of LAS. For comparative purposes, faculty from the Humanities would be combined with faculty from the Social Sciences to form a group called the Soft-Sciences Division, and faculty from Bio-Sciences, Math-Sciences, and Physical Sciences would be combined to form a group called the Hard Sciences Division.

Table 3.22 shows the breakdown of information on tenured and tenure-track faculty from the College of Design after faculty were categorized under a consensus opinion that faculty from the field of Architecture are paid significantly more than faculty from Fine Arts and Design disciplines. Inspection of the five data files revealed that both groups appear to be relatively the same size in 1991 and 2000. Some differences in faculty group size are noticeable in the 1998 and 1999 data sets, when the proportion of tenured and tenure-track faculty employed in the Architecture division reached approximately 54% of all faculty in the College of Design. It is important to note that this variable was created to be used as a dichotomous predictor variable in the model for analyzing salary equity only at the University level and within the College of Design.

Table 3.22

Frequencies and Percentages of Tenured and Tenure-Track Design Faculty Members by Discipline Groupings and Year Studied

	1991		1992		1998		1999		2000	
Discipline	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Fine-Arts/Design	35	51.5	36	50.0	32	45.7	31	45.6	32	50.0
Architecture	33	48.5	36	50.0	38	54.3	37	54.4	32	50.0
Total	68	100.0	72	100.0	70	100.0	68	100.0	64	100.0

Note: Percentage calculations for each column are based on the intact faculty data prior to the elimination of unusable cases.

Salaries of tenured and tenure-track faculty after equalizing for various appointment type levels within the university are presented in Table 3.23. Notably, the mean salary for this faculty group increased substantially during this period of research. Faculty members with administrative status are included in this table summary. Therefore, ranges and means of adjusted salaries reported here may be somewhat misleading when thinking about the teaching faculty. This instance demonstrates that it is not always accurate to depend on mean salary figures to make comparisons

Table 3.23

Descriptive Features of Adjusted Salaries for Tenured and Tenure-Track Faculty Members at University by Year Studied

Year	Faculty Count	Minimum Salary	Maximum Salary	Mean Salary	Standard Deviation
1991	1,448	$ 20,373.55	$ 145,014.55	$ 54,077.32	$ 16,424.98
1992	1,477	$ 14,809.09	$ 134,181.82	$ 52,985.28	$ 16,423.69
1998	1,456	$ 24,545.45	$ 251,414.00	$ 65,926.12	$ 23,979.72
1999	1,443	$ 25,200.82	$ 254,756.00	$ 68,252.34	$ 24,992.62
2000	1,424	$ 26,590.91	$ 231,336.00	$ 70,604.35	$ 26,129.21

Note: Amounts reflected include faculty with administrative standing or special appointment status.

in wages among faculty, and lends credence to the proposition that there is a need to use a control model in the study of faculty salary-equity. These adjusted salaries will be used as the wage of comparison on building the regression models used in this research project.

Data Analysis Methods

A five-step analytical model was used in determining if gender-related wage disparities exist among tenured and tenure-tack faculty members at ISU. In simplified form, these steps are:

1. Select independent clusters of faculty to be compared.
2. Generate autonomous salary regression equations for each faculty cluster chosen.
3. Compute the predicted wage for each faculty member in the independent clusters.
4. Compute the salary residuals (i.e., subtract the predicted annual wage from the adjusted wage) for faculty members of each cluster.
5. Compare the salary residuals of the Caucasian-male faculty members to the salary residuals of the female faculty members in each of the selected clusters.

The following sections outline the process and techniques for using the above multi-level analytical model on the five data files contained in this research project.

Selection of Clusters

The first step in the analytical process necessitated the clustering of university faculty into various groups upon which distinct regression models could be built. In the initial pilot studies at the university, data of faculty members were analyzed at the university-wide level, college-wide level, chosen college-grouping level, and selective disciplines level. This somewhat arbitrary system for organizing of faculty into rational clusters produced 19 different faculty clusters for the model building process. These cluster formations are the footings in the foundation of the 95 hypotheses (detailed in Chapter1) to be tested. Upon choosing the faculty clusters, simplified names or acronyms were assigned to each of the cluster formations. Listed in Table 3.24 (on page 83) are the 19 faculty clusters and the abridged names or acronyms assigned to each cluster. This list of cluster groups is not exhaustive. Thus, many other combinations of clusters

Table 3.24

Faculty Member Divisions for Investigative Model

Name	Clusters
ISU	Iowa State University
Agriculture	College of Agriculture
Design	College of Design
Education	College of Education
Engineering	College of Engineering
FCS	College of Family and Consumer Sciences
FCS&ED	College of Family and Consumer Sciences combined with College of Education
Library	College of Library Services
LIB&ED	College of Library Services combined with College of Education
Business	College of Business
LAS	Liberal Arts and Sciences
Biology	Bioscience Departments within the College of Liberal Arts and Sciences
Humanities	Humanities Departments within the College of Liberal Arts and Sciences
Math	Mathematics Departments within the College of Liberal Arts and Sciences
PHY-SCI	Physical Sciences Departments within the College of Liberal Arts and Sciences
SOC-SCI	Social Science Departments within the College of Liberal Arts and Sciences
SFT-SCI	Soft-Sciences Departments within the College of Liberal Arts and Sciences.
HRD-SCI	Hard-Sciences Departments within the College of Liberal Arts and Sciences
VET-MED	College of Veterinary Medicine

could have been selected for this kind of examination. Various departments from independent colleges could have been coupled into cluster groups according to the subject matter taught (e.g., faculty teaching Hotel Management from FCS could be coupled with faculty teaching Management in Business). It was decided to constrain this exercise to examining the clusters used in the original pilot study at the university.

Generate Regression Equations

Prior to generating the regression equations used to compare the cluster groups chosen, a series of micro-steps were performed. First, it was necessary to choose the predictor variables that would be used in trying to account for the variations in the criterion variable (i.e., what faculty attributes in the data set would be used in the regression analysis to account for fluctuations in wages among faculty in a given group). Data available from the university facilitated the process. The following faculty attributes (predictor variables) were selected to use in the regression equations:

> Age of Individual, Highest Degree Earned, Number of Years Since Receiving Highest Degree, Classification of Periodic Faculty, Rank of Regular Faculty, Number of Years in Current Rank, Graduate Faculty Member Status, Administrative Position Status, College of Rank (for ISU cluster analyses only), Number of Years Employed at ISU, Five Disciplines in LAS, and Two Disciplines in Design.

Only selected variables from the above list were applicable in each of the clusters formed in this analyses (e.g., five discipline within the College of Liberal Arts and Sciences were used as independent dichotomous variables in performing the regression analysis of the Iowa State University cluster group and the Liberal Arts and Sciences cluster group, etc.).

Given that predictor variables used in regression analysis should be continuous or dichotomous, it was an imperative to breakdown the categorical variables of each fiscal data file into sets of dichotomous variables. Using the SPSS-10 syntax editor, several syntax statements were composed and then executed to produce computationally friendly predictor variables. Appendix A provides several tables detailing the syntax utilized in collapsing each categorical variable into dichotomous variables. Since the procedures for entering and executing these syntax statements are so similar to those outlined previously in this chapter, the instructional steps for this process are not reflected upon here.

Determining the type of regression method to use in the model-building phase of the analysis was the next micro-step taken. When using the SPSS-10 statistics package, three options are available for generating the regression equations that could be used in helping to make the comparative procedures of this study possible. Forward solution, backward solution, and stepwise solution are the regression methods offered. Arguments for and explanations of each option are beyond the scope of this paper and can be found in many textbooks on statistics and in the application guides provided by SPSS, Inc. within their statistical package programs. As part of the replication process, the author chose to use the stepwise solution approach for the regression analysis portion of this study.

The process for doing the regression analysis on a computer is extremely simple when compared to doing the analysis by long hand. For this study, 19 distinct syntax statements (provided in Appendix B) were written within SPSS-10 data editor and saved as separate files to the hard disk on the author's computer. The first element in each of these syntax statements define the faculty group to be analyzed with regard to clustering order, selection of the Caucasian-males only, selection of tenure or tenure-track faculty only, and selection of a non-supervisory administrative faculty. The second part of these syntax statements asks the computer to do the stepwise solution regression and asks for a variety of other output (e.g. correlation matrix of the predictor variables, etc.). For further discussion and details of what other information can be obtained when performing a regression analysis within SPSS-10 or other versions of SPSS, please refer to the application guide that comes with the program package. Next, each of the regression syntax statements were opened and then independently applied in each year of the study producing 95 different output statements in the SPSS-10 output editor (note: since many procedures for running applications were covered previously in this chapter, technical details and instructions on this process are excluded). A pivotal procedure in running each of the independent regressions on SPSS-10 was to make sure the filter variable created from running each analysis was deleted or shut-off prior to executing each of the remaining regression analyses. Knowing most researchers are interested in a variety of the statistical properties surrounding the building of regression models of this nature, selected segments of the information from each output are presented in Appendix C. Finally, the regression output statements were independently saved to a computer disk for latter use in the comparative portion of this research.

Computation of Predicted Wages

The next stage in the process toward performing this comparison study of faculty wages required the composition of 95 additional syntax statements formulated from the 95 output statements obtained during the regression analysis phase. These syntax statements function to produce predicted salaries for all faculty members in each selected cluster. These 95 syntax statements are individually different, yet not too complex. Instead of presenting each of the syntax statements in an appendix, an example of one of these syntax statements is presented below:

```
IF ((collrank=8) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1))
ynewbus = 61,409.111 + (129,05.580 *  full) + (-70,64.077 * assist) .
EXECUTE.
```

The first line of this statement defines the cluster (e.g., College Of Business), selects faculty with tenure status (e.g., tenured or tenure-track faculty), and selects non-administrative status faculty. Importantly, it should be noted the selection process now includes faculty of all ethnic backgrounds and from both genders. The second line of the syntax contains the mathematical formula for computing the predicted salary for each faculty member in the cluster group. It was constructed by typing an invented name for the predicted variable, followed by a mathematical equation extracted from the regression output (i.e., the constant plus or minus any variable deemed to significantly account for variations in the wages of the Caucasian-male faculty member multiplied by a coefficient for that variable). The final line tells the computer program to run the statement when it is executed and produces a new variable in the data file.

Computation of Salary Residuals

The fourth stage of the salary equity analysis required computing salary residuals (i.e., actual salary of individual subtracted from predicted salary) for each of the faculty members in each cluster for each year of the study. As with the computation of the predicted salaries, 95 additional SPSS-10 syntax statements were produced to accomplish the task of calculating these residuals. An example of the syntax statement follows:

```
IF ((collrank=8) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1))
NBUSRES = newsal-ynewbus.
EXECUTE.
```

As in stage three, the first line of the syntax singles out the group for the calculation. On the second line of the syntax, a variable name for the regression variable is entered along with a simple equation for the subtraction of the predicted salary from the actual salary (in the case above: salary residuals for the College of Business were produced). Again, the third line tells the computer to run the syntax when executed within SPSS-10. Instead of saving each of these statements as a separate file on a computer disk, these syntax statements were simply added to the syntax statement created in stage three of this process. Finally, the combined syntax statements were executed within the data file from which each syntax command had been derived. This phase of the process created 38 new variables (viz., 19 predictor variables and 19 residual variables) in each of the fiscal data files.

Comparison of Salary Residuals

Step five required making comparisons of the salary residuals for Caucasian-male faculty members to the salary residuals of female faculty members in each cluster group. In the original pilot study at the university, the team believed that the comparisons should be conducted on faculty groups within the cluster rather than case by case within the cluster. It was ascertained that, by doing so, we could compare the average salary residuals of Caucasian-males to the average salary residuals of female faculty members in a given cluster. By comparing the mean salary residuals of the selected groups in each cluster, it would be possible to determine if the wages of Caucasian-male faculty members were significantly different than the wages of female faculty members in each cluster.

To perform the comparison, it was decided to use *t*-test for groups as the avenue of statistical comparison. Prior to making the comparisons, it was determined that one more variable (genethn) would have to be created in each of the fiscal data files. The comparison process required that we insulate non-Caucasian-males from this analysis so as to not bias the average salary residual calculations of the male group. The new variable (genethn) would code faculty within a cluster into three categories, Caucasian-male faculty members, female faculty members, and non-Caucasian-male faculty members. The syntax statement creating the three classifications for this new categorical variable is presented in the order mentioned below:

```
IF (gender=1) genethn = 1.
EXECUTE.
IF (gender=2 and ethnic=1) genethn = 2.
EXECUTE .
IF (gender=2 and ethnic ~= 1) genethn = 3.
EXECUTE.
```

After creating this syntax statement within the SPSS-10 syntax editor, the syntax was saved to computer disk, and then applied to each of the fiscal data files creating the new variable.

The next phase of the comparative analysis involved using SPSS-10 to execute the actual statistical procedure desired. As mentioned previously, *t*-test groups were the method chosen for making the final comparison of salary residuals. To accomplish this task within SPSS-10, the 1991 data set was loaded into the SPSS-10 data editor. Next, the Analyze pull-down menu was opened by selecting the Analyze feature of the Menu bar in the SPSS-10 editor. After opening the pull-down menu, the Compare Means category menu was selected. Then, within the Compare Means category menu, the Independent-Samples T Test function was selected thus creating a pop-up window. After the pop-up window appeared, each of the cluster-related salary residual variables were highlighted and then moved to the Test Variable(s) box. Next, the genethn variable was highlighted and moved into the Grouping Variable box. This action was followed by opening the

Define Groups option in the Grouping Variable box. Within the define Groups box, the numerical value code for the females and the Caucasian-males were then entered and the continue option was selected. Last, by selecting the OK option, SPSS-10 produced an output window that contained two sets of tabular information for final inspection and interpretation (note: the salary residual average for the Caucasian-male clusters should always equal zero or there has been an entry-error when creating the predicted salary variable). As always, the output from the analysis was saved to a computer disk. After saving the 1991 output, each of the other data files were opened and the same techniques were used to perform and complete investigation for each year of the study.

CHAPTER 4

RESEARCH FINDINGS

Chapter Preface

As discussed in the previous chapters, this research study examines the status of salary equity for female faculty members when compared to Caucasian-male faculty members at a major land grant institution in five years of the 1991-2000 decade. Using stepwise solution regression analysis to pick the best predictors of wages for Caucasian-male faculty members, an analytical model was designed to predict what the wages of female faculty members ought to be if they were a component of this historically dominant group in academe. After selecting cluster groups of faculty members to apply the model to, salary residuals were calculated for the faculty members in 19 cluster groups. Finally, SPSS-10 was used to scrutinize whether the mean salary residuals of the Caucasian-male as compared to female faculty members in these 19 cluster groups were equitable in each year of the study.

This chapter is written to present results from the 95 independent comparative inspections spawned from the analytical operations of this research project. These 95 comparative inspections are based upon the global null hypothesis that there is no significant difference in the mean salary residuals of female faculty members and the mean salary residuals of Caucasian-male faculty members within a chosen cluster group at the university. The rest of this chapter is partitioned into six sections (viz., one section for each year of the study and a section highlighting/summarizing the findings).

Results from 1991 Fiscal Data

The number of Caucasian-male and female faculty members, along with the mean salary residuals, and other statistics from 19 cluster group comparisons (viz., faculty members on a university-wide basis, faculty members on an autonomous college basis, faculty members on a combined college basis, and/or faculty members on a divisional or a merged divisions basis) for the 1991 fiscal data are presented in Table 4.1 (on pages 91-92).

Table 4.1

1991 Salary Residual Statistics of Females and Caucasian-Males by Cluster at University

Cluster Group	Gender/Ethnicity	N	Mean Residual	Std. Deviation	Std. Error Mean
ISU	Females	259	257.0275	5,789.6050	359.7485
Residuals	Caucasian-Males	978	6.682E-03	8,294.4861	265.2284
Agriculture	Females	22	- 714.8755	5,173.6894	1,103.0343
Residuals	Caucasian-Males	228	9.916E-03	8,862.1558	586.9106
Design	Females	19	- 2,469.9838	4,378.3899	1,004.4715
Residuals	Caucasian-Males	46	5.020E-04	5,952.0958	877.5887
Education	Females	23	1,721.5973	4,514.3675	941.3107
Residuals	Caucasian-Males	48	- 3.3011E-03	5,106.4802	737.0569
Engineering	Females	11	- 650.8421	4,846.7828	1,461.3600
Residuals	Caucasian-Males	166	- 5.5831E-03	7,999.5931	620.8888
FCS	Females	68	248.1390	6,763.1425	820.1515
Residuals [a]	Caucasian-Males	14	- 5.7143E-04	5,052.4510	1,350.3243
FCS-EDUC	Females	91	1,239.4358	5,437.2531	569.9790
Residuals	Caucasian-Males	62	- 3.1041E-03	5,566.5008	706.9463
Library	Females	22	- 3,448.0869	7,087.7551	1,511.1145
Residuals	Caucasian-Males	11	- 4.1322E-05	5,819.6920	1,754.7032
LIB-EDUC	Females	45	1,296.8445	4,594.2557	684.8712
Residuals	Caucasian-Males	59	3.663E-03	5,065.9399	659.5292
Business	Females	6	1,771.7132	6,464.6011	2,639.1624
Residuals	Caucasian-Males	33	- 4.2424E-04	6,099.4301	1,061.7745
LAS	Females	75	- 33.9221	5,508.9570	636.1196
Residuals	Caucasian-Males	367	- 3.1096E-04	8,799.6887	459.3400

[a] The regression equation for this cluster had an Adjusted $R^2 = .386$.

Table 4.1

(Continued)

Cluster Group	Gender/Ethnicity	N	Mean Residual	Std. Deviation	Std. Error Mean
Biology	Females	4	- 991.3550	1,496.4448	748.2224
Residuals	Caucasian-Males	42	- 3.3766E-04	7,320.9943	1,129.6539
Humanities	Females	48	- 420.1008	4,252.6856	613.8223
Residuals	Caucasian-Males	107	8.001E-04	5,153.2854	498.1869
Math	Females	3	2,016.9753	6,918.9423	3,994.6532
Residuals [b]	Caucasian-Males	63	- 3.6667E-03	11,897.2828	1,498.9167
Phys-Sciences	Females	2	- 4,910.8705	2,961.8645	2,094.3545
Residuals	Caucasian-Males	46	3.482E-03	9,489.4010	1,399.1358
Soc-Sciences	Females	8	- 4,716.1181	7,777.0593	2,749.6057
Residuals	Caucasian-Males	45	- 2.8889E-04	11,333.0321	1,689.4287
Soft-Sciences	Females	56	- 934.7150	5,562.1158	743.2690
Residuals [c]	Caucasian-Males	152	- 4.9302E-03	8,368.4571	678.7715
Hard-Sciences	Females	9	- 373.4278	4,622.2052	1,540.7351
Residuals	Caucasian-Males	151	- 6.8212E-04	10,832.7949	881.5603
Vet-Med	Females	13	1,871.9963	6,176.3683	1,713.0163
Residuals	Caucasian-Males	65	- 2.0699E-03	6,456.6846	800.8532

[b] The regression equation for this cluster had an Adjusted $R^2 = .475$.

[c] The regression equation for this cluster had an Adjusted $R^2 = .371$.

Pertinently, there were very few female faculty members in six of the cluster groups (viz., N = 6 for females in Business, N = 4 for females in Biology, N = 3 for females in Math, N = 2 for females in Physical Sciences, N = 8 for females in Social Sciences, and N = 9 for females in Hard-Sciences = 9). As expected, the salary residual mean calculated for Caucasian-males is approximately zero (always less than one cent) in each of the cluster formations. Salary residual means (the calculated possible wage disparity) for female faculty members in the various cluster groups were broadly different from their Caucasian-male counterparts (ranging from a probable *negative* wage disparity of $4,910.87 for the females employed in the Physical Sciences division to a probable *positive* wage disparity of $2,016.98 for females in the Math division). Noticeably, female faculty members employed in the College of Liberal Arts and Sciences had the lowest salary residual mean (a potential *negative* wage disparity of $33.92) for the 1991 cluster group study. When comparing the salary residual means of females to Caucasian-males at the university as a whole level, it is interesting that the wage disparity for female faculty members turned out to be presumably favorable (a *positive* wage disparity of $257.023).

Table 4.2 (on pages 94-97) contains the information acquired when testing to see if the salary residual means of female faculty members were significantly different from the salary residual means of the Caucasian-male faculty members in each of the cluster groups for the fiscal year of 1991. In examining the results for determining which type of assumption should be followed in doing the *t*-test (equal as opposed to non-equal salary residual variances between the males and females in a given cluster), the Levene's Variances Test revealed that the salary residual variance for females was significantly different ($\alpha = .10$ arbitrarily set by the author) than the salary residual variance for Caucasian-males in five of the groupings (viz., Iowa State University cluster, Liberal Arts and Sciences cluster, Biology cluster, Soft-Sciences cluster, and Hard-Sciences cluster). Accordingly, in these instances the *t* statistic for the assumption of non-equal variances was used to determine if the mean salary residual were dissimilar.

With regard to the 19 independent hypothesis tests performed on the 1991 data, there were no significant differences found when comparing the salary residual means for the female faculty members with that of the Caucasian-male faculty members for any of the cluster groups. In laymen terms, when using a statistical test that is accurate 99 times out of 100 to compare aspects of faculty information for the 1991 school year, it was determined

Table 4.2

1991 Independent t-test of Faculty Salary Residuals for Females vs. Caucasian-Males by Faculty Clusters at University

		Levene's Variances Test		Equality of Means *t*-test					95% Confidence Interval of the Difference	
Cluster Group	Assumption	F	Sig.	*t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
ISU Residuals	Equal Variances	11.721	.001	.469	1,235.000	.639	257.0208	547.7097	- 817.5235	1,331.5652
	Non-Equal Variances			.575	570.211	.565	257.0208	446.9509	- 620.8503	1,134.8919
Agriculture Residuals	Equal Variances	.701	.403	- .372	248.000	.710	- 714.8854	1,922.4653	- 4,501.3262	3,071.5555
	Non-Equal Variances			- .572	34.320	.571	- 714.8854	1,249.4594	- 3,253.2214	1,823.4506
Design Residuals	Equal Variances	.003	.959	- 1.632	63.000	.108	- 2,469.9843	1,513.0498	- 5,493.5731	553.6045
	Non-Equal Variances			- 1.852	45.389	.071	- 2,469.9843	1,333.8384	- 5,155.8376	215.8690
Education Residuals	Equal Variances	.159	.691	1.378	69.000	.173	1,721.6006	1,249.0749	- 770.2356	4,213.4367
	Equal Variances			1.440	48.681	.156	1,721.6006	1,195.5412	- 681.3278	4,124.5289
Engineering Residuals	Equal Variances	2.251	.135	- .266	175.000	.790	- 650.8365	2,445.1482	- 5,476.6115	4,174.9385
	Non-Equal Variances			- .410	13.909	.688	- 650.8365	1,587.7897	- 4,058.4053	2,756.7323

Table 4.2

(continued)

		Levene's Variances Test		Equality of Means *t*-test					95% Confidence Interval of the Difference	
Cluster Group	Assumption	F	Sig.	*t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
FCS	Equal Variances	1.404	.240	.130	80.000	.897	248.1396	1,912.2976	- 3,557.4539	4,053.7332
Residuals [a]	Non-Equal Variances			.157	23.734	.877	248.1396	1,579.8811	- 3,014.5102	3,510.7894
FCS-EDUC	Equal Variances	.359	.550	1.371	151.000	.172	1,239.4393	904.0412	- 546.7644	3,025.6430
Residuals	Non-Equal Variances			1.365	129.106	.175	1,239.4393	908.1019	- 557.2487	3,036.1273
Library	Equal Variances	.224	.640	- 1.393	31.000	.174	- 3,448.0868	2,475.9694	- 8,497.8598	1,601.6861
Residuals	Non-Equal Variances			- 1.489	24.037	.149	- 3,448.0868	2,315.6965	- 8,227.0586	1,330.8850
LIB-EDUC	Equal Variances	.385	.536	1.346	102.000	.181	1,296.8409	963.4780	- 614.2133	3,207.8950
Residuals	Non-Equal Variances			1.364	98.915	.176	1,296.8409	950.8035	- 589.7797	3,183.4614
Business	Equal Variances	.021	.886	.649	37.000	.520	1,771.7136	2,729.4679	- 3,758.7136	7,302.1408
Residuals	Non-Equal Variances			.623	6.722	.554	1,771.7136	2,844.7395	- 5,011.8250	8,555.2522

[a] The regression equation for this cluster had an Adjusted $R^2 = .386$.

Table 4.2

(continued)

Cluster Group	Assumption	Levene's Variances Test F	Sig.	Equality of Means *t*-test t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
LAS Residuals	Equal Variances	6.030	.014	- .032	440.000	.974	- 33.9218	1,056.5459	- 2,110.4256	2,042.5820
	Non-Equal Variances			- .043	162.365	.966	- 33.9218	784.6282	- 1583.3132	1,515.4696
Biology Residuals	Equal Variances	3.096	.085	- .268	44.000	.790	- 991.3547	3,703.5889	- 8,455.4477	6,472.7383
	Non-Equal Variances			- .732	23.377	.472	- 991.3547	1,354.9741	- 3,791.8343	1,809.1250
Humanities Residuals	Equal Variances	0.909	.342	- .494	153.000	.622	- 420.1026	850.2442	- 2,099.8368	1,259.6315
	Non-Equal Variances			- .531	108.448	.596	- 420.1026	790.5492	- 1,987.0348	1,146.8296
Math Residuals [b]	Equal Variances	0.460	.500	.290	64.000	.773	2,016.9790	6,957.4636	- 11,882.1523	15,916.1103
	Non-Equal Variances			.473	2.601	.673	2,016.9790	4,266.6152	- 12,818.5210	16,852.4790
Phys-Sciences Residuals	Equal Variances	1.875	.178	- .724	46.000	.473	- 4,910.8740	6,786.7592	- 18,571.9118	8,750.1638
	Non-Equal Variances			- 1.950	2.083	.185	- 4,910.8740	2,518.7104	- 15,346.6152	5,524.8673

[b] The regression equation for this cluster had an Adjusted $R^2 = .475$.

Table 4.2

(continued)

Cluster Group	Assumption	Levene's Variances Test F	Sig.	Equality of Means t-test t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Soc-Sciences	Equal Variances	1.404	.242	- 1.126	51.000	.265	- 4,716.1178	4,187.5658	- 13,123.0069	3,690.7713
Residuals [c]	Non-Equal Variances			- 1.461	12.988	.168	- 4,716.1178	3,227.1505	- 11,688.5849	2,256.3492
Soft-Sciences	Equal Variances	4.744	.031	- .775	206.000	.439	- 934.7101	1,206.7431	- 3,313.8605	1,444.4404
Residuals	Non-Equal Variances			- .929	147.599	.355	- 934.7101	1,006.5682	- 2,923.8567	1,054.4365
Hard-Sciences	Equal Variances	2.771	.098	- .103	158.000	.918	- 373.4271	3,639.2022	- 7,561.1865	6,814.3323
Residuals	Non-Equal Variances			- .210	14.015	.836	- 373.4271	1,775.1094	- 4,180.2675	3,433.4133
Vet-Med	Equal Variances	0.283	.596	.961	76.000	.340	1,871.9984	1,948.4818	- 2,008.7394	5,752.7362
Residuals	Non-Equal Variances			.990	17.661	.336	1,871.9984	1,890.9761	- 2,106.2739	5,850.2708

[c] The regression equation for this cluster had an Adjusted $R^2 = .371$.

that the salary disparities that exist between female and Caucasian-male faculty members were not statistically different at the university level, college level, or other selected faculty grouping levels. However, the author believes that the computed wage disparities (average salary residual difference) for three cluster groups in this study year are suspiciously diverse and deem further investigation. The *negative* wage disparity ($2,469.98) for female members in the College of Design, the *positive* wage disparity ($1,721.60) for female members in the College of Education, and the *negative* disparity ($3,448.09) for female members in the College of Library border on being statistically significant and worthy of mention.

Results from 1992 Fiscal Data

When looking at the first section of SPSS-10 output (see Table 4.3 on pages 99-100) generated by analyzing and comparing the 1992 salary residuals of faculty members, it should be noted that the count for female faculty members was rather low in four of the 19 university cluster groups (viz., N = 8 for females in Business, N = 5 for females in Biology, N = 6 for females in Math, and N =4 for females in Physical Sciences). As before, the salary residual mean for the Caucasian-males computed to be zero (less than one cent) for each of the 19 cluster groups. Salary residual means for the female faculty members were wide-ranging in 1992, with women in the Biology division of LAS having the largest negative disparity (salary residual mean = - $6,625.95) and women in the College of Veterinary Medicine having the largest positive disparity (salary residual mean = $2,176.27). In reporting about the salary residual mean for the university as a whole, it is interesting that the wage disparity for female faculty members switched from being positive in 1991 to slightly negative (salary residual mean = - $24.17) in 1992 and that this was the smallest measured disparity gap for any of the 19 clusters studied.

Table 4.4 (on pages 101-104) contains the SPSS-10 results from performing the *t*-test for independent groups analysis on each of the cluster groups for the 1992 data used in this study. When using an $\alpha = .10$ level, the Levene's Variances Test revealed that it would be

Table 4.3

1992 Salary Residual Statistics of Females and Caucasian-Males by Cluster at University

Cluster Group	Gender/Ethnicity	N	Mean Residual	Std. Deviation	Std. Error Mean
ISU	Females	297	- 24.1708	6,837.5584	396.7554
Residuals	Caucasian-Males	972	6.435E-03	8,722.9812	279.7898
Agriculture	Females	22	- 408.2039	3,840.8325	818.8682
Residuals	Caucasian-Males	226	5.533E-03	6,934.5557	461.2798
Design	Females	20	- 1,835.2433	4,709.5396	1,053.0851
Residuals	Caucasian-Males	49	3.711E-05	5,942.8460	848.9780
Education	Females	24	1,144.1632	6,945.1765	1,417.6782
Residuals	Caucasian-Males	46	- 7.9486E-03	5,310.5419	782.9967
Engineering	Females	13	- 661.5635	4,225.0772	1,171.8256
Residuals	Caucasian-Males	167	4.698E-03	10,226.9304	791.3836
FCS	Females	71	- 1,326.0057	7,480.5780	887.7813
Residuals [a]	Caucasian-Males	14	2.338E-04	5,426.6203	1,450.3253
FCS-EDUC	Females	95	258.9327	7,871.2863	807.5769
Residuals	Caucasian-Males	60	6.161E-03	5,744.3022	741.5862
Library	Females	23	- 1,547.2021	8,663.0452	1,806.3698
Residuals	Caucasian-Males	16	- 6.0227E-04	4,740.2642	1,185.0661
LIB-EDUC	Females	47	- 150.6539	7,101.1195	1,035.8047
Residuals	Caucasian-Males	62	2.834E-03	5,377.5215	682.9459
Business	Females	8	- 1,058.5904	8,476.4244	2,996.8686
Residuals	Caucasian-Males	36	- 8.3333E-05	6,443.1810	1,073.8635
LAS	Females	101	- 741.3222	7,175.5843	713.9973
Residuals	Caucasian-Males	352	1.886E-03	9,467.8881	504.6401
Biology	Females	5	- 6,625.9450	12,758.1528	5,705.6194
Residuals	Caucasian-Males	38	3.612E-04	7,390.0178	1,198.8192

[a] The regression equation for this cluster had an Adjusted $R^2 = .246$.

Table 4.3

(continued)

Cluster Group	Gender/Ethnicity	N	Mean Residual	Std. Deviation	Std. Error Mean
Humanities	Females	58	- 2,020.8539	5,915.9830	776.8066
Residuals	Caucasian-Males	101	- 7.5404E-03	6,044.8169	601.4818
Math	Females	6	- 3,685.8322	9,358.5523	3,820.6130
Residuals [b]	Caucasian-Males	61	- 5.4098E-04	11,057.7611	1,415.8012
Phys-Sciences	Females	4	- 4,620.3075	5,432.1793	2,716.0897
Residuals [c]	Caucasian-Males	45	5.387E-05	12,667.0006	1,888.2850
Soc-Sciences	Females	15	- 3,385.5263	11,447.6274	2,955.7647
Residuals	Caucasian-Males	56	- 1.9489E-12	9,983.7894	1,334.1400
Soft-Sciences	Females	73	- 4,424.5580	10,150.0522	1,187.9738
Residuals	Caucasian-Males	157	5.156E-03	8,348.0526	666.2471
Hard-Sciences	Females	15	- 4,524.7913	8,066.4173	2,082.7400
Residuals	Caucasian-Males	144	7.233E-04	10,430.7365	869.2280
Vet-Med	Females	15	2,176.2745	6,049.6818	1,562.0211
Residuals	Caucasian-Males	66	2.342E-05	7,254.6762	892.9889

[b] The regression equation for this cluster had an Adjusted $R^2 = .439$.

[c] The regression equation for this cluster had an Adjusted $R^2 = .379$.

prudent to use the non-equal variances *t* statistic to compare the Caucasian-male salary residual average to the female salary residual average in four of the cluster groups (viz., Iowa State University cluster, Agriculture cluster, Engineering cluster, and Liberal Arts and Sciences cluster).

When considering the global hypothesis that there is no significant difference in the salary residual mean of female faculty members and the salary residual mean of Caucasian-male faculty members in the selected clusters at the university, it was found that two of the nineteen null hypotheses were rejected. The salary residual mean (a *negative* wage disparity

Table 4.4

1992 Independent t-test of Faculty Salary Residuals for Females vs. Caucasian-Males by Faculty Clusters at University

		Levene's Variances Test		Equality of Means *t*-test					95% Confidence Interval of the Difference	
Cluster Group	Assumption	F	Sig.	*t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
ISU	Equal Variances	8.721	.003	- .044	1,267.000	.965	- 24.1772	551.6790	- 1,106.4821	1,058.1277
Residuals	Non-Equal Variances			- .050	617.083	.960	- 24.1772	485.4865	- 977.5832	929.2288
Agriculture	Equal Variances	4.249	.040	- .272	246.000	.786	- 408.2094	1,502.2168	- 3,367.0571	2,550.6382
Residuals	Non-Equal Variances			- .434	36.103	.667	- 408.2094	939.8533	- 2,314.1318	1,497.7130
Design	Equal Variances	.000	.998	- 1.231	67.000	.223	- 1,835.2434	1,491.4160	- 4,812.1222	1,141.6354
Residuals	Non-Equal Variances			- 1.357	44.314	.182	- 1,835.2434	1,352.6832	- 4,560.8523	890.3655
Education	Equal Variances	.411	.524	.768	68.000	.445	1,144.1711	1,489.2292	- 1,827.5396	4,115.8818
Residuals	Non-Equal Variances			.706	37.394	.484	1,144.1711	1,619.5355	- 2,136.1534	4,424.4956
Engineering	Equal Variances	3.623	.059	- .231	178.000	.817	- 661.5682	2,861.2677	- 6,307.9392	4,984.8028
Residuals	Non-Equal Variances			- .468	25.065	.644	- 661.5682	1,414.0238	- 3,573.4196	2,250.2832

Table 4.4

(continued)

		Levene's Variances Test		Equality of Means *t*-test					95% Confidence Interval of the Difference	
Cluster Group	Assumption	F	Sig.	*t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
FCS	Equal Variances	1.472	.228	- .630	83.000	.530	- 1,326.0059	2,104.7932	- 5,512.3550	2,860.3431
Residuals [a]	Non-Equal Variances			- .780	23.943	.443	- 1,326.0059	1,700.4702	- 4,836.0460	2,184.0341
FCS-EDUC	Equal Variances	1.268	.262	.220	153.000	.826	258.9265	1,175.2099	- 2,062.8068	2,580.6598
Residuals	Non-Equal Variances			.236	149.736	.814	258.9265	1,096.4172	- 1,907.5210	2,425.3741
Library	Equal Variances	.486	.490	- .648	37.000	.521	- 1,547.2015	2,386.3180	- 6,382.3411	3,287.9381
Residuals	Non-Equal Variances			- .716	35.396	.479	- 1,547.2015	2,160.4058	- 5,931.3046	2,836.9016
LIB-EDUC	Equal Variances	.174	.677	- .126	107.000	.900	- 150.6567	1,194.8043	- 2,519.2168	2,217.9034
Residuals	Non-Equal Variances			- .121	82.877	.904	- 150.6567	1,240.6879	- 2,618.3893	2,317.0758
Business	Equal Variances	.863	.358	- .397	42.000	.693	- 1,058.5903	2,667.3825	- 6,441.5861	4,324.4055
Residuals	Non-Equal Variances			- .333	8.884	.747	- 1,058.5903	3,183.4579	- 8,274.4688	6,157.2882

[a] The regression equation for this cluster had an Adjusted $R^2 = .246$.

Table 4.4

(continued)

		Levene's Variances Test		Equality of Means *t*-test					95% Confidence Interval of the Difference	
Cluster Group	Assumption	F	Sig.	*t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
LAS Residuals	Equal Variances	3.521	.061	- .729	451.000	.466	- 741.3241	1,017.0578	- 2,740.0846	1,257.4365
	Non-Equal Variances			- .848	209.937	.397	- 741.3241	874.3305	- 2,464.9165	982.2683
Biology Residuals	Equal Variances	2.116	.153	- 1.725	41.000	.092	- 6,625.9454	3,840.2769	- 14,381.5419	1,129.6511
	Non-Equal Variances			- 1.136	4.360	.314	- 6,625.9454	5,830.2024	- 22,299.3835	9,047.4928
Humanities Residuals	Equal Variances	.055	.815	- 2.045	157.000	.043	- 2,020.8464	988.2268	- 3,972.7812	- 68.9116
	Non-Equal Variances			- 2.057	121.037	.042	- 2,020.8464	982.4504	- 3,965.8601	- 75.8327
Math Residuals [b]	Equal Variances	.345	.559	- .788	65.000	.434	- 3,685.8316	4,679.2089	- 13,030.8570	5,659.1938
	Non-Equal Variances			- .905	6.457	.398	- 3,685.8316	4,074.5032	- 13,487.0878	6,115.4245
Phys-Sciences Residuals [c]	Equal Variances	1.122	.295	- .718	47.000	.476	- 4,620.3076	6,434.5608	- 17,564.9741	8,324.3590
	Non-Equal Variances			- 1.397	6.497	.208	- 4,620.3076	3,307.9847	- 12,566.8107	3,326.1956

[b] The regression equation for this cluster had an Adjusted $R^2 = .439$. [c] The regression equation for this cluster had an Adjusted $R^2 = .378$.

Table 4.4

(continued)

Cluster Group	Assumption	Levene's Variances Test F	Sig.	Equality of Means t-test t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Soc-Sciences	Equal Variances	.270	.605	- 1.131	69.000	.262	- 3,385.5263	2,993.8310	- 9,358.0557	2,587.0030
Residuals [d]	Non-Equal Variances			- 1.044	20.074	.309	- 3,385.5263	3,242.9114	- 10,148.5321	3,377.4794
Soft-Sciences	Equal Variances	1.944	.165	- 3.487	228.000	.001	- 4,424.5632	1,268.7737	- 6,924.5843	- 1,924.5420
Residuals	Non-Equal Variances			- 3.248	118.982	.002	- 4,424.5632	1,362.0451	- 7,121.5527	- 1,727.5736
Hard-Sciences	Equal Variances	.650	.421	- 1.628	157.000	.105	- 4,524.7920	2,778.8202	- 10,013.4875	963.9035
Residuals [e]	Non-Equal Variances			- 2.005	19.245	.059	- 4,524.7920	2,256.8481	- 9,244.3689	194.7849
Vet-Med	Equal Variances	1.636	.205	1.078	79.000	.284	2,176.2744	2,018.3329	- 1,841.1166	6,193.6655
Residuals	Non-Equal Variances			1.210	24.092	.238	2,176.2744	1,799.2607	- 1,536.4644	5,889.0133

[d] The regression equation for this cluster had an Adjusted $R^2 = .459$. [e] The regression equation for this cluster had an Adjusted $R^2 = .480$.

of $2,020.85) for female faculty members in the Humanities division within the College of Liberal Arts and Sciences was significantly different ($\alpha \leq .05$) from the salary residual mean of their male-counterparts. One statistical test revealed that there was a highly significant difference (a *negative* wage disparity of $4,424.56 at the $\alpha \leq .01$ level) in the salary residual mean of female faculty members as compared to that of the Caucasian-male faculty members in the Soft-Sciences division within the College of Liberal Arts. Simply put, female faculty members working in the Humanities and/or Social Sciences appear to have significantly lower average financial compensation levels than their male counterparts.

Even though not statistically significant, wage disparities in two other cluster comparisons merit discussion. In the Biology division of the College of Liberal Arts and Sciences, the salary residual mean (a *negative* wage disparity of $6,626.95 at an $\alpha \leq .10$) for female faculty members was noticeably different from the salary residual mean for the Caucasian-male faculty members. Additionally, the results from one test uncovered a conspicuously high negative salary residual average (a *negative* wage disparity of $4,524.79 at an $\alpha \leq .15$) for female faculty members holding rank in the Hard-Sciences division of the College of Liberal Arts and Sciences.

Results from 1998 Fiscal Data

In examining the first section of SPSS-10 output (see Table 4.5 on pages 106-107) generated by analyzing and comparing the salary residuals of faculty member clusters at the university for the 1998 academic year, five cluster groups had female faculty counts of less than 15 (viz., N = 12 for females in Business, N = 9 for females in Biology, N = 8 for females in Math, N = 7 for females in Physical Sciences, and N = 14 for females in Veterinary Medicine). Additionally, the examination revealed that within one cluster the male faculty member count was at a conspicuously low level (N = 14 for males in Family and Consumer Sciences). By 1998, the salary residual means calculated for the female faculty have a cosmetically different appearance than in 1992. The range of salary residual

Table 4.5

1998 Salary Residual Statistics of Females and Caucasian-Males by Cluster at University

Cluster Group	Gender/Ethnicity	N	Mean Residual	Std. Deviation	Std. Error Mean
ISU	Females	323	1,973.6320	9,939.6188	553.0552
Residuals	Caucasian-Males	886	3.764E-03	15,057.5155	505.8671
Agriculture	Females	27	2,403.4129	7,757.3678	1,492.9061
Residuals	Caucasian-Males	225	- 1.1526E-03	9,922.0975	661.4732
Design	Females	33	- 891.8478	6,381.9033	1,110.9468
Residuals [a]	Caucasian-Males	40	- 4.7129E-03	8,774.1874	1,387.3208
Education	Females	28	- 1,784.0396	6,673.9892	1,261.2654
Residuals	Caucasian-Males	31	- 4.1818E-03	9,068.8177	1,628.8077
Engineering	Females	16	1,021.3188	10,754.1443	2,688.5361
Residuals [b]	Caucasian-Males	143	- 8.3622E-03	24,058.7776	2,011.8961
FCS	Females	59	725.2932	10,831.7433	1,410.1729
Residuals	Caucasian-Males	14	3.506E-04	6,796.9106	1,816.5508
FCS-EDUC	Females	87	- 79.1912	8,882.3972	952.2929
Residuals	Caucasian-Males	45	- 5.0384E-03	8,733.2569	1,301.8771
Library	Females	18	- 229.2967	9,188.4967	2,165.7495
Residuals	Caucasian-Males	15	8.867E-03	5,757.1856	1,486.4989
LIB-EDUC	Females	46	- 1,034.6151	8,278.4734	1,220.5943
Residuals	Caucasian-Males	46	2.104E-03	7,760.1707	1,144.1748
Business	Females	12	2,171.9732	12,215.3139	3,526.2574
Residuals	Caucasian-Males	36	4.167E-04	5,783.6881	963.9480
LAS	Females	116	869.4393	10,893.9205	1,011.4751
Residuals	Caucasian-Males	317	2.794E-04	13,314.1346	747.7963

[a] The regression equation for this cluster had an Adjusted $R^2 = .458$.

[b] The regression equation for this cluster had an Adjusted $R^2 = .496$.

Table 4.5

(continued)

Cluster Group	Gender/Ethnicity	N	Mean Residual	Std. Deviation	Std. Error Mean
Biology	Females	9	1,229.6867	7,228.0775	2,409.3592
Residuals	Caucasian-Males	34	- 7.7454E-03	9,224.2126	1,581.9394
Humanities	Females	66	- 803.0576	8,171.1924	1,005.8043
Residuals	Caucasian-Males	91	1.777E-03	8,589.1892	900.3917
Math	Females	8	1,081.7983	8,817.8437	3,117.5785
Residuals	Caucasian-Males	61	- 1.1343E-02	13,288.1867	1,701.3780
Phys-Sciences	Females	7	- 2,614.9703	23,154.8618	8,751.7151
Residuals [c]	Caucasian-Males	47	1.031E-02	18,563.0159	2,707.6942
Soc-Sciences	Females	17	- 3,119.0211	12,385.3119	3,003.8794
Residuals	Caucasian-Males	48	3.251E-04	16,749.5130	2,417.5840
Soft-Sciences	Females	83	23.2791	11,212.1706	1,230.6956
Residuals	Caucasian-Males	139	- 3.0124E-03	12,848.3348	1,089.7815
Hard-Sciences	Females	24	4,752.9809	8,881.8695	1,813.0040
Residuals [d]	Caucasian-Males	142	3.494E-03	14,370.6147	1,205.9552
Vet-Med	Females	14	56.5909	8,314.2469	2,222.0760
Residuals	Caucasian-Males	65	- 1.1030E-03	11,524.7607	1,429.4706

[c] The regression equation for this cluster had an Adjusted $R^2 = .328$.

[d] The regression equation for this cluster had an Adjusted $R^2 = .474$.

means were now narrower with positive salary residual means outnumbering negative salary residual means by 12 to seven (ranging from a probable *negative* wage disparity of $3,119.02 for the females employed in the Social Sciences division of LAS to a presumable *positive* wage disparity of $4,752.98 for females working in the Hard-Sciences division of LAS). As was the case in the previous years, the salary residual average for Caucasian-male faculty members computed to zero (less than one cent) in all 19 cluster groups.

Table 4.6

1998 Independent t-test of Faculty Salary Residuals for Females vs. Caucasian-Males by Faculty Clusters at University

		Levene's Variances Test		Equality of Means *t*-test					95% Confidence Interval of the Difference	
Cluster Group	Assumption	F	Sig.	*t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
ISU Residuals	Equal Variances	9.138	.003	2.188	1,207.000	.029	1,973.6282	902.0328	203.9018	3,743.3546
	Non-Equal Variances			2.633	865.706	.009	1,973.6282	749.5142	502.5506	3,444.7058
Agriculture Residuals	Equal Variances	.280	.597	1.214	250.000	.226	2,403.4141	1,979.5617	- 1,495.3295	6,302.1577
	Non-Equal Variances			1.472	37.045	.149	2,403.4141	1,632.8856	- 904.9912	5,711.8194
Design Residuals [a]	Equal Variances	2.375	.128	- .487	71.000	.628	- 891.8431	1,831.3507	- 4,543.4527	2,759.7665
	Non-Equal Variances			- .502	69.983	.617	- 891.8431	1,777.3187	- 4,436.6090	2,652.9228
Education Residuals	Equal Variances	1.752	.191	- .853	57.000	.397	- 1,784.0354	2,091.9836	- 5,973.1602	2,405.0894
	Non-Equal Variances			- .866	54.851	.390	- 1,784.0354	2,060.0498	- 5,912.7197	2,344.6489
Engineering Residuals [b]	Equal Variances	2.471	.118	.168	157.000	.867	1,021.3271	6,095.0025	- 11,017.4557	13,060.1100
	Non-Equal Variances			.304	35.333	.763	1,021.3271	3,357.9684	- 5,793.4149	7,836.0691

[a] The regression equation for this cluster had an Adjusted $R^2 = .458$. [b] The regression equation for this cluster had an Adjusted $R^2 = .496$.

Table 4.6

(continued)

Cluster Group	Assumption	Levene's Variances Test F	Levene's Variances Test Sig.	Equality of Means *t*-test *t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper
FCS Residuals	Equal Variances	.771	.383	.239	71.000	.812	725.2928	3,036.1276	- 5,328.5737	6,779.1594
	Non-Equal Variances			.315	30.876	.755	725.2928	2,299.6618	- 3,965.6608	5,416.2464
FCS-EDUC Residuals	Equal Variances	.635	.427	- .049	130.000	.961	- 79.1862	1,621.7728	- 3,287.6698	3,129.2974
	Non-Equal Variances			- .049	90.435	.961	- 79.1862	1,612.9928	- 3,283.4677	3,125.0953
Library Residuals	Equal Variances	1.623	.212	- .084	31.000	.934	- 229.3056	2,736.4841	- 5,810.4017	5,351.7905
	Non-Equal Variances			- .087	28.980	.931	- 229.3056	2,626.8136	- 5,601.9012	5,143.2900
LIB-EDUC Residuals	Equal Variances	0.037	.849	- .618	90.000	.538	- 1,034.6172	1,673.0171	- 4,358.3578	2,289.1233
	Non-Equal Variances			- .618	89.626	.538	- 1,034.6172	1,673.0171	- 4,358.5465	2,289.3121
Business Residuals	Equal Variances	1.068	.307	.833	46.000	.409	2,171.9727	2,606.2631	- 3,074.1629	7,418.1084
	Non-Equal Variances			.594	12.683	.563	2,171.9727	3,655.6377	- 5,745.6539	10,089.5994

Table 4.6

(continued)

Cluster Group	Assumption	Levene's Variances Test F	Sig.	Equality of Means t-test t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
LAS	Equal Variances	1.784	.182	.630	431.000	.529	869.4390	1,379.5930	- 1,842.1280	3,581.0059
Residuals	Non-Equal Variances			.691	248.097	.490	869.4390	1,257.8876	- 1,608.0611	3,346.9391
Biology	Equal Variances	0.062	.804	.370	41.000	.713	1,229.6945	3,325.0673	- 5,485.4152	7,944.8042
Residuals	Non-Equal Variances			.427	15.678	.675	1,229.6945	2,882.2810	- 4,890.6834	7,350.0724
Humanities	Equal Variances	0.164	.686	- .590	155.000	.556	- 803.0594	1,360.7708	- 3,491.1085	1,884.9897
Residuals	Non-Equal Variances			- .595	144.091	.553	- 803.0594	1,349.9435	- 3,471.3098	1,865.1910
Math	Equal Variances	0.116	.734	.223	67.000	.824	1,081.8096	4,848.3852	- 8,595.6077	10,759.2270
Residuals	Non-Equal Variances			.305	11.670	.766	1,081.8096	3,551.6169	- 6,680.8568	8,844.4761
Phys-Sciences	Equal Variances	1.114	.296	- .337	52.000	.737	- 2,614.9806	7,757.9647	- 18,182.4756	12,952.5144
Residuals [c]	Non-Equal Variances			- .285	7.195	.783	- 2,614.9806	9,161.0112	- 24,158.8550	18,928.8938

[c] The regression equation for this cluster had an Adjusted R^2 = .328.

Table 4.6

(continued)

Cluster Group	Assumption	Levene's Variances Test F	Sig.	Equality of Means *t*-test *t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Soc-Sciences	Equal Variances	0.204	.653	- .701	63.000	.486	- 3,119.0214	4,446.9248	- 12,005.4914	5,767.4486
Residuals	Non-Equal Variances			- .809	38.011	.424	- 3,119.0214	3,855.9050	- 10,924.8161	4,686.7733
Soft-Sciences	Equal Variances	0.351	.554	.014	220.000	.989	23.2821	1,701.2317	- 3,329.5148	3,376.0789
Residuals	Non-Equal Variances			.014	191.170	.989	23.2821	1,643.8478	- 3,219.1268	3,265.6910
Hard-Sciences	Equal Variances	0.800	.373	1.568	164.000	.119	4,752.9774	3,031.0502	- 1,231.9360	10,737.8908
Residuals [d]	Non-Equal Variances			2.183	46.374	.034	4,752.9774	2,177.4553	370.9419	9,135.0128
Vet-Med	Equal Variances	0.816	.369	.017	77.000	.986	56.5920	3,255.3029	- 6,425.5442	6,538.7283
Residuals	Non-Equal Variances			.021	25.113	.983	56.5920	2,642.1597	- 5,383.8002	5,496.9842

[d] The regression equation for this cluster had an Adjusted $R^2 = .474$.

Results obtained from the *t*-test analysis comparing the computed salary residuals of Caucasian-male and female faculty members employed during the academic year of 1998 are presented in Table 4.6 (on pages 108-111). By inspecting the results from testing for the equality of variances between male salary residuals and female salary residuals, the Levene's Variances Test on the 19 cluster groups indicated that at an $\alpha = .10$ it would be necessary to use the non-equal variances *t* statistic for comparing means within the Iowa State University Cluster only.

By scrutinizing the results from the 1998 *t*-test analyses, it was determined that one of the 19 independent hypotheses should be rejected, a highly significant difference in means was detected (a *positive* wage disparity of \$1,973.63 at the $\alpha = .01$) when comparing the salary residuals for female faculty members to that of Caucasian-male faculty members in the Iowa State University as a whole cluster. Said differently, when ISU faculty member salary data is batched as one unit and many of the various attributes of the faculty members are accounted for with a mathematical model, the average salary levels for females are approximately \$2,000.00 higher than their male counterparts. Additionally, a statistical test showed this wage disparity to be highly significant.

While inspecting the 1998 salary residual means for faculty in the 19 cluster groups, it was determined that female faculty members in the Hard-Sciences division cluster have a noticeably higher salary residual mean than their male counterparts (a somewhat *positive* wage disparity of \$4,752.98 favoring females that is probable at an $\alpha \leq .15$ level).

Results from 1999 Fiscal Data

Upon analyzing and comparing the 1999 salary residuals of faculty members in the various cluster groupings at the university, the first section of SPSS-10 output (see Table 4.7 on pages 113-114) revealed that only four clusters had female faculty member counts at less than 15 (viz., N = 12 for females in Business, N = 9 for females in Biology, N = 7 for females in Math, and N = 7 for females in Physical Sciences). Additional results established

Table 4.7

1999 Salary Residual Statistics of Females and Caucasian-Males by Cluster at University

Cluster Group	Gender/Ethnicity	N	Mean	Std. Deviation	Std. Error Mean
ISU	Females	323	75.8993	10,639.0987	591.9753
Residuals	Caucasian Males	867	2.465E-02	16,283.0362	553.0009
Agriculture	Females	28	1,442.7189	7,712.2454	1,457.4774
Residuals	Caucasian Males	222	- 4.3983E-03	12,158.8326	816.0474
Design	Females	31	- 269.5373	7,262.0398	1,304.3008
Residuals	Caucasian Males	38	- 2.5821E-02	7,551.5731	1,225.0269
Education	Females	30	623.7677	7,560.5799	1,380.3667
Residuals	Caucasian Males	32	3.202E-03	8,525.2993	1,507.0742
Engineering	Females	16	1,522.1809	12,622.9133	3,155.7283
Residuals	Caucasian Males	137	- 3.0105E-03	21,835.2657	1,865.5126
FCS	Females	53	- 11,413.6215	17,967.1597	2,467.9792
Residuals [a]	Caucasian Males	13	- 3.0559E-03	25,110.6618	6,964.4445
FCS-EDUC	Females	83	- 7,221.8257	13,823.8251	1,517.3619
Residuals [b]	Caucasian Males	45	9.394E-03	16,137.6939	2,405.6654
Library	Females	19	467.3530	7,683.2783	1,762.6649
Residuals	Caucasian Males	15	- 1.1153E-02	4,881.4991	1,260.3976
LIB-EDUC	Females	49	146.4558	6,545.7080	935.1011
Residuals	Caucasian Males	47	8.557E-03	8,372.7150	1,221.2860
Business	Females	12	- 324.0329	6,725.7402	1,941.5540
Residuals	Caucasian Males	39	1.538E-04	13,746.9737	2,201.2775
LAS	Females	119	926.8842	12,265.2772	1,124.3561
Residuals	Caucasian Males	312	- 3.6294E-03	15,745.2316	891.3982

[a] The regression equation for this cluster had an Adjusted $R^2 = .329$.

[b] The regression equation for this cluster had an Adjusted $R^2 = .375$.

Table 4.7

(continued)

Cluster Group	Gender/Ethnicity	N	Mean	Std. Deviation	Std. Error Mean
Biology	Females	9	2,646.2091	9,256.0986	3,085.3662
Residuals	Caucasian Males	37	1.252E-02	7,209.6672	1,185.2620
Humanities	Females	69	202.5931	11,152.6730	1,342.6241
Residuals	Caucasian Males	89	- 1.4981E-03	8,975.6406	951.4160
Math	Females	7	3,736.8361	17,142.4705	6,479.2448
Residuals [c]	Caucasian Males	62	- 6.1979E-03	19,123.2965	2,428.6611
Phys-Sciences	Females	7	- 8,039.3780	38,055.5065	14,383.6295
Residuals [d]	Caucasian Males	50	6.282E-03	19,103.2187	2,701.6031
Soc-Sciences	Females	18	- 3,271.6652	12,669.3643	2,986.1978
Residuals	Caucasian Males	42	2.199E-04	13,918.9820	2,147.7456
Soft-Sciences	Females	87	757.1402	11,386.2920	1,220.7386
Residuals	Caucasian Males	131	- 4.6028E-04	11,760.9914	1,027.5626
Hard-Sciences	Females	23	4,035.3283	11,276.8556	2,351.3869
Residuals [e]	Caucasian Males	149	4.041E-03	17,698.4660	1,449.9148
Vet-Med	Females	15	70.8375	8,619.4869	2,225.5419
Residuals	Caucasian Males	59	8.176E-03	12,699.5592	1,653.3418

[c] The regression equation for this cluster had an Adjusted $R^2 = .396$.

[d] The regression equation for this cluster had an Adjusted $R^2 = .477$.

[e] The regression equation for this cluster had an Adjusted $R^2 = .429$.

that the Caucasian-male faculty member count was noticeably low (N = 13 for males) in the Family and Consumer Sciences cluster. Salary residual means for female faculty members were widely different in 1999 (ranging from a *negative* wage disparity of $11,413.62 for females in the College of Family and Consumer Sciences to a *positive* wage disparity of $4,035.33 for females in the Hard-Sciences division of LAS). As was the case in 1998, female faculty members had positive salary residual means (wage disparities favoring women) that outnumbered their negative salary residual means by ratio of more than two-to-one. In contrast, the salary residual mean was again zero (less than one cent) for Caucasian-male faculty members in each of the 19 cluster groups.

Table 4.8 (on pages 116-119) contains output information obtained by testing to see if the salary residual means of female faculty members were significantly different from the salary residual means of the Caucasian-male faculty members in each of the 19 cluster group formations for the 1999 academic year. Variance comparisons (Levene's Variances Test at an $\alpha = .10$) for the 19 clusters revealed a significant need for using the non-equal variances *t*-test when comparing salary residual means for faculty members in the Iowa State University cluster, the Library cluster, the Library combined with Education cluster, and the Physical Sciences division cluster.

With regard to the global hypothesis that there is no significant difference in the mean salary residuals of female faculty members and the mean salary residuals of Caucasian-male faculty members within any of the chosen cluster groups at the university, results from the *t*-test indicate that salary residual means of female faculty members were statistically different from the salary residual means of Caucasian-males in one of the cluster formations analyzed. Results indicate that female faculty members in the Family and Consumer Sciences combined with Education cluster have a salary residual mean that is statistically different (a *negative* wage disparity of $7,221.84) than their male counterparts. It should be noted that this result is largely tenuous due to a compounding effect (discussed in Chapter Five) not controlled for in the regression model. Worthy of discussion, the salary residual means comparison test revealed a noticeably high (at an $\alpha \leq .10$) *negative* wage disparity of $11,413.62 for female faculty members of the Family and Consumer Sciences cluster. Simply stated, statistical testing of the 1999 data indicates there is a possibility that female faculty members from the College of Family and Consumer Sciences have

Table 4.8

1999 Independent t-test of Faculty Salary Residuals for Females vs. Caucasian-Males by Faculty Clusters at University

		Levene's Variances Test		Equality of Means *t*-test					95% Confidence Interval of the Difference	
Cluster Group	Assumption	F	Sig.	*t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
ISU Residuals	Equal Variances	9.435	.002	.078	1,188.000	.938	75.8746	975.5311	- 1,838.0812	1,989.8305
	Non-Equal Variances			.094	880.022	.925	75.8746	810.0893	- 1,514.0580	1,665.8073
Agriculture Residuals	Equal Variances	1.553	.214	.612	248.000	.541	1,442.7233	2,357.7409	- 3,201.0258	6,086.4723
	Non-Equal Variances			.864	46.029	.392	1,442.7233	1,670.3813	- 1,919.5219	4,804.9684
Design Residuals	Equal Variances	.123	.726	- .150	67.000	.881	- 269.5115	1,796.5964	- 3,855.5329	3,316.5100
	Non-Equal Variances			- .151	65.160	.881	- 269.5115	1,789.3830	- 3,842.9893	3,303.9664
Education Residuals	Equal Variances	1.792	.186	.304	60.000	.762	623.7645	2,051.7197	- 3,480.2860	4,727.8150
	Non-Equal Variances			.305	59.824	.761	623.7645	2,043.6940	- 3,464.4799	4,712.0089
Engineering Residuals	Equal Variances	2.022	.157	.273	151.000	.785	1,522.1839	5,574.7442	- 9,492.3897	12,536.7576
	Non-Equal Variances			.415	26.953	.681	1,522.1839	3,665.8912	- 6,000.2227	9,044.5906

Table 4.8

(continued)

Cluster Group	Assumption	Levene's Variances Test F	Sig.	Equality of Means *t*-test *t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
FCS Residuals [a]	Equal Variances	.581	.449	- 1.890	64.000	.063	- 11,413.6184	6,037.3965	- 23,474.7045	647.4676
	Non-Equal Variances			- 1.545	15.148	.143	- 11,413.6184	7,388.8029	- 27,149.0918	4,321.8550
FCS-EDUC Residuals [b]	Equal Variances	.206	.650	- 2.659	126.000	.009	- 7,221.8351	2,716.3726	- 12,597.4566	- 1,846.2136
	Non-Equal Variances			- 2.539	79.244	.013	- 7,221.8351	2,844.2245	- 12,882.8515	- 1,560.8188
Library Residuals	Equal Variances	3.981	.055	.205	32.000	.839	467.3642	2,281.4727	- 4,179.8436	5,114.5720
	Non-Equal Variances			.216	30.770	.831	467.3642	2,166.9310	- 3,953.4598	4,888.1882
LIB-EDUC Residuals	Equal Variances	5.777	.018	.096	94.000	.924	146.4473	1,530.3698	- 2,892.1379	3,185.0324
	Non-Equal Variances			.095	87.067	.924	146.4473	1,538.1657	- 2,910.7902	3,203.6848
Business Residuals	Equal Variances	.650	.424	- .078	49.000	.938	- 324.0331	4,132.4815	- 8,628.5656	7,980.4994
	Non-Equal Variances			- .110	38.866	.913	- 324.0331	2,935.1754	- 6,261.6422	5,613.5761

[a] The regression equation for this cluster had an Adjusted $R^2 = .329$. [b] The regression equation for this cluster had an Adjusted $R^2 = .375$.

Table 4.8

(continued)

		Levene's Variances Test		Equality of Means *t*-test					95% Confidence Interval of the Difference	
Cluster Group	Assumption	F	Sig.	*t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
LAS	Equal Variances	1.646	.200	.579	429.000	.563	926.8879	1,602.0761	- 2,222.0073	4,075.7831
Residuals	Non-Equal Variances			.646	272.159	.519	926.8879	1,434.8406	- 1,897.9096	3,751.6854
Biology	Equal Variances	1.340	.253	.934	44.000	.355	2,646.1966	2,833.1317	- 3,063.6051	8,355.9983
Residuals	Non-Equal Variances			.801	10.485	.441	2,646.1966	3,305.1975	- 4,672.3544	9,964.7476
Humanities	Equal Variances	.618	.433	.127	156.000	.899	202.5946	1,601.3132	- 2,960.4594	3,365.6486
Residuals	Non-Equal Variances			.123	128.417	.902	202.5946	1,645.5491	- 3,053.3045	3,458.4937
Math	Equal Variances	.039	.844	.494	67.000	.623	3,736.8423	7,557.6813	- 11,348.3527	18,822.0373
Residuals [c]	Non-Equal Variances			.540	7.789	.604	3,736.8423	6,919.4659	- 12,294.8962	19,768.5808
Phys-Sciences	Equal Variances	6.060	.017	- .906	55.000	.369	- 8,039.3843	8,870.0563	- 25,815.3743	9,736.6057
Residuals [d]	Non-Equal Variances			- .549	6.430	.601	- 8,039.3843	14,635.1445	- 43,277.9291	27,199.1606

[c] The regression equation for this cluster had an Adjusted $R^2 = .396$. [d] The regression equation for this cluster had an Adjusted $R^2 = .477$.

Table 4.8

(continued)

Cluster Group	Assumption	Levene's Variances Test F	Levene's Variances Test Sig.	Equality of Means *t*-test *t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper
Soc-Sciences	Equal Variances	.092	.763	- .856	58.000	.395	- 3,271.6654	3,821.4061	- 10,921.0408	4,377.7099
Residuals	Non-Equal Variances			- .889	35.228	.380	- 3,271.6654	3,678.3404	- 10,737.3660	4,194.0351
Soft-Sciences	Equal Variances	.185	.667	.471	216.000	.638	757.1407	1,606.1530	- 2,408.5988	3,922.8802
Residuals	Non-Equal Variances			.475	188.456	.636	757.1407	1,595.6465	- 2,390.4822	3,904.7636
Hard-Sciences	Equal Variances	.317	.574	1.059	170.000	.291	4,035.3243	3,809.5483	- 3,484.7878	11,555.4363
Residuals [e]	Non-Equal Variances			1.461	41.029	.152	4,035.3243	2,762.4760	- 1,543.4913	9,614.1398
Vet-Med	Equal Variances	1.505	.224	.020	72.000	.984	70.8294	3,474.3677	- 6,855.1960	6,996.8547
Residuals	Non-Equal Variances			.026	31.408	.980	70.8294	2,772.4675	- 5,580.6796	5,722.3383

[e] The regression equation for this cluster had an Adjusted R^2 = .429.

compensation levels that are significantly less (not equitable to) their male counterparts.

Results from 2000 Fiscal Data

Presented in Table 4.9 (on pages 121-122) are the results obtained from analyzing and comparing the academic year 2000 salary residual data of faculty members in the 19 university cluster groups. Importantly, it should be noted that the count for female faculty members was somewhat low (below N = 15) in five of the 19 cluster groups (viz., N = 13 for females in Business, N = 11 for females in Biology, N = 7 for females in Math, N = 7 for females in Physical Sciences, N = 14 for females in Social Sciences). As in the other years of the study, the Caucasian-male faculty members had a salary residual mean equal to zero (less than one cent) for all cluster groups. Salary residual means for female faculty members were wide-ranging in the year 2000 (ranging from a *negative* wage disparity of $9,854.36 for females in the College of Family and Consumer Sciences to a *positive* wage disparity of $2,749.02 for females in the Math division of LAS). When examining the wage disparities, the wage disparity for females was lowest (a salary residual mean of $71.85) in Liberal Arts and Sciences cluster. Possibly the most interesting detail of this analysis is how the number of clusters having female groups with positive wage disparities shifted from being predominant in 1999 to negative wage disparities being the most prevalent in the year 2000 (the number of clusters with negative wage disparities nearly double that of positive wage disparities). Also notable, the salary residual mean of females in the Iowa State University cluster grouping was now negative (a *negative* wage disparity of $603.66) as compared to positive in the 1999 academic year.

Table 4.10 (on pages 123-126) contains the comparisons of salary residual means between female and Caucasian-male faculty members in 19 cluster groups for the academic year 2000. Results from the Levene's Equality of Variances tests (at an $\alpha = .10$) indicate that it would be prudent to use the *t* statistic for non-equal variances in determining whether residual means are equal for seven of the cluster groups (viz., Iowa State University cluster,

Table 4.9

2000 Salary Residual Statistics of Females and Caucasian-Males by Cluster at University

Cluster Group	Gender/Ethnicity	N	Mean	Std. Deviation	Std. Error Mean
ISU	Females	327	- 603.6564	10,916.4742	603.6824
Residuals	Caucasian Males	840	1.217E-02	17,165.8390	592.2777
Agriculture	Females	35	496.2268	7,432.9408	1,256.3963
Residuals	Caucasian Males	213	- 1.2384E-03	15,179.4374	1,040.0779
Design	Females	29	- 2,866.1674	10,699.0922	1,986.7715
Residuals [a]	Caucasian Males	34	- 4.8832E-04	18,280.1128	3,135.0135
Education	Females	31	- 219.1302	7,103.2563	1,275.7825
Residuals	Caucasian Males	35	3.764E-03	7,573.6170	1,280.1749
Engineering	Females	17	- 438.7670	6,469.0504	1,568.9752
Residuals	Caucasian Males	131	- 7.1784E-04	20,184.7976	1,763.5540
FCS	Females	51	- 9,854.3562	20,189.1330	2,827.0441
Residuals [b]	Caucasian Males	16	- 2.3864E-03	23,965.3385	5,991.3346
FCS-EDUC	Females	82	- 6,381.1511	15,844.9310	1,749.7799
Residuals [c]	Caucasian Males	51	2.060E-02	16,164.6090	2,263.4980
Library	Females	19	113.1561	6,699.2080	1,536.9037
Residuals	Caucasian Males	15	6.929E-03	5,162.6408	1,332.9881
LIB-EDUC	Females	50	305.7702	6,131.1037	867.0690
Residuals	Caucasian Males	50	- 7.4262E-03	8,050.8790	1,138.5662
Business	Females	13	1,133.1471	10,418.5669	2,889.5906
Residuals	Caucasian Males	39	- 1.9673E-02	12,366.6570	1,980.2499
LAS	Females	117	71.8538	12,317.9462	1,138.7945
Residuals	Caucasian Males	304	3.915E-03	16,653.8492	955.1638

[a] The regression equation for this cluster had an Adjusted $R^2 = .362$.

[b] The regression equation for this cluster had an Adjusted $R^2 = .355$.

[c] The regression equation for this cluster had an Adjusted $R^2 = .386$.

Table 4.9

(continued)

Cluster Group	Gender/Ethnicity	N	Mean	Std. Deviation	Std. Error Mean
Biology	Females	11	- 5,403.6638	13,188.8141	3,976.5771
Residuals [d]	Caucasian Males	34	1.016E-04	17,025.9988	2,919.9347
Humanities	Females	69	- 1,194.3433	10,116.1584	1,217.8424
Residuals	Caucasian Males	86	7.151E-03	10,471.2711	1,129.1462
Math	Females	7	2,749.0190	14,299.6475	5,404.7587
Residuals [e]	Caucasian Males	57	- 8.5965E-03	23,117.9483	3,062.0471
Phys-Sciences	Females	7	- 7,369.6920	39,393.0362	14,889.1682
Residuals	Caucasian Males	47	- 1.5571E-03	19,872.6879	2,898.7295
Soc-Sciences	Females	14	- 3,255.5406	12,298.8609	3,287.0088
Residuals	Caucasian Males	39	3.232E-05	15,395.9686	2,465.3280
Soft-Sciences	Females	83	- 159.0818	10,893.3779	1,195.7036
Residuals	Caucasian Males	125	- 9.5419E-03	12,446.5238	1,113.2509
Hard-Sciences	Females	25	- 1,303.1326	18,269.4242	3,653.8848
Residuals [f]	Caucasian Males	138	2.531E-03	20,813.4148	1,771.7555
Vet-Med	Females	15	374.0338	9,101.0000	2,349.8681
Residuals	Caucasian Males	53	1.356E-04	11,616.1443	1,595.6001

[d] The regression equation for this cluster had an Adjusted $R^2 = .441$.

[e] The regression equation for this cluster had an Adjusted $R^2 = .176$.

[f] The regression equation for this cluster had an Adjusted $R^2 = .369$.

Agriculture cluster, Design cluster, Engineering cluster, Library combined with Education cluster, Liberal Arts and Sciences cluster, and Physical Sciences cluster). With attention to the global hypothesis that there is no difference in the salary residual means of female and Caucasian-male faculty members in any of the 19 cluster groups, results exposed that the salary residual average for females was significantly ($\alpha \leq .05$) different from the salary

Table 4.10

2000 Independent t-test of Faculty Salary Residuals for Females vs. Caucasian-Males by Faculty Clusters at University

		Levene's Variances Test		Equality of Means *t*-test					95% Confidence Interval of the Difference	
Cluster Group	Assumption	F	Sig.	*t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
ISU Residuals	Equal Variances	15.673	.000	- .591	1,165.000	.555	- 603.6686	1,021.4054	- 2,607.6684	1,400.3312
	Non-Equal Variances			- .714	923.262	.476	- 603.6686	845.7100	- 2,263.4055	1,056.0683
Agriculture Residuals	Equal Variances	6.004	.015	.189	246.000	.850	496.2280	2,619.0990	- 4,662.4912	5,654.9473
	Non-Equal Variances			.304	89.804	.762	496.2280	1,631.0407	- 2,744.2155	3,736.6715
Design Residuals [a]	Equal Variances	3.005	.088	- .742	61.000	.461	- 2,866.1669	3,861.0737	- 10,586.8611	4,854.5272
	Non-Equal Variances			- .772	54.474	.443	- 2,866.1669	3,711.5456	- 10,305.8846	4,573.5508
Education Residuals	Equal Variances	.310	.580	- .121	64.000	.904	- 219.1340	1,814.4743	- 3,843.9631	3,405.6951
	Non-Equal Variances			- .121	63.777	.904	- 219.1340	1,807.3375	- 3,829.9492	3,391.6813
Engineering Residuals	Equal Variances	4.931	.028	- .089	146.000	.929	- 438.7663	4,941.0394	- 10,203.9681	9,326.4356
	Non-Equal Variances			- .186	68.509	.853	- 438.7663	2,360.4673	- 5,148.3712	4,270.8386

[a] The regression equation for this cluster had an Adjusted $R^2 = .362$.

Table 4.10

(continued)

Cluster Group	Assumption	Levene's Variances Test F	Sig.	Equality of Means *t*-test *t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
FCS	Equal Variances	.004	.948	- 1.628	65.000	.108	- 9,854.3539	6,051.9882	- 21,941.0089	2,232.3011
Residuals [b]	Non-Equal Variances			- 1.487	22.094	.151	- 9,854.3539	6,624.8222	- 23,589.9905	3,881.2828
FCS-EDUC	Equal Variances	.457	.500	- 2.241	131.000	.027	- 6,381.1717	2,847.5817	- 12,014.3675	- 747.9759
Residuals [c]	Non-Equal Variances			- 2.230	104.565	.028	- 6,381.1717	2,860.9706	- 12,054.2232	- 708.1202
Library	Equal Variances	1.083	.306	.054	32.000	.957	113.1492	2,098.2696	- 4,160.8861	4,387.1845
Residuals	Non-Equal Variances			.056	31.991	.956	113.1492	2,034.4361	- 4,030.9059	4,257.2043
LIB-EDUC	Equal Variances	5.478	.021	.214	98.000	.831	305.7776	1,431.1330	- 2,534.2593	3,145.8145
Residuals	Non-Equal Variances			.214	91.530	.831	305.7776	1,431.1330	- 2,536.7704	3,148.3256
Business	Equal Variances	.018	.893	.297	50.000	.768	1,133.1668	3,820.0707	- 6,539.6710	8,806.0045
Residuals	Non-Equal Variances			.323	24.230	.749	1,133.1668	3,503.0163	- 6,093.0659	8,359.3994

[b] The regression equation for this cluster had an Adjusted $R^2 = .355$. [c] The regression equation for this cluster had an Adjusted $R^2 = .386$.

Table 4.10

(continued)

Cluster Group	Assumption	Levene's Variances Test: F	Levene's Variances Test: Sig.	Equality of Means *t*-test: *t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference: Lower	Upper
LAS	Equal Variances	2.766	.097	.042	419.000	.966	71.8499	1,694.4653	- 3,258.8621	3,402.5618
Residuals	Non-Equal Variances			.048	283.001	.961	71.8499	1,486.3347	- 2,853.8244	2,997.5241
Biology	Equal Variances	.088	.768	- .961	43.000	.342	- 5,403.6639	5,624.4988	- 16,746.5467	5,939.2189
Residuals [d]	Non-Equal Variances			- 1.095	21.773	.285	- 5,403.6639	4,933.4758	- 15,641.2684	4,833.9406
Humanities	Equal Variances	.022	.884	- .716	153.000	.475	- 1,194.3504	1,667.0910	- 4,487.8393	2,099.1385
Residuals	Non-Equal Variances			- .719	147.790	.473	- 1,194.3504	1,660.7562	- 4,476.2465	2,087.5456
Math	Equal Variances	.750	.390	.306	62.000	.760	2,749.0276	8,977.9051	- 15,197.5490	20,695.6042
Residuals [e]	Non-Equal Variances			.443	10.356	.667	2,749.0276	6,211.8877	- 11,027.7770	16,525.8322
Phys-Sciences	Equal Variances	6.148	.016	- .791	52.000	.432	- 7,369.6904	9,312.8960	- 26,057.3835	11,318.0026
Residuals	Non-Equal Variances			- .486	6.462	.643	- 7,369.6904	15,168.7165	- 43,852.0359	29,112.6551

[d] The regression equation for this cluster had an Adjusted $R^2 = .441$. [e] The regression equation for this cluster had an Adjusted $R^2 = .176$.

Table 4.10

(continued)

Cluster Group	Assumption	Levene's Variances Test: F	Levene's Variances Test: Sig.	Equality of Means *t*-test: *t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference: Lower	95% Confidence Interval of the Difference: Upper
Soc-Sciences Residuals	Equal Variances	.888	.350	- .712	51.000	.479	- 3,255.5406	4,570.1917	- 12,430.5832	5,919.5020
	Non-Equal Variances			- .792	28.639	.435	- 3,255.5406	4,108.8039	- 11,663.5889	5,152.5076
Soft-Sciences Residuals	Equal Variances	1.158	.283	- .095	206.000	.925	- 159.0722	1,678.2417	- 3,467.8040	3,149.6596
	Non-Equal Variances			- .097	190.913	.923	- 159.0722	1,633.7180	- 3,381.5284	3,063.3839
Hard-Sciences Residuals [f]	Equal Variances	.047	.829	- .293	161.000	.770	- 1,303.1351	4,445.9862	- 10,083.1046	7,476.8344
	Non-Equal Variances			- .321	36.262	.750	- 1,303.1351	4,060.7871	- 9,536.7306	6,930.4604
Vet-Med Residuals	Equal Variances	.233	.631	.115	66.000	.909	374.0336	3,255.1785	- 6,125.1399	6,873.2072
	Non-Equal Variances			.132	28.268	.896	374.0336	2,840.3908	- 5,441.7587	6,189.8260

[f] The regression equation for this cluster had an Adjusted $R^2 = .369$.

residual average of Caucasian-males in the Family and Consumer Sciences combined with Education cluster. In other words, by combining faculty members from the College of Family and Consumer Sciences and the College of Education into one unit and using a statistical model that controls for various attributes of this body of faculty members, it was determined that the salary levels of females appear to be considerably less (more than $6,000.00) than that of the Caucasian-males in the unified group. As was the case in 1999, it should be noted that this result is largely tenuous due to a compounding effect (discussed in Chapter Five) not controlled for in the regression model. The mean for the salary residuals of females in the Family and Consumer Sciences cluster was noticeably (at an $\alpha \leq .10$) different (a *negative* wage disparity of $9,854.35) than that of their Caucasian-male counterparts.

Highlights/Summary of Findings

This section of the chapter provides a brief summary of the findings obtained by analyzing regression model data for five academic years at a large land-grant institution. Results of this study will be presented from two perspectives. Statistically significant results from the analyses will be highlighted first. Additionally, "noticeable results"(what the author considers discovery worthy findings) from testing of the 95 hypotheses will be presented.

The statement used for the global null hypothesis says there is no significant difference in the salary residual means of female faculty members and Caucasian-male faculty members included in any of the chosen cluster groups in this five-year study at the university. Results from the 95 independent *t*-test comparison analyses suggest rejecting five of the null hypotheses in favor of the five alternative statements listed below:

1. For the year 1992, the salary residual mean computed for female faculty members employed in the Humanities cluster is *significantly* different (a *negative* wage disparity of $2,020.85 for females at $\alpha \leq .05$) from the salary residual mean computed for Caucasian-males faculty members.
2. For the year 1992, the salary residual mean computed for female faculty members

employed in the Soft-Sciences cluster is *highly* different (a *negative* wage disparity of \$4,424.56 for females at $\alpha \leq .01$) from the salary residual mean computed for Caucasian-males faculty members.

3. For the year 1998, the salary residual mean computed for female faculty members employed in the Iowa State University cluster is *highly* different (a *positive* wage disparity of \$1,973.63 for females at $\alpha \leq .01$) from the salary residual mean computed for Caucasian-males faculty members.
4. For the year 1999, the salary residual mean computed for female faculty members employed in the Family and Consumer Sciences combined with Education cluster is *highly* different (a *negative* wage disparity of \$7,221.83 for females at $\alpha \leq .01$) from the salary residual mean computed for Caucasian-males faculty members (note: discussion in Chapter 5 delineates the contingency of how this may be a spurious outcome).
5. For the year 2000, the salary residual mean computed for female faculty members employed in the Family and Consumer Sciences combined with Education cluster is *significantly* different (a *negative* wage disparity of \$6,381.15 for females at $\alpha \leq .01$) from the salary residual mean computed for Caucasian-males faculty members (note: discussion in Chapter 5 delineates the contingency of how this may be a spurious outcome).

The rejection of any hypothesis establishes a need to address the implications of research. These implications and the author's thoughts and opinions are voiced in Chapter 5.

Salary residual mean comparison results that approach being statistically significant are periodically worthy of mention and discussion in any research project. Ten other test results worthy of mention and possible elaboration are presented below:

1. For the year 1991, the salary residual mean computed for female faculty members employed in the Design cluster is *noticeably* different (a *negative* wage disparity

of $2,469.98 for females at $\alpha \leq .15$) from the salary residual mean computed for Caucasian-males faculty members.

2. For the year 1991, the salary residual mean computed for female faculty members employed in the Education cluster is *noticeably* different (a *positive* wage disparity of $1,721.60 for females at $\alpha \leq .15$) from the salary residual mean computed for Caucasian-males faculty members.
3. For the year 1991, the salary residual mean computed for female faculty members employed in the Family and Consumer Sciences combined with Education cluster is *noticeably* different (a *positive* wage disparity of $1,239.44 for females at $\alpha \leq .15$) from the salary residual mean computed for Caucasian-males faculty members (note: discussion in Chapter 5 delineates the contingency of how this may be a spurious outcome).
4. For the year 1991, the salary residual mean computed for female faculty members employed in the Library cluster is *noticeably* different (a *negative* wage disparity of $3,448.09 for females at $\alpha \leq .15$) from the salary residual mean computed for Caucasian-males faculty members.
5. For the year 1991, the salary residual mean computed for female faculty members employed in the Library combined with Education cluster is *noticeably* different (a *positive* wage disparity of $1,296.84 for females at $\alpha \leq .15$) from the salary residual mean computed for Caucasian-males faculty members (note: discussion in Chapter 5 delineates the contingency of how this may be a spurious outcome).
6. For the year 1992, the salary residual mean computed for female faculty members employed in the Biology cluster is *noticeably* different (a *negative* wage disparity of $6,625.95 for females at $\alpha \leq .15$) from the salary residual mean computed for Caucasian-males faculty members.
7. For the year 1992, the salary residual mean computed for female faculty members

employed in the Hard-Sciences cluster is *noticeably* different (a *negative* wage disparity of $4,524.79 for females at $\alpha \leq .15$) from the salary residual mean computed for Caucasian-males faculty members.

8. For the year 1998, the salary residual mean computed for female faculty members employed in the Hard-Sciences cluster is *noticeably* different (a *negative* wage disparity of $4,752.98 for females at $\alpha \leq .15$) from the salary residual mean computed for Caucasian-males faculty members.
9. For the year 1999, the salary residual mean computed for female faculty members employed in the Family and Consumer Sciences cluster is *noticeably* different (a *negative* wage disparity of $11,413.62 for females at $\alpha \leq .15$) from the salary residual mean computed for Caucasian-males faculty members (note: discussion in Chapter 5 delineates the contingency of how this may be a spurious outcome).
10. For the year 2000, the salary residual mean computed for female faculty members employed in the Family and Consumer Sciences cluster is *noticeably* different (a *negative* wage disparity of $9,854.36 for females at $\alpha \leq .15$) from the salary residual mean computed for Caucasian-males faculty members (note: discussion in Chapter 5 delineates the contingency of how this may be a spurious outcome).

Results that border on being statistically significant in a purely scientific sense do not always reveal the true nature of the universe. Readers, researchers, administrator, faculty members and others should bear in mind that all results reported emulate from a comparison model that was in part built from regression equations. Therefore, when examining these results it would be prudent to keep in mind that the adjusted R^2 for each equation is material in interpreting the results for each of the group comparisons. Chapter five provides further discussion that substantiates a need to look at the results exhaustively and comprehensively.

CHAPTER 5

SUMMARY AND DISCUSSION

Chapter 5 Preface

This chapter provides an abbreviated overview of information drawn from the first four chapters of this composition, an array of interpretations and implications drawn from the research and findings, and some brief recommendations for administrators, faculty, and others intrigued with gender-related salary equity research in academe. Therefore, this chapter is partitioned into four sections: a review of the study section, a section on interpretations, a section on implications, and a section of recommendations.

Review of Study

Faculty member compensation (i.e., pay) has been a subject receiving widespread attention and momentous discussion during the past two decades. Much of the literature encompassing the field of higher education has been inundated with research and discussion emphasizing the subject of salary equity between male and female faculty members. The primary purpose of this study was to investigate gender-related salary equity issues in academe and provide readers with the information obtained from this research work. The secondary purpose of this study was to provide detailed instructions on the numerous aspects of this inspection process and to tutor others on how to conduct similar investigations.

As noted in Chapter 1, demographic transformations, changing faculty perspectives, financial changes at institutions and in the world, and the legal environment in our ever-changing world have triggered a fury of discussions, many debates, and an array of research projects directed at the issues related to faculty member salary equity in higher education. As outlined in the chapters, determining the technique for measuring the existence of salary equity or inequity is of great significance. This study establishes that many associations, organizations, institutions, educational researchers, and government agencies provide situational salary reports for faculty members broken down into comparative groups based on faculty member age, gender, ethnicity, type of educational institution, and so forth. Frequently, the salary information provided and the comparisons made in these reports are not entirely logical, scientifically analyzed, nor reported in a rational manner that affords the opportunity for correct interpretation (e.g., using mean salaries as points of comparison makes little sense when faculty groups have varying attributes).

In building models for detecting the actuality of gender-related salary disparities in the educational arena, most analysts (Allard, 1984; Balzer, Boudreau, Hutchinson, Ryan, Thorsteinson, Sullivan, Yonker, & Snavely, 1996; Haigenere, Eisenberg, & McCarthy, 1996; Moore, 1992; Scott, 1977; Simpson & Rosenthal, 1982) advocate the use of analytical models that incorporate multiple regression techniques to aid in the accounting for diverse attributes of faculty members. The model used in this study was built on this precept. Five years of salary information and employment data about faculty members were acquired from a major land-grant educational institution.

After cleaning the data and working with university administration to make sure the data sets were as complete as possible, the comparative study was launched. Upon categorizing faculty members into those that could be and should be included in the study, each data file was analyzed by faculty cluster. Multiple regression procedures were used to determine which faculty member attributes account for the variations in salary levels of Caucasian-male faculty members included in the selected cluster groups for each year of the study.

For the five-year study, 95 independent regression equations were estimated for use in a wage comparison model. The wage comparison model utilized in this research required computing the expected salaries for all faculty members in a given cluster group from the regression equations obtained in analyzing salary levels and attributes of Caucasian-male faculty members. After computing the predicted salary for each faculty member in a given cluster, the actual salary of each faculty member is subtracted from his or her predicted salary to create a salary residual. The salary residual can be either positive or negative for any given faculty member. Since regression equations are built using a summation-of-the-differences technique, the average of the salary residuals for Caucasian-male faculty members in any given cluster should always approximate zero. In theory, the average of the salary residuals for female faculty members in any given cluster also should be zero, but theory is not reality. In most cases the salary residual mean for females will differ from that of their Caucasian-male counterparts. The difference in residual means between the groups being compared is classified as the average annual wage disparity in a cluster. Wage disparities can be favorable or unfavorable depending on group-of-reference perspectives. A negative wage disparity in any given cluster denotes that females have unfavorable salary levels, and a positive wage disparity in any given cluster signifies that Caucasian-males have unfavorable salary levels.

Under the comparative aspects of the model developed in this study, *t*-tests were used to compare the salary residual means of female faculty members with those of the Caucasian-males. When comparing the salary residual means of female faculty members to those of Caucasian-male faculty members, it was hypothesized that no significant wage disparities would be found. By applying the schemata of the global hypothesis to each cluster, the *t*-test analysis was used to determine if the hypothesis should be accepted or rejected for any given cluster in a particular year of the study. In all, 95 independent hypotheses were tested.

The findings from the examinations were wide-ranging. Gender-related salary residual comparative testing revealed that cases of negative wage disparity for female faculty members were more prevalent than cases of positive wage disparity for female faculty members (53 instances of negative salary residual means, compared to 42 instances of positive salary residual means). Remarkably, only 5 of the 95 wage disparity cases were classified as statistically significant ($\alpha \leq .05$). In looking at the 1992 data, unfavorable wage disparities for female faculty members were found in the Humanities cluster and the Soft-Sciences cluster. The gender-related comparisons of faculty members in the College of Family and Consumer Sciences combined with the College of Education cluster reveal unfavorable wage disparities for female faculty members in academic years 1999 and 2000. In examining the salary comparisons for the 1998 academic data, unfavorable wage disparities for Caucasian-male faculty members were discovered in the Iowa State University cluster.

Ten of the other wage disparities uncovered during the comparative analyses were of a nature the author considered to be noticeable or questionable ($.05 \leq \alpha \leq .15$) and thus worthy of mention (see Chapter 4 for details on when, where, and in what amounts). Materially, seven of the ten noticeable wage disparities were judged to be unfavorable for faculty women, and three of the noticeable wage disparities were determined to be unfavorable for the faculty men. The mere fact that a wage disparity is unfavorable for any given group does not mean that the group is being discriminated against. Several convoluted factors could have skewed or corrupted the results in such a way that the results are without merit or of greater importance than suggested.

Interpretations of Findings

The outcomes reported in Chapter 4 and summarized above are results from singular components of the models used in this study. Prior to presenting rational interpretations of the findings of this study, sweeping inspections on multiple aspects of each model are needed. In the following subsection, factors (elements) that exhibit influence on the model and the outcomes of this research are presented. In the next subsection, interpretations based on the findings of this research work are presented from a holistic perspective.

Factors Influencing Interpretation

Four key elements in interpreting the results of this study come to mind. First and foremost, the 95 regression equations used in this comparative study have a coefficient of determination (i.e., an R^2 or adjusted R^2 value) associated with each equation. The R^2 statistic describes the proportion of variation in salary that can be attributed to various characteristics (predictors) of the faculty members in the group. Therefore, the R^2 or the adjusted R^2 statistic should be utilized to augment conclusions extracted from each model.

Second, a low number of Caucasian-male faculty members in a given cluster can adversely affect the validity of the regression analysis. In discussing some concerns they have about research using multiple regression techniques for analyzing data, Borg and Gall (1989) assert that there should be "reasonable balance between the sample size and the number of predictor variables. . . . rule of thumb is to increase the sample size by at least 15 subjects for each variable that will be included" (p. 609). These statements imply that various results obtained in this study should be adjusted or tempered to account for possible rule infractions regarding sample size.

The combining of faculty members from various colleges at an institution into one cluster group is a method often used to increase the number of subjects in a sample stratum. When combining faculty members from divergent colleges into larger cluster groups, a variable that accounts for each faculty member's college of rank should be created and included in the regression model. If clusters of faculty members are formed and no predictor variable is assigned to account for any major differences in the groups combined, the integrity of equation constructed from any combined-cluster regression analysis may be jeopardized. The failure to account for group attributes in combined-clusters is of paramount importance in interpreting and drawing implications for any such study. These assertions indicate that possible errors in this research project may have mottled the outcomes of some segments of this study (i.e., analyzing combined-college-clusters without appropriate control variables).

When using inferential statistics to test for differences in means between groups, there are assumptions that come with the statistical testing. When statistical assumptions are violated, the validity of the model results can range from somewhat to exceedingly tenuous. In considering the underlying assumption that salary residuals are normally distributed in each group being compared (females and Caucasian-males), the interpretations and implications of this study should include a discussion of the extent of model violations.

Unilateral Interpretations

By keeping the four elements that exhibit influence on the integrity of the salary equity model in mind, the discoveries of this study are considerably different from the unblended statistical results of the comparative analyses. The author believes that the intermingling of faculty members from distinct colleges without having college of rank as an attribute (predictor) in the regression analysis has flawed the results for 10 comparisons in this study. The author contends that the results from *t*-test analyses of the Family and Consumer Sciences combined with Education cluster and the Library combined with Education cluster should be discarded for all years analyzed in this study. This diminishes the number of comparative cases that are worthy of further interpretation to 85.

The number of Caucasian-male faculty members in a cluster was extremely low ($N \leq 20$) on ten occasions in this study. The author thinks the results of the comparative analysis on these ten cluster formations are tenuous at best. The author contends that the results from *t*-test analyses for the Family and Consumer Sciences cluster and the Library cluster for all five years of this study should be disregarded and not included as conclusive evidence. Thus, only 75 of the comparative cases are accorded further speculation or elaboration.

Results from models for comparison groups with low female faculty member counts ($N \leq 12$, a cutoff set arbitrarily by the author) are unlikely to have salary residuals that are normally distributed. Therefore, 22 of the 75 results considered for serious discussion are possibly tenuous, and should be carefully scrutinized and tested further.

The remaining 53 results obtained from the five-year comparative analysis provide the cornerstone for constructing credible interpretations of the status of gender-related salary equity. Of the 53 plausibly sound results; there are 21 cases of negative wage disparity (note that residual means were statistically different in 2 of these cases and noticeably different in 3 other cases). There were 32 positive wage disparities detected in the credible results (note that residual means were statistically different in 1 of these cases and noticeably different in 1 other case).

Keeping in mind the earlier statement that the coefficient of determination for the regression equation should be utilized to augment the conclusions extracted from the comparative models used in this study, the following statements are offered as the author's interpretations of the findings:

1. By using a model that conservatively accounts for 68% of the wage variations among selected faculty members working in the Humanities during 1992, the author discovered that female faculty member wage levels were significantly lower ($2,020.85 wage inequity) than their male counterparts. In the author's opinion, there is *strong evidence ($\alpha \leq .05$) to suggest that the salary dispensing practices within the Humanities field at the university were inequitable at a level that could be perceived as discriminatory toward females in 1992.*
2. By using a model that conservatively accounts for 46% of the wage variations among selected faculty members working in the Soft-Sciences area within the College of LAS during 1992, the author discovered that the wages of female faculty members were significantly lower ($4,424.56 wage inequity) than their male counterparts. In the author's opinion, there is *profound evidence ($\alpha \leq .01$) to suggest that the salary dispensing practices within the Soft-Sciences field at the university were inequitable at a level that could be perceived as discriminatory toward females in 1992.*
3. By using a model that conservatively accounts for 59% of the wage variations among selected faculty members working at Iowa State University during 1998,

the author discovered that Caucasian-male faculty member wage levels were significantly lower ($1,973.63 wage inequity) than their female counterparts. In the author's opinion, there is *profound evidence ($\alpha \leq .01$) to suggest that the salary dispensing practices at Iowa State University were inequitable at a level that could be perceived as discriminatory toward Caucasian-males in 1998.*

4. By using a model that conservatively accounts for 59% of the wage variations among selected faculty members working at the College of Design during 1991, the author discovered that female faculty member wage levels were noticeably lower ($2,469.98 wage inequity) than their Caucasian-male counterparts. In the author's opinion, there is *functional evidence ($\alpha \leq .15$) to suggest that the salary dispensing practices of the College of Design were inequitable at a level that could be perceived as latently discriminatory toward females in 1991.*
5. By using a model that conservatively accounts for 77% of the wage variations among selected faculty members working at the College of Education during 1991, the author discovered that Caucasian-male faculty member wage levels were noticeably lower ($1,973.63 wage inequity) than their female counterparts. In the author's opinion, there is *functional evidence ($\alpha \leq .15$) to suggest that the salary dispensing practices of the College of Education were inequitable at a level that could be perceived as latently discriminatory toward Caucasian-males in 1991.*
6. By using a model that conservatively accounts for 78% of the wage variations among selected faculty members working at the Hard-Sciences area within the College of LAS during 1992, the author discovered that the wages of female faculty members were noticeably lower ($4,524.79 wage inequity) than their male counterparts. In the author's opinion, there is *functional evidence ($\alpha \leq .15$) to suggest that the salary dispensing practices within the Hard-Sciences field at the university were inequitable at a level that could be perceived as latently*

discriminatory toward females in 1992.

7. By using a model that conservatively accounts for 47% of the wage variations among selected faculty members working at the Hard-Sciences area within the College of LAS during 1998, the author discovered that the wages of female faculty members were noticeably lower ($4,752.09 wage inequity) than their male counterparts. In the author's opinion, there is *functional evidence ($\alpha \leq .15$) to suggest that the salary dispensing practices within the Hard-Sciences field at the university were inequitable at a level that could be perceived as latently discriminatory toward females in 1998.*

Implications of Findings

Many questions come to mind when considering the interpretations and implications of this research. Are these findings definitive? Is there evidence to suggest that pay practices are unfair or gender-biased at the university? Does the existence of a wage disparity negate the need to change salary dispensation practices in a given cluster or at the university as a whole? Are there any significant cases of wage disparity that warrant arbitration or legal litigation? These questions, though not exhaustive, form the foundation for constructing the discussion in this section.

Definitive Statement

By recognizing the tenuous outcomes as results needing further scrutiny and by purging all spurious or flawed results of this faculty salary analysis, 53 cluster comparisons provided conclusive results. Convincing evidence obtained from the analytical model used in this study revealed that the wage disparities between female and Caucasian-male faculty members were relatively insignificant in a majority (87% of the cases) of the comparisons. The four instances of functionally substantial salary inequity (7.5% of the cases) exposed during this study indicate the potential existence of problematic pay practices at the university. The profound ($\alpha \leq .01$) and strong ($\alpha \leq .05$) wage disparity cases discussed in the interpretation section above substantiate (in 6.5% of the cases) the allegations that past pay practices at the university have been discriminatory (although not necessarily in the anticipated direction).

Fairness of System

The fairness of faculty pay practices is often measured by looking at things from the perspective of the person judging the situation. From an administrative perspective, an administrator whose job it is to oversee pay practices at the university easily could assert that the significant findings in this research project were so few, that faculty pay practices appear to be relatively fair. In contrast, the faculty member whose salary level was shown to be noticeably or significantly lower than his or her counterpart probably will perceive the pay practices at the university as extremely unfair. An objective researcher could see the university's system of faculty wage compensation as both fair and unfair.

From the author's point of view, all institutions and organizations engaged in employing workers need to have a proactive system for determining if the wages of various groups are comparably equitable, and the system needs to be one that is accepted by the experts and the courts. The author conducted many interviews with staff members, administrators, and faculty throughout the past 12 years, and was unable to corroborate evidence that university decision makers consistently use viable analytical models to measure the state of wage equity among faculty or other employees at the university. In fact, the pilot studies performed during the first years of the decade presented overwhelming evidence to support the continuous use of the Holland, Warren, and Lee model for measuring wage equity. By continuing to use the regression comparison model on an annual basis, university decision makers could build upon, refine, and customize various aspects of the analytical model to eliminate the occurrence of discriminatory practices in pay administration. To the extent that university policy and decision makers have not used analytical models in measuring for wage disparity that are acceptable to qualified experts and the courts of our land, then that is the extent to which employee (viz., faculty members) compensation systems are unfair.

Gender-Bias of Practices

Similarly, multiple perceptions can hinder or complicate the measuring of gender-bias in wage distribution systems at any place of employment. Many stakeholders will have their own individual way of trying to find evidence that supports their preconceived notions of whether or not the pay practices at the university are gender-biased. Since the author is not a stakeholder in this process and has very little to gain or lose from his decisions, the ideas and perceptions expressed here hopefully are unprejudiced. To see if wage distribution practices are gender-biased, one alternative is that researchers could compare the count of credible negative wage disparities to the count of credible positive wage disparities in each year of a study. If negative wage disparities outnumber positive wage disparities, then the bias would be unfavorable for female faculty members. In contrast, when the count of positive wage disparities outnumbers the count of negative wage disparities then the bias would be unfavorable for male faculty members. However, this method has many shortcomings and is not recommended by the author.

A second, preferable approach yields a two-step process that measures the magnitude and directional nature of the gender-bias in wage compensation systems. First, the positive and/or negative wage disparity in each college cluster for a given year of the study would be multiplied by the count of females in each corresponding college cluster. The resulting products of the multiplication (which can be positive or negative) then are summed. This summation can be used to measure the direction and monetary magnitude of gender-bias in the pay distribution practices for a given academic year at the institution. Since credible results were not available for the Family and Consumer Sciences cluster nor the Library cluster, the author believes the alternative process described above is not a good fit or viable.

By modifying the method suggested above, the author was able to find one technique for measuring gender-bias in wage dispensation practices at the university. First, the positive and/or negative average wage residual for the Iowa State University cluster is multiplied by the count of females in that cluster. This process of multiplying the female count for the Iowa State University cluster times the average wage residual for the cluster is repeated for each year of the study. The product of these calculations gives a rough estimate of the directional nature and magnitude of the annual wage dispensing bias. Next, the products of each multiplication for the university clusters could be summed to produce a composite estimate of the directional nature and magnitude of gender-bias in wage dispensing practices at the university for all years of the study combined. Using these procedures, the author discovered the following:

1. University wage dispensing practices *favored female faculty* members in the amount of *$66,570.12* in the 1991 academic year.
2. University wage dispensing practices *favored female faculty* members in the amount of *$8,069.73* in the 1992 academic year.
3. University wage dispensing practices *favored female faculty* members in the amount of *$637,482.49* in the 1998 academic year.
4. University wage dispensing practices *favored female faculty* members in the amount of *$24,515.47* in the 1999 academic year.
5. University wage dispensing practices *favored Caucasian-male faculty* members in the amount of *$197,395.64* in the academic year 2000.

This information effectively suggests that there is gender-bias in the compensation practices at the university and that the bias is against Caucasian-male faculty members. In fact, calculation totals for the five years of this study combined show a composite bias favoring females over males in the magnitude of $539,242.17.

Pay System Changes

A section of Chapter 2 was dedicated to the field of study known as Organizational

Behavior (OB). It was implied that educational institutions could and should use proactive approaches to analyze how OB models can be utilized in the realm of higher education. It was indicated that colleges and universities ought to build compensation programs that faculty members perceive as equitable, that create a sense of belonging for faculty, and that help to motivate the faculty. Additionally, it was argued that OB theories offer institutions of higher learning the opportunity to fine-tune their pay systems so they become more cost-effective and conducive to the goals of the educational institution in the long run.

Universities have many loose couplings (e.g., a faculty member employed in three colleges, inconsistent faculty pay-for-performance measures within departments and colleges, etc.) that often make it arduous to compare the salary levels of faculty members. Wage disparity among faculty members is relative and does not always negate a need for change in compensation systems. When wage disparity levels are substantial and extremely noticeable, there may be cause to think that the current wage compensation system is flawed and in need of repair. The amount of repair is dependent on many factors and beyond the scope of this paper. Given the evidence on gender-bias at the university, the evidence on salary inequities at the university, and the propensities of the university's wage disbursement system to be judged as unfair, it is highly likely that pay disbursement practices at the university are possibly flawed, warrant investigation, and in need of change.

Arbitration or Litigation

Determining if arbitration or litigation is needed to rectify a case of wage disparity is considerably different from articulating the gender-bias of a pay practice or determining if a past pay practice is of a discriminatory nature. Sporadic factors can cause study results to be misleading or inaccurate. Does the fact that the position of university President was held by three different individuals during the decade have any effect on the results of the study? Could other administrative changes (e.g., new deans, department chairpersons, etc.) within the various colleges at the institution have any influence on the wage dispensing practices at the university? Could the proactive approach to broaden the diversity of faculty members employed at the university alter the salary dispensing practices in a way that the results of this study are biased? Is it possible that wages for one gender or the other, in a given year, included adjustments to compensate for past deficiencies in the compensation system at the university? Is there a chance that arbitration and litigation actions already have resolved the issues of gender-related wage disparity at the university? These questions, and many more questions of this nature, suggest that other information could be gathered.

An *events-analysis* covering the years of this study would be of very practical benefit prior to responding to the findings of this research project or before taking any corrective actions based on these results. Discovery information of this type can be very helpful in deciding if arbitration or litigation is warranted in the instances of substantial gender-related wage disparity. If extenuating circumstances are not discovered, at minimum some form of arbitration is warranted. Litigation should be the last avenue of action for all involved. The author claims no expertise in the legal arena and offers this statement as a note of monition.

Recommendations

Numerous recommendations may be derived from this research. A series of condensed recommendations (advising statements), with no preference as to order or importance, are as follows:

1. This study provided evidence that incomplete and erroneous employee data can impede and degrade the process for determining the equity of salary among faculty members at institutions of higher learning. Omitting any faculty member from a salary equity study emerges as unconscionable at best. The mere fact that the author was forced to eliminate faculty members from this study indicates that the amassing of data at institutions is important. Broadly speaking, the author believes that it would be highly prudent for all agencies, organizations, and institutions (educational) to maintain accurate and current data on all employees (faculty

members) to better empower decision makers and enhance the decision-making processes.

2. Decision makers at this university, as well as many other universities and colleges, need to evaluate the wage distribution system on an annual basis. Evidence provided in this paper indicates a need to conduct gender-related salary equity studies with mathematical models that account (i.e., control) for faculty member attributes and characteristics. For example, there is a likelihood that the number of years a faculty member has been employed factors strongly into the level of pay he or she receives, and this should be controlled for when conducting gender-related salary comparisons. Annual evaluations of wage dispensing practices with regression techniques can provide information that the analysis of unrefined salary data, average salaries, and other descriptive salary properties does not provide (e.g., decision makers will have annual comparative information upon which they can judge the adequacy of effects to changes made in the wage distribution system).
3. The results of this study and studies of this nature should be made public to the constituents of the university (all stakeholders). By making the results of salary equity studies available to the public, faculty members will be afforded the opportunity to internalize findings that are more accurate than looking at the mean salaries currently published by many organizations and institutions. The publishing of wage-disparity results by schools of higher learning can establish a sense of trust between institutions and the public (e.g., alumni, taxpayers, and others interested). Additionally, an open-door policy of publishing and sharing findings about the relative state of wage disparity can help other institutions replicate analytical models, develop expanded models, and effectuate empowered comparisons of wage disparity measuring practices.

4. Results from this study indicate that researchers ought to be alert to the delicacies of performing comparative wage studies. Group comparisons of wages for faculty members make little sense if the female count is two members and the male count is 46 members (as was true for the Physical Sciences cluster for the 1991 data). Market force factors and other events at the time of initial employment may have skewed the salaries of the female faculty members to such an extent that wage comparison methods are limited or nearly impossible. For these and various other reasons, the 22 cluster comparison results that were eliminated from the interpretive process (i.e., clusters with low numbers of female faculty members) in this study should be analyzed extensively (e.g., testing for symmetry of salary residuals, case-by-case inspections, matched-pair inspections, etc.).
5. For the colleges with low male counts ($N \leq 30$), analysts should use a modified technique for measuring and analyzing gender-related salary equity. The approach involves using the salaries and attributes of female faculty members in the regression equation instead of the Caucasian-males. Once salary residual calculations are complete for each group in the cluster, the analyst then can compare the salary residuals mean for females to that of the Caucasian-males. This procedure will produce a negative or positive measure of wage disparity for Caucasian-males in the cluster and should provide conclusive evidence on the level and direction of inequity in a given college.
6. Evidence from this study indicates a valid rationality for decision makers at this university to conduct gender-related equity studies for the years immediately following the initial pilot study (the 1993, 1994, 1995, 1996, and 1997 fiscal years). Since suspicious gender-related wage disparities were found in the pilot study years (1991 and 1992) and the first year of the new study (1998), there is a strong likelihood that gender-related wage disparities were present in the

intermediate years. Through such an investigation information may be found to explain the wage disparity shifts (e.g., additional examinations might explain why faculty pay levels for Caucasian-males were significantly less than those for their female counterparts in 1998). In the author's opinion, the university needs to conduct these additional studies to provide an entire picture on the state of wage equity at the university during the 1990's.

7. Given that wage disparity discrimination can be based on ethnicity of the faculty member, the university should conduct similar and/or equivalent studies to determine if Caucasian-male faculty salary levels are comparable to the salary levels of faculty members from other ethnic backgrounds. That is, decision makers should determine the directional nature and magnitude of ethnic-bias in the wage compensation system at ISU. Acknowledging the fact that faculty member counts for ethnic minorities are extremely low in many departments and colleges at the university, it is highly probable that studies of this nature would need to be conducted using only the larger cluster groups (e.g., the Liberal Arts and Sciences College or Iowa State University as a whole).
8. Since results from this study and the salary equity study at the University of Wisconsin at Madison (Harrigan, 1999) showed directional wage disparity shifts (i.e., switching from routinely negative wage disparities to globally positive wage disparities for female faculty members) in the last part of the 1990's, comparable research at several other institutions of higher learning appears to be warranted. By conducting additional salary equity studies using the Holland, Warren, and Lee model for analyzing faculty member salaries at other universities, researchers would be able to determine if the phenomena of favorable wage disparities for female faculty members are widespread and if this pattern can be generalized to faculty members of higher learning in the whole.

9. Initially, this study established that gender-related equity issues have been an ardent theme for many years now. This and many other studies (Harrigan, 1999; Holland, Warren, Lee, 1990; Hyde and Jones, 1992; Krallman, 1993; Sokol, 1992) have established the existence of gender-related faculty wage disparities at several institutions of higher education. Later this study presented the notion that conducting and publishing the results from salary equity studies would provide faculty members with an increased level organizational support that ultimately leads to improved work performance of faculty members. Additionally, this study also substantiated the essentiality of analyzing the internal and external factors (i.e., an events-analysis) of an educational institution when research substantiates the reality of gender-related wage disparities. These details and much of the other information provided in this study indicate that expanded versions of research on salary equity need to be developed. The author believes that a meta-analysis of salary equity issues is highly warranted. By combining wage disparity measuring techniques with the procedures for measuring for employee satisfaction, and the methods used in determining the effects of environmental factors on institutions, researchers would be able to develop a multifaceted model for analyzing the state of wage equity in academe.

APPENDIX A

Table A.1

Syntax to Change Five LAS Pay Divisions into Dichotomous Variables

Dichotomous Variable	Syntax Statement
Biology Departments	RECODE newpd1 (1=1) (ELSE=0) INTO biodi. EXECUTE.
Humanities Departments	RECODE newpd1 (2=1) (ELSE=0) INTO humdi. EXECUTE.
Math Departments	RECODE newpd1 (3=1) (ELSE=0) INTO matdi. EXECUTE.
Physical Science Departments	RECODE newpd1 (4=1) (ELSE=0) INTO phscdi. EXECUTE.
Sociology Departments	RECODE newpd1 (5=1) (ELSE=0) INTO socdi. EXECUTE.

Table A.2

Syntax to Change Administration to Non-Administration and Breakdown of Non-Administrators into Dichotomous Variables

Variable/Dichotomous Variable	Syntax Statement
Non-administrators	RECODE admincd1 (8=1) (9=1) (12=1) (ELSE=0) INTO nonadm. EXECUTE.
Extension Services	RECODE admincd1 (8=1) (ELSE=0) INTO extens. EXECUTE.
Non-Teaching Faculty	RECODE admincd1 (9=1) (ELSE=0) INTO nontea. EXECUTE.
Teaching Faculty	RECODE admincd1 (12=1) (ELSE=0) INTO teach. EXECUTE.

Table A.3

Syntax to Change Two College of Design Pay Divisions into Dichotomous Variables

Dichotomous Variable	Syntax Statement
	RECODE
Fine Arts	newpd2
	(1=1) (ELSE=0) INTO FineArts.
	EXECUTE.
	RECODE
Architecture	newpd2
	(2=1) (ELSE=0) INTO Architec.
	EXECUTE.

Table A.4

Syntax to Change Periodic and Graduate Faculty Classification into Dichotomous Variables

Dichotomous Variable	Syntax Statement
	RECODE
Periodic Status	rankc1
	(1=0) (ELSE=1) INTO periodic.
	EXECUTE.
	RECODE
Graduate Status	gradfac
	(1=0) (ELSE=1) INTO gradstat.
	EXECUTE.

Table A.5

Syntax to Change Highest Degree Earned into Dichotomous Variables

Dichotomous Variable	Syntax Statement
Bachelor	RECODE highdegr (1=1) (ELSE=0) INTO bachelor. EXECUTE.
Master	RECODE highdegr (2=1) (ELSE=0) INTO master. EXECUTE.
Doctor	RECODE highdegr (3=1) (ELSE=0) INTO doctor. EXECUTE.
Professional	RECODE highdegr (4=1) (ELSE=0) INTO prfessnl. EXECUTE.

Table A.6

Syntax to Change Rank of Regular Faculty into Dichotomous Variables

Dichotomous Variable	Syntax Statement
Instructor	RECODE rankc2 (4=1) (ELSE=0) INTO instruct. EXECUTE.
Assistant Professor	RECODE rankc2 (3=1) (ELSE=0) INTO assist. EXECUTE.
Associate Professor	RECODE rankc2 (2=1) (ELSE=0) INTO assoc. EXECUTE.
Full Professor	RECODE rankc2 (1=1) (ELSE=0) INTO full. EXECUTE.

Table A.7

Syntax to Change College of Rank into Dichotomous Variables

Dichotomous Variable	Syntax Statement
Agriculture	RECODE collrank (1=1) (ELSE=0) INTO agricul. EXECUTE.
Design	RECODE collrank (2=1) (ELSE=0) INTO design. EXECUTE.
Education	RECODE collrank (3=1) (ELSE=0) INTO educ. EXECUTE.
Engineering	RECODE collrank (4=1) (ELSE=0) INTO engin. EXECUTE.
Family and Consumer Sciences	RECODE collrank (5=1) (ELSE=0) INTO fcs. EXECUTE.

Table A.7 (continued)

Dichotomous Variable	Syntax Statement
Library	RECODE collrank (7=1) (ELSE=0) INTO lib. EXECUTE.
Business	RECODE collrank (8=1) (ELSE=0) INTO busin. EXECUTE .
Liberal Arts and Sciences	RECODE collrank (9=1) (ELSE=0) INTO las. EXECUTE.
Veterinary Medicine	RECODE collrank (10=1) (ELSE=0) INTO vet. EXECUTE.

APPENDIX B

Table B.1

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the Iowa State University Cluster

Cluster Group	Syntax Statement
Iowa State University	USE ALL. COMPUTE ISUcamal=((tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL ISUcamal '(tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS ISUcamal 0 'Not Selected' 1 'Selected'. FORMAT ISUcamal (f1.0). FILTER BY ISUcamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl agricul design educ engin fcs lib busin las vet periodic gradstat finearts architec extens nontea teach biodi humdi matdi phscdi socdi.

Table B.2

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the College of Agriculture Cluster

Cluster Group	Syntax Statement
College of Agriculture	USE ALL. COMPUTE agrcamal=((collrank=1) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL agrcamal '(collrank=1) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS agrcamal 0 'Not Selected' 1 'Selected'. FORMAT agrcamal (f1.0). FILTER BY agrcamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.3

Syntax Statements to Perform Regression Analysis on Caucasian-Males in The College of Design Cluster

Cluster Group	Syntax Statement
College of Design	USE ALL. COMPUTE descamal=((collrank=2) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL descamal '(collrank=2) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS descamal 0 'Not Selected' 1 'Selected'. FORMAT descamal (f1.0). FILTER BY descamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor periodic prfessnl gradstat finearts architec extens nontea teach.

Table B.4

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the College of Education Cluster

Cluster Group	Syntax Statement
College of Education	USE ALL. COMPUTE educamal=((collrank=3) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL educamal '(collrank=3) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS educamal 0 'Not Selected' 1 'Selected'. FORMAT educamal (f1.0). FILTER BY educamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.5

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the College of Engineering Cluster

Cluster Group	Syntax Statement
College of Engineering	USE ALL. COMPUTE engcamal=((collrank=4) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL engcamal '(collrank=4) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS engcamal 0 'Not Selected' 1 'Selected'. FORMAT engcamal (f1.0). FILTER BY engcamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.6

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the College of Family and Consumer Sciences Cluster

Cluster Group	Syntax Statement
College of Family and Consumer Sciences	USE ALL. COMPUTE fcscamal=((collrank=5) and (tenure=3 or tenure=4 or tenure=5) and (gender=2) and (nonadm=1) and (ethnic=1)). VARIABLE LABEL fcscamal '(collrank=5) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS fcscamal 0 'Not Selected' 1 'Selected'. FORMAT fcscamal (f1.0). FILTER BY fcscamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.7

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the College of Family and Consumer Sciences Combined with College of Education Cluster

Cluster Group	Syntax Statement
College of Family and Consumer Sciences Combined with College of Education	USE ALL. COMPUTE f_ecamal=((collrank=5 or collrank=3) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL f_ecamal '(collrank=5 or collrank=3) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS f_ecamal 0 'Not Selected' 1 'Selected'. FORMAT f_ecamal (f1.0). FILTER BY f_ecamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.8

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the College of Library Cluster

Cluster Group	Syntax Statement
College of Library	USE ALL. COMPUTE libcamal=((collrank=7) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL libcamal '(collrank=7) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS libcamal 0 'Not Selected' 1 'Selected'. FORMAT libcamal (f1.0). FILTER BY libcamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.9

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the College of Library Combined with College of Education Cluster

Cluster Group	Syntax Statement
College of Library combined with College of Education	USE ALL. COMPUTE l_ecamal=((collrank=7 or collrank=3) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL l_ecamal '(collrank=7 or collrank=3) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS l_ecamal 0 'Not Selected' 1 'Selected'. FORMAT l_ecamal (f1.0). FILTER BY l_ecamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.10

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the College of Business

Cluster Group	Syntax Statement
College of Business	USE ALL. COMPUTE buscamal=((collrank=8) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL buscamal '(collrank=8) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS buscamal 0 'Not Selected' 1 'Selected'. FORMAT buscamal (f1.0). FILTER BY buscamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.11

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the College of Liberal Arts and Sciences Cluster

Cluster Group	Syntax Statement
College of Liberal Arts and Sciences	USE ALL. COMPUTE lascamal=((collrank=9) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL lascamal '(collrank=9) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS lascamal 0 'Not Selected' 1 'Selected'. FORMAT lascamal (f1.0). FILTER BY lascamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach biodi humdi matdi phscdi socdi.

Table B.12

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the Biology Division of Liberal Arts and Sciences Cluster

Cluster Group	Syntax Statement
Biology Division of Liberal Arts and Sciences	USE ALL. COMPUTE biocamal=((collrank=9 and newpd1=1) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL biocamal '(collrank=9 and newpd1=1) and (tenure=3 or tenure=4 or teure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS biocamal 0 'Not Selected' 1 'Selected'. FORMAT biocamal (f1.0). FILTER BY biocamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.13

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the Humanities Division of Liberal Arts and Sciences Cluster

Cluster Group	Syntax Statement
Humanities Division in Liberal Arts and Sciences	USE ALL. COMPUTE humcamal=((collrank=9) and (newpd1=2) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL humcamal '(collrank=9)and (newpd1=2) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS humcamal 0 'Not Selected' 1 'Selected'. FORMAT humcamal (f1.0). FILTER BY humcamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.14

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the Math Division of Liberal Arts and Sciences Cluster

Cluster Group	Syntax Statement
Math Division of Liberal Arts and Sciences	USE ALL. COMPUTE matcamal=((collrank=9 and newpd1=3) and (tenure=3 or tenure=4 or tenure=5)and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL matcamal '(collrank=9 and newpd1=3) and (tenure=3 or tenure=4 tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS matcamal 0 'Not Selected' 1 'Selected'. FORMAT matcamal (f1.0). FILTER BY matcamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.15

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the Physical Sciences Division of Liberal Arts and Sciences Cluster

Cluster Group	Syntax Statement
Physical	USE ALL.
Sciences	COMPUTE phscamal=((collrank=9 and newpd1=4) and (tenure=3 or tenure=4
Division	or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)).
of	VARIABLE LABEL phscamal '(collrank=9 and newpd1=4) and (tenure=3 or
Liberal	tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' +
Arts	'(FILTER)'.
and	VALUE LABELS phscamal 0 'Not Selected' 1 'Selected'.
Sciences	FORMAT phscamal (f1.0).
	FILTER BY phscamal.
	EXECUTE.
	REGRESSION
	/DESCRIPTIVES MEAN STDDEV CORR SIG N
	/MISSING LISTWISE
	/STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP
	/CRITERIA=PIN(.05) POUT(.10)
	/NOORIGIN
	/DEPENDENT newsal
	/METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist
	instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.16

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the Social Sciences Division of Liberal Arts and Sciences Cluster

Cluster Group	Syntax Statement
Social Sciences Division of Liberal Arts and Sciences	USE ALL. COMPUTE soccamal=((collrank=9) and (newpd1=5) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL soccamal '(collrank=9) and (newpd1=5) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS soccamal 0 'Not Selected' 1 'Selected'. FORMAT soccamal (f1.0). FILTER BY soccamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.17

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the Soft-Sciences Division of Liberal Arts and Sciences Cluster

Cluster Group	Syntax Statement
Soft-Sciences Division of Liberal Arts and Sciences	USE ALL. COMPUTE sftcamal=((collrank=9) and (newpd1=5 or newpd1=2) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL sftcamal '(collrank=9) and (newpd1=5 or newpd1=2) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS sftcamal 0 'Not Selected' 1 'Selected'. FORMAT sftcamal (f1.0). FILTER BY sftcamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.18

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the Hard-Sciences Division of Liberal Arts and Sciences Cluster

Cluster Group	Syntax Statement
Hard-Sciences Division of Liberal Arts and Sciences	USE ALL. COMPUTE hrdcamal=((collrank=9) and (newpd1=1 or newpd1=3 or newpd1=4)and (nonadm=1) and (tenure=3 or tenure=4 or tenure=5) and (gender=2) and (ethnic=1)). VARIABLE LABEL hrdcamal '(collrank=9) and (newpd1=1 or newpd1=3 or newpd1=4) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS hrdcamal 0 'Not Selected' 1 'Selected'. FORMAT hrdcamal (f1.0). FILTER BY hrdcamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

Table B.19

Syntax Statements to Perform Regression Analysis on Caucasian-Males in the College of Veterinary Medicine Cluster

Cluster Group	Syntax Statement
College of Veterinary Medicine	USE ALL. COMPUTE vetcamal=((collrank=10) and (tenure=3 or tenure=4 or tenure=5) and (nonadm=1) and (gender=2) and (ethnic=1)). VARIABLE LABEL vetcamal '(collrank=10) and (tenure=3 or tenure=4 or tenure=5) and (gender=2)' + 'and (ethnic=1) and (nonadm=1)' + '(FILTER)'. VALUE LABELS vetcamal 0 'Not Selected' 1 'Selected'. FORMAT vetcamal (f1.0). FILTER BY vetcamal. EXECUTE. REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL CHANGE ZPP /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT newsal /METHOD=STEPWISE yrsnrank yrsemply yrsdegre age full assoc assist instruct bachelor master doctor prfessnl periodic gradstat extens nontea teach.

APPENDIX C

Table C.1

1991 Selected Results From Stepwise Solution Regression Salary Analyses of Caucasian-Males by Clusters at the University

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
ISU Grouping	.839	.704	.700	Y for ISU = 24,652.963 + (30,575.956 * full) + (18,371.065 * engin) + (1,6745.922 * periodic) + (19,263.236 * busin) + (12,816.017 * vet) + (16,920.060 * assoc) + (749.958 * yrsnrank) + (-591.081 * yrsemply) + (-7,591.394 * humdi) + (6,858.508 * las) + (4,733.276 * agricul) + (8,444.714 * assist) + (-3,031.375 * biodi) + (118.706 * yrsdegre) .
Agriculture Grouping	.740	.547	.537	Y for AGR = 40,025.270 + (18,436.275 * full) + (12,803.193 * periodic) + (-5,93.095 * yrsemply) + (1,035.664 * yrsnrank) + (7,454.580 * assoc).
Design Grouping	.793	.629	.593	Y for DES = 36,515.472 + (18,662.088 * full) + (8,859.610 * assoc) + (-5,298.734 * finearts) + (4,805.448 * doctor).
Education Grouping	.890	.792	.767	Y for EDU = 32,134.340 + (20,052.841 * full) + (8,898.938 * assoc) + (1,092.666 * yrsnrank) + (-13,832.396 * instruct) + (-526.392 * yrsemply).

Table C.1 (continued)

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
Engineering Grouping	.828	.685	.675	Y for ENG = 48,326.963 + (26,659.944 * full) + (16,706.424 * periodic) + (12,378.530 * assoc) + (787.532 * yrsnrank) + (-516.592 * yrsemply).
FCS Grouping	.658	.433	.386	Y for FCS = 41,901.830 + (8,605.398 * full).
FCS-EDUC Grouping	.842	.709	.688	Y for FCS&EDU = 19,333.662 + (29,506.213 * full) + (19,983.731 * assoc) + (486.911 * yrsnrank) + (12,605.407 * assist).
Library Grouping	.858	.736	.707	Y for LIB = 33,161.091 + (24,016.727 * full).
Library-Education Grouping	.897	.805	.787	Y for LIB&EDU = 31,094.037 + (17,414.384 * full) + (8,117.651 * assoc) + (580.326 * yrsnrank) + (-6,403.422 * master) + (-9,773.070 * instruct).
Business Grouping	.820	.673	.639	Y for BUS = 61,409.111+ (12,905.580 * full) + (-7,064.077 * assist) + (-8,437.217 * master).
LAS Grouping	.823	.677	.670	Y for LAS = 39,327.216 + (23,166.249 * full) + (20,337.017 * periodic) + (-6928.404 * humdi) + (224.265 * yrsdegre) + (7,329.552 * assoc) + (-637.581 * yrsemply) + (628.463 * yrsnrank) + (-3,020.182 * biodi).
Biology Grouping	.801	.641	.622	Y for BIO = 42,161.105 + (16,733.918 * full) + (15,886.795 * periodic).

Table C.1 (continued)

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
Humanities Grouping	.862	.742	.732	Y for HUM = 26,263.797 + (15,550.976 * full) + (429.457 * yrsdegre) + (5,318.695 * assoc) + (2,641.662 * gradstat).
Math Grouping	.707	.500	.475	Y for MATH = 41,090.679 + (16,514.960 * full) + (2,6047.350 * periodic) + (370.893 * yrsnrank).
Physical Sciences Grouping	.810	.656	.622	Y for PHS = 42,822.026 + (22,162.532 * full) + (23,794.575 * periodic) + (-930.787 * yrsemply) + (667.961 * yrsdegre).
Soc-Sciences Grouping	.621	.385	.371	Y for SOC = 44,864.312 + (19,166.483 * full).
Soft-Sciences Grouping	.781	.609	.601	Y for SFT-SCI = 29,601.085 + (20,815.106 * full) + (350.863 * yrsdegre) + (7,027.416 * assoc).
Hard-Sciences Grouping	.716	.513	.506	Y for HRD-SCI = 43,080.428 + (18,538.499 *full) + (22,542.866 * periodic).
Vet-Med Grouping	.809	.654	.631	Y for VET = 48,590.114 + (24,829.607* full) + (951.210 * yrsnrank) + (-846.234 * yrsemply) + (8,927.507 * assoc).

Table C.2

1992 Selected Results From Stepwise Solution Regression Salary Analyses of Caucasian-Males by Clusters at the University

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
ISU Grouping	.822	.676	.672	Y for ISU = 32,320.483 + (24,256.143 * full) + (18,479.583 * engin) + (10,759.950 * periodic) + (9,942.045 * assoc) + (17,807.988 * busin) + (12,305.643 * vet) + (874.533 * yrsnrank) + (-574.250 * yrsemply) + (5,724.109 * las) + (-24,512.222 * instruct) + (-5,986.803 * humdi) + (4,395.435 * agricul).
Agriculture Grouping	.810	.656	.646	Y for AGR = 44,221.118 + (17,166.336 * full) + (18,218.025 * periodic) + (66,84.224 *assoc) + (618.174 * yrsnrank) + (-317.820 * yrsemply) + (-4,883.646 * doctor).
Design Grouping	.808	.653	.621	Y for DES = 34,531.611 + (20,507.624 * full) + (-6,406.735 * finearts) + (10,939.115 * assoc) + (6,403.708 * doctor).
Education Grouping	.905	.819	.791	Y for EDU = 11,222.225 + (40,676.877 * full) + (29,035.607 * assoc) + (12,44.480 * yrsnrank) + (20,136.310 * periodic) + (19,681.352 * assist) + (-618.447 * yrsemply).

Table C.2 (continued)

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
Engineering Grouping	.749	.562	.551	Y for ENG = 45,903.924 + (29,153.783 * full) + (1,164.639 * yrsnrank) + (13,992.109 * assoc) + (-657.278 * yrsemply).
FCS Grouping	.551	.304	.246	Y for FCS = 42,801.626 + (7,211.592 * full).
FCS-EDUC Grouping	.861	.742	.713	Y for FCS&EDU = 14,303.794 + (37,666.461 * full) + (26,839.312 * assoc) + (21,238.734 * periodic) + (975.414 * yrsnrank) + (17,901.358 * assist) + (-477.781 * yrsemply).
Library Grouping	.890	.791	.759	Y for LIB = 29,340.205 + (27,837.614 * full) + (8,725.023 * assoc).
Library-Education Grouping	.904	.817	.798	Y for LIB&EDU = 29,967.335 + (18,304.182 * full) + (8,615.440 * assoc) + (567.768 * yrsnrank)+ (19,304.886 * periodic) + (-4,278.099 * master) + (-13,068.675 * instruct).
Business Grouping	.904	.817	.800	Y for BUS = 4,4872.400 + (14,782.378 * gradstat) + (16,500.322 * full) + (-15,008.067 * instruct).
LAS Grouping	.793	.629	.622	Y for LAS = 38,605.634 + (26,206.164 * full) + (15,201.656 * periodic) + (-31,864.411 * instruct) + (-5,165.969 * humdi) + (9,050.290 * assoc) + (883.699 * yrsnrank) + (-686.175 * yrsemply).

Table C.2 (continued)

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
Biology Grouping	.797	.635	.615	Y for BIO = 42,119.588 + (16,467.445 * full) + (16,194.785 * periodic).
Humanities Grouping	.831	.690	.677	Y for HUM = 28,034.018 + (14,681.516 * full) + (538.180 * yrsdegre) + (4,473.515 * assoc) + (-3776.230 * master).
Math Grouping	.670	.449	.439	Y for MATH = 43,995.358 + (19,784.845 * full).
Physical Sciences Grouping	.627	.393	.379	Y for PHS = 42,829.827 + (20,280.961 * full).
Soc-Sciences Grouping	.699	.489	.459	Y for SOC = 47,833.874 + (13,624.191 * full) + (-13,069.474 * assist) + (13,664.056 * periodic).
Soft-Sciences Grouping	.783	.613	.600	Y for SFT-SCI = 32,778.715 + (12,513.597 * full) + (360.450 * yrsdegre) + (-6,757.733 * assist) + (11,741.692 * periodic) + (4,623.380 * gradstat).
Hard-Sciences Grouping	.701	.491	.480	Y for HRD-SCI = 43,080.428 + (18,538.499 * full) + (22,542.866 * periodic).
Vet-Med Grouping	.771	.594	.581	Y for VET = 46,378.052 + (22,407.163 * full) + (6,753.741 * assoc).

Table C.3

1998 Selected Results From Stepwise Solution Regression Salary Analyses of Caucasian-Males by Clusters at the University

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
ISU Grouping	.773	.598	.590	Y for ISU = 27,021.518 + (25,038.859 * full) + (24,447.552 * engin) + (18,045.473 * periodic) + (1,082.179 * yrsnrank) + (9,979.447 * gradstat) + (23,623.927 * busin) + (17,383.378 * vet) + (-864.045 * yrsemply) + (9,195.260 * assoc) + (-34,282.194 * instruct) + (-9,382.793 * humdi) + (7,378.271 * las) + (411.585 * yrsdegre) + (-9,886.892 * prfessnl) + (-6,446.377 * biodi) + (4,351.354 * agricul).
Agriculture Grouping	.778	.606	.591	Y for AGR = 57,741.623 + (17,754.596 * periodic) + (23,079.084 * full) + (-74,101.174* instruct) + (52,547.423 * gradstat) + (10,527.795 * assoc) + (-65,596.605 * doctor) + (1,015.604 * yrsnrank) + (-546.852 * yrsemply).
Design Grouping	.697	.485	.458	Y for DES = 40,401.966 + (13,215.805 * full) + (393.658 * yrsdegre).
Education Grouping	.797	.635	.609	Y for EDU = 39,209.382 + (16,057.368 * full) + (546.737 * yrsdegre).
Engineering Grouping	.712	.506	.496	Y for ENG = 15,284.501+ (1,581.721 * yrsdegre) + (36,784.593 * periodic) + (3,4401.522 * doctor).

Table C.3 (continued)

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
FCS Grouping	.753	.568	.532	Y for FCS = 50,156.068 + (15,166.189 * full).
FCS-EDUC Grouping	.767	.588	.568	Y for FCS&EDU = 41,881.634 + (16,212.141 * full) + (411.196 * yrsdegre).
Library Grouping	.745	.555	.520	Y for LIB = 26597.385 + (672.076 * yrsdegre).
Library-Education Grouping	.857	.735	.716	Y for LIB-EDU = 39,546.296 + (12430.8441 * full) + (-14,476.484 * nontea) + (652.794 * yrsdegre).
Business Grouping	.949	.900	.883	Y for BUS = 20,764.341 + (33,979.042 * gradstat) + (34,750.660 * full) + (25,210.397 * assoc) + (16,081.325 * periodic) + (11,587.964 * assist).
LAS Grouping	.794	.630	.619	Y for LAS = 10,481.405 + (66,721.877 * full) + (18,802.850 * periodic) + (-9,198.915 * humdi) + (374.059 * yrsdegre) + (-1,338.425 * yrsemply) + (1,394.948 * yrsnrank) + (46,368.614 * assoc) + (-6,615.632 * biodi) + (34,149.823 * assist).
Biology Grouping	.799	.638	.602	Y for BIO = 41,011.771 + (15,888.018 * full) + (1,295.379 * yrsdegre) + (-905.344 * yrsemply).
Humanities Grouping	.777	.604	.590	Y for HUM = 28,734.103 + (12,984.764 * full) + (507.456 * yrsdegre) + (8,864.582 * gradstat).
Math Grouping	.759	.576	.537	Y for MATH = -28,629.861 + (9,397.361 * full) + (2,8879.521 * periodic) + (74,844.488 * gradstat) + (1,917.391 * yrsdegre) + (-1,455.017 * yrsemply).

Table C.3 (continued)

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
Physical Sciences Grouping	.585	.342	.328	Y for PHY = 41,297.866 + (11,65.990 * yrsdegre).
Soc-Sciences Grouping	.748	.559	.540	Y for SOC = 50,913.880 + (30,074.733 * full) + (30,607.637 * periodic).
Soft-Sciences Grouping	.783	.614	.596	Y for SFT-SCI = 40,276.509 + (38,797.951 * full) + (25,520.494 * periodic) + (13,327.437 * assoc) + (-1,388.293 * yrsemply) + (1,759.659 * yrsnrank) + (-4,6201.221 * instruct).
Hard-Sciences Grouping	.702	.493	.474	Y for HRD-SCI = 56,307.146 + (20,960.575 * full) + (616.378 * yrsdegre) + (-1,895.217 * yrsemply) + (1,722.104 * yrsnrank) + (-12,896.001 * assist).
Vet-Med Grouping	.777	.603	.577	Y for VET = 46,476.613 + (20,809.198 * full) + (1,504.847 * yrsnrank) + (16,762.974 * gradstat) + (-848.015 * yrsemply).

Table C.4

1999 Selected Results From Stepwise Solution Regression Salary Analyses of Caucasian-Males by Clusters at the University

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
ISU Grouping	.759	.576	.569	Y for ISU = 22,660.771 + (20,808.194 * engin) + (16,561.629 * full) + (26,529.580 * busin) + (18,956.102 * periodic) + (10,438.651* gradstat) + (13,498.550 * vet) + (-45,756.504 * instruct) + (-11,386.419 * humdi) + (37,38.323 * doctor) + (-85,79.735 * biodi) + (4,856.192 * las) + (-9,743.507 * assist) + (-8,19.324 * yrsemply) + (10,52.401 * yrsnrank) + (453.220 * age).
Agriculture Grouping	.722	.521	.510	Y for AGR = 45,713.830 + (23,311.853 * full) + (15,453.540 * periodic) + (1,092.921 * yrsnrank) + (9,906.270 * assoc) + (-486.766 * yrsemply).
Design Grouping	.800	.640	.596	Y for DES = 22,657.073 + (11,435.528 * full) + (602.933 * age) + (-6,550.064 * finearts) + (-19,755.214 * prfessnl).
Education Grouping	.816	.666	.630	Y for EDU = 40,334.073 + (8,448.638 * full) + (917.791 * yrsdegre) + (-29,619.347 * master).
Engineering Grouping	.739	.546	.528	Y for ENG = -53,025.219 + (877.861 * yrsdegre) + (35,516.459 * periodic) + (78,378.658 * doctor) + (52,268.966 * master) + (789.320 * age).

Table C.4 (continued)

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
FCS Grouping	.620	.385	.329	Y for FCS = 35,287.059 + (1,864.200 * yrsemply).
FCS-EDUC Grouping	.635	.403	.375	Y for FCS-EDU = -32,400.149 + (1,330.408 * age) + (27,551.286 * teach).
Library Grouping	.947	.897	.879	Y for LIB = 30,298.573 + (44,529.447 * bachelor) + (506.741 * yrsdegre).
Library-Education Grouping	.860	.740	.722	Y for LIB-EDU = 41,529.651 + (10,423.648 * full) + (-18,904.406 * master) + (798.716 * yrsdegre).
Business Grouping	.800	.640	.609	Y for BUS = 42,565.556 + (32,959.539 * full) + (18,194.221 * assoc) + (29,216.530 * doctor).
LAS Grouping	.760	.578	.565	Y for LAS = 10,423.389 + (65,507.423 * full) + (19,130.872 * periodic) + (599.097 * yrsdegre) + (-10,833.863 * humdi) + (-1,410.238 * yrsemply) + (1,399.752 * yrsnrank)+ (4,6635.240 * assoc) + (-8,880.128 * biodi) + (34,879.840 * assist).
Biology Grouping	.856	.733	.709	Y for BIO = 41,321.384 + (15,487.162 * full) + (1,530.491 * yrsdegre) + (-1,200.163 * yrsemply).
Humanities Grouping	.785	.616	.603	Y for HUM = 27,460.802 + (14,325.489 * full) + (519.934 * yrsdegre) + (10,497.383 * gradstat).
Math Grouping	.660	.435	.396	Y for MATH = 47,372.004 + (51,795.599 * full) + (3,505.399 * yrsnrank) + (-3,028.641 * yrsemply) + (23,444.178 * assoc).

Table C.4 (continued)

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
Physical Sciences Grouping	.706	.498	.477	Y for PHY = 32,032.836 + (3,367.799 * yrsdegre) + (-2,168.408 * yrsemply).
Soc-Sciences Grouping	.813	.661	.643	Y for SOC = 54,196.833 + (26,551.830 * full) + (36,726.587 * periodic).
Soft-Sciences Grouping	.813	.662	.645	Y for SFT-SCI = 52,524.300 + (23,003.675 * full) + (-1,2681.425 * assist) + (-1,108.875 * yrsemply) + (32,358.634 * periodic) + (1,573.085 * yrsnrank) + (-66,319.720 * instruct).
Hard-Sciences Grouping	.670	.448	.429	Y for HRD-SCI = 41,673.691 + (35,778.626 * full) + (1,178.204 * yrsdegre) + (-2,398.575 * yrsemply) + (17,04.215 * yrsnrank) + (13,467.821 * assoc).
Vet-Med Grouping	.759	.576	.544	Y for VET = 45,924.225 + (22,398.206 * full) + (1,637.985 * yrsnrank) + (19,106.605 * gradstat) + (-893.478 * yrsemply).

Table C.5

2000 Selected Results From Stepwise Solution Regression Salary Analyses of Caucasian-Males by Clusters at the University

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
ISU Grouping	.759	.575	.569	Y for ISU = 28,429.447 + (19,973.829 * full) + (18,264.251 * engin) + (1,178.816 * yrsnrank) + (27,271.442 * busin) + (12,080.633 * gradstat) + (16,539.299 * periodic) + (-48,837.817 * instruct) + (-8,765.336 * humdi) + (-876.558 * yrsemply) + (-9,201.952 * assist) + (9,429.578 * vet) + (431.636 * age) + (-12,569.852 * finearts).
Agriculture Grouping	.732	.536	.522	Y for AGR = 79,810.968 + (18,031.394 * periodic) + (31,678.603 * full) + (-11,54.743 * yrsemply) + (1,816.594 * yrsnrank) + (11,149.927 * assoc) + (-31,579.252 * gradstat).
Design Grouping	.617	.381	.362	Y for DES = 50,946.1823 + (30,192.129 * full).
Education Grouping	.864	.747	.713	Y for EDU = 41,492.911+ (1,188.117 * yrsdegre) + (-27,844.840 * master) + (85,30.764 * full) + (-377.815 * yrsemply).
Engineering Grouping	.739	.546	.535	Y for ENG = 36,776.033 + (26,527.378 * full) + (1,319.600 * yrsnrank) + (25,337.834 * gradstat).
FCS Grouping	.631	.398	.355	Y for FCS = 40,853.932 + (1,738.114 * yrsemply) .

Table C.5 (continued)

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
FCS-EDUC Grouping	.641	.411	.386	Y for FCS-EDU = -28,218.282 + (1259.511 * age) + (28,883.447 * teach).
Library Grouping	.948	.898	.881	Y for LIB = 27,978.301 + (43,083.299 * bachelor) + (622.418 * yrsdegre).
Library-Education Grouping	.883	.780	.766	Y for LIB-EDU = 42,244.910 + (10,515.626 * full) + (-19,824.435 * master) + (819.834 * yrsdegre).
Business Grouping	.856	.732	.717	Y for BUS = -30,311.014 + (56,154.652 * doctor) + (1,408.914 * age).
LAS Grouping	.769	.591	.579	Y for LAS = 9,452.251 + (71,827.1132 * full) + (20,636.194 * periodic) + (632.777 * yrsdegre) + (-9,640.527 * humdi) + (-1,691.261 * yrsemply) + (1,591.336 * yrsnrank) + (5,0534.831 * assoc) + (-7,256.686 * biodi) + (36,359.280 * assist).
Biology Grouping	.689	.475	.441	Y for BIO = 53,570.989 + (30,946.276 * periodic) + (15,789.208 * full).
Humanities Grouping	.775	.601	.586	Y for HUM = 29,690.347 + (16,345.969 * full) + (573.853 * yrsdegre) + (8,461.694 * gradstat).
Math Grouping	.437	.191	.176	Y for MATH = 21,575.300 + (1,009.695 * age).
Physical Sciences Grouping	.741	.549	.529	Y for PHS = 33,364.134 + (3,466.885 * yrsdegre) + (-2,285.459 * yrsemply).
Soc-Sciences Grouping	.814	.663	.644	Y for SOC = 54,908.378 + (29,383.069 * full) + (37,311.803 * periodic).

Table C.5 (continued)

Cluster Group	R	R^2	Adjusted R^2	Best Stepwise Solution Regression Equation
Soft-Sciences Grouping	.824	.679	.662	Y for SFT-SCI = 41,159.607 + (38,322.494 * full) + (32,366.828 * periodic) + (12,831.438 * assoc) + (-5,6718.603 * instruct) + (1,937.426 * yrsnrank) + (-1,346.206 * yrsemply).
Hard-Sciences Grouping	.619	.383	.369	Y for HRD-SCI = 41,907.221 + (14,221.527 * full) + (2,195.744 * yrsdegre) + (-1,532.363 * rsemply).
Vet-Med Grouping	.765	.586	.569	Y for VET = 68,174.202 + (18,069.368 * full) + (30,227.726 * periodic).

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ACKNOWLEDGMENTS

I want to express genuine appreciation and thanks to my co-major professors, Dr. Larry H. Ebbers and Dr. Mack C. Shelley. Dr. Ebbers' suggestions, support, and guidance throughout the past decade have made it possible for me to experience in life what on many occasions seemed impossible (the earning of a doctoral degree). For his patience, perseverance, kindness, and top-flight skills in guiding me through the many aspects of writing and doing this study, I impart my most sincere gratitude and thanks to Dr. Shelley. The opportunity to interact and learn from such an individual has been a true blessing to me. Additionally, I also wish to thank the other members of my committee, Dr. Daniel C. Robinson, Dr. Thomas J. Chacko, and Dr. C. Bradley Shrader, for their direction and counsel through the many years that I have been a student at Iowa State University. Their perspectives and knowledge have afforded me the help I have needed in reaching my goals.

With deep-felt gratitude, I extend my thanks to Dr. Alyce A. Holland. As a fellow student and researcher at Iowa State University she provided me with much needed counsel and direction in my work on this study. Without her earlier investigative efforts at building a gender-related salary equity measurement model, this study could not have been realized. I will forever recognize her efforts and accomplishments.

I want to recognize the staff, faculty, and administrators at Iowa State University, who helped to make this research study possible. Specifically, I want to thank Robert C. Bergmann for the many hours of arduous work he performed in capturing data for this study. I also want to thank Elizabeth C. Stanley for her insight and her role in introducing me to the field of Institutional Research. Additionally, I want to thank Dr. Richard D. Warren for his efforts and guidance during the development stage of this investigation.

I tender my appreciation and blessing to my friend and spiritual mentor, Dr. Richard Banzhaf. His ability to prod me when I was encumbered in myself and his acceptance of me through thick-and-thin are the characteristics in him I most value. He has constantly been an inspiration and a real asset in my life.

To my wife, Vickie L. Lee, I bestow my highest level of gratitude. Throughout the many years of our marriage she has been the balancing beam and sounding block upon which I was able to find answers and relief to the many exciting and perplexing events surrounding my educational experiences. Her love, patience, and understanding in our relationship are immeasurable and unsurpassable to me. I love her deeply and I continue to be indebted to her for eternity.

Finally, I want to thank my mother, Mary E. Lee, for the encouragement and hope she has provided me throughout my life. Her faith in my abilities and me has always made it possible for my endeavors to become reality. Her love for me is unconditional, as is mine for her. I will always be her "little" baby, and for that I have always been grateful.