Report of Equity Analyses of Las Cruces Campus Faculty Base Salary Compensation

Prepared by members of the Faculty Compensation Advisory Committee

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Executive Summary

As part of achieving NMSU's LEADS 2025 strategic plan, the Office of the Provost and NMSU (New Mexico State University) Human Resources co-lead regular studies to evaluate the state of faculty compensation. Faculty input and expertise are contributed by a Faculty Compensation Advisory Committee, a group of 15 Las Cruces campus faculty assembled specifically for this task (see Addendum). Two types of studies are conducted on an alternating basis. External market studies compare NMSU faculty compensation rates with those of other research universities. Internal equity studies examine NMSU's compensation rates for evidence of inequitable pay gaps based on gender or race-ethnicity. This study schedule is intended to help establish a rigorous, regular, and transparent process for continual review of compensation packages for NMSU's faculty. Both studies examined base salaries of Las Cruces campus faculty with continuing appointments (i.e., tenured, tenure-track, and college-track appointments).

To date, four studies have been conducted:

- Study One was an external market study based on NMSU's Fiscal Year (FY) 20/21 compensation rates.
- Study Two was an internal equity study based on NMSU's FY21/22 compensation rates.
- Study Three was an external market study based on NMSU's FY 22/23 compensation rates.
- Study Four was an internal equity study based on NMSU's FY23/24 compensation rates.

This report details the analytical methodology and results of Study Four. The intent is that this report will document the processes developed and methods used such that studies of this nature can be conducted regularly, rigorously, and transparently into the future.

Study Four showed:

- Some evidence of a gender pay gap. Specifically, two of the three statistical models indicate women are slightly underpaid relative to men. However, the third model indicates no gender pay gap.
- Some evidence of a pay gap favoring Asian American faculty members. Again, two of the three statistical models indicate Asian American faculty are overpaid compared to White faculty. The third statistical model did not indicate this gap.
- Inconsistent evidence of a pay gap for Hispanic faculty members. One model indicates Hispanic faculty members are paid more than White faculty members. The second model shows the reverse pattern; White faculty members are paid more than Hispanic faculty members. Results from the third model suggest that these inconsistent results might reflect a gender pay gap within this group: 65% of Hispanic men faculty are underpaid relative to White men faculty, but only 42.6% of Hispanic women faculty are underpaid relative to White men faculty.
- Representation of Black/African Americans and American Indian/Native Americans in NMSU's faculty ranks remains unconscionably poor. There are 13 Black/African American faculty members (2% of the faculty) and five American Indian/Native American faculty members (1% of the faculty). By way of comparison, Black/African Americans earned 7% of the doctoral degrees in the U.S. (National Science Foundation 2022 Survey of Earned Doctorates). If NMSU's faculty

was representative of this group, we would have approximately 50 Black/African American faculty members.

Background

The preferred technique for examining salary equity is a statistical technique called multiple regression. Multiple regression can estimate how membership in a group affects a faculty member's salary, holding other relevant characteristics constant. For example, we can determine whether, on average, women faculty members are paid the same as men faculty members who have the same degree, are in the same discipline, and have the same number of years of experience. As explained by Haignere (2002):

> Regression analyses answer these questions by creating a line that "best fits" the data points scattered above and below it. Points below the line represent individuals whose actual salaries are lower than the salaries predicted by the variables in the regression analysis. These people are being paid less than colleagues at the same institution with comparable career attributes.
>
> In all likelihood, some points representing men will fall below the line, and some points representing women will fall above it. If, however, you add all the positive and negative distances from the line of the faculty women's scatter points and find a lower total than for faculty men, regression analysis provides a negative number (coefficient) for the variable female. That negative coefficient indicates the average amount that women's salaries would need to be increased for them to be distributed like men's salaries. In other words, this one summary number represents how much, on average, it costs a faculty member to be a woman at the institution under study.
>
> The beauty of the answer provided by multiple regression is that it takes care of most of the "yes, buts." Conceptually, multiple regression lets us compare people with the same level of education, the same years of experience, and in the same discipline and rank, who vary only in their gender or race. Multiple-regression analyses account for variations in salaries by using a set of control or predictor variables, such as years of experience, highest degree attained, rank, and discipline. The information concerning these variables is mathematically held constant while we examine the impact of gender and race on salaries... (pp. 17-18).
>
> ... Multiple regression gives an estimate of how well the set of control or predictor variables—years of experience, discipline, and the like—account for the variation in the dependent variable, salary. This measure is called the adjusted R^2 (R-square). The adjusted R^2 takes into account the number of predictor variables relative to the number of cases (faculty members) in the data set. An adjusted R^2 of 0.75 indicates that 75% of the variation in salary is accounted for by the predictor variables in the equation; an adjusted R^2 of 0.55 indicates that 55 percent of the variation is accounted for by the variables (pp. 19).
>
> Assuming that the predictor variables include those most commonly used… most analyses of faculty salaries have adjusted R^2 values greater than 0.50 and values above 0.70 are common. Thus, the variables included in most faculty salary analyses do a good job of explaining the differences between salaries.

It is important to understand, however, that there are important constraints on the reliability of multiple regression analyses. Specifically, results may not be trustworthy unless there is a sufficient ratio of data points to predictor variables; too few data points and/or too many predictor variables yield unreliable

results. Thus, predictor variables should be selected carefully, and sample size is an important consideration in interpreting the results.

Although the size of the NMSU-Las Cruces faculty was sufficiently large to conduct multiple regression analyses, the analyses that were important in exploring salary equity required splitting the faculty into groups that quickly became quite small. For example, imagine a department with 33 full-time faculty members, 16 women and 17 men. If the department is representative of the U.S. in 2022, 15% (N=5) of these faculty are Black/African American.

With small samples, we must be careful about the conclusions drawn from a multiple regression analysis. In addition, we are mindful of privacy concerns when publishing statistics about small groups of faculty.

In sum, multiple regression analyses allowed the committee to determine whether the base salaries of Las Cruces campus faculty members did or did not show evidence of inequitable pay gaps based on gender and race-ethnicity holding other relevant predictor variables constant (e.g., discipline, rank, terminal degree, years of experience). Results must be interpreted carefully, though, and with consistent attention to the size of the data set included in the analyses.

Population Studied

The population studied contained all full-time tenured, tenure-track, and college-track faculty with active appointments on NMSU's Las Cruces campus and ranks of Assistant, Associate, or Professor as of December 13, 2023 (N=599).[1] Forty-eight current faculty executives (e.g., Department Heads and Associate Department Heads, Deans, Assistant Deans, and Associate Deans) were excluded from the study population by design. The base salary of a small number of faculty serving as interim faculty executives were included in the population under the presumption that they would return to their primary faculty roles soon.

Analysis Procedure

Analyses were planned and conducted by members of the Statistics Subcommittee (See Addendum).

The first step was assigning a code to each faculty member's Banner record representing their discipline. The U.S. Dept. of Education Classification of Instructional Programs (CIP) [2] code was used for this purpose. CIP codes were assigned to each NMSU faculty member in Banner and validated with the assistance of department chairs and deans. This step allowed us to control for faculty members' discipline in the analyses.

The second step was to identify and calculate the appropriate measurement of faculty salaries. We used a natural log transformation of FY23/24 faculty salary in dollars, scaled to a 9-month appointment and 1.0 Full Time Equivalent (FTE) for consistency. Using natural logs instead of salary in dollars helped correct the very skewed distribution of the data (which is typical of faculty salaries in higher education).

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1 Faculty working as Cooperative Extension Services Agents or at community colleges were excluded, as were visiting faculty, instructors, research faculty, and adjuncts. Two faculty with missing data were also excluded.

[2] CIP codes are reported at varying levels of specificity (i.e., 6-digits, 4-digits, and 2-digits). Because some NMSU departments have too few faculty salaries to build a reliable regression model with 4-digit or 6-digit CIP codes, all analyses were conducted using 2-digit CIP codes to maximize the amount of data available.

The third step was to review the available fields in Banner to determine which predictor variables to include in the analysis. Based heavily on the approach recommended by Haignere (2002), the Subcommittee chose the following:[3]

1. Gender
2. Race-ethnicity
3. Terminal degree
4. Years since highest degree at time of hire
5. Years at institution prior to current rank
6. Years at current rank
7. Current rank
8. Tenure track / Non-tenure track
9. Discipline (CIP code)

The Subcommittee agreed that there was no perfect approach to examine salary inequity. Given that each approach described in the research literature offered advantages as well as disadvantages, we conducted a series of analyses using different methodologies. As detailed in Haignere (2002), we built these types of regression models:

1. Total Population Model (LTPM) – This model used the full faculty sample to predict faculty salaries in dollars. Evidence for inequities would be provided by the estimated regression coefficients for the model. For example, the coefficient for gender represented the predicted change in salary (in dollars) when moving from men to women when all other variables in the model were held constant. This model could have indicated, for example, that there was a $600 reduction in salary as you moved from men to women when all other predictor variables in the model were held constant.
2. Log Total Population Model (LTPM) – This model used the full faculty sample to predict faculty salaries transformed to a logarithmic scale. Evidence for inequities would be provided by the estimated regression coefficients for the model. For example, the coefficient for gender represented the predicted change in salary (in terms of a proportion) when moving from men to women when all other variables in the model were held constant. This model could have indicated, for example, that there was a 1% reduction in salary as you moved from men to women when all other predictor variables in the model were held constant.
3. White Male Model (WMM) – This approach built a model to predict salary in dollars using only White men faculty. This model allowed us to make predictions about other faculty. Any differences between these predictions and actual salaries (i.e., residuals) would indicate potential inequity.

As suggested in Haignere (2002), the Committee elected to deal with the small number of faculty in some disciplines by removing faculty from the analysis if there were less than 5 people in their discipline (as represented by two-digit CIP code).[4] In the pursuit of redundancy, three members of the Statistics

[3] We did not include any interaction terms in the models, largely because of insufficient sample size.

[4] Three faculty members were excluded from the analyses for this reason. We also tested another small sample size mitigation technique that involved using market salary as a stand-in for discipline, rank, tenure track status, and highest degree. However, this technique did not significantly increase the sample size for the TPM and LTPM

Subcommittee conducted all three regression analyses (TPM, LTPM, and WMM) independently and compared their results, which were identical.

Results

Sample sizes

Using three different regression models resulted in different numbers of faculty being included in each analysis (see Table 1 below). In particular, the WMM excluded about 75% of the sample (i.e., those faculty members who were not White men).

Table 1

Model Type	Sample size
TPM & LTPM	596
WMM	153

Evaluation of the regression models

Results for each of the three models are detailed below.

Total Population Model

The results of this analysis indicated:

- Women faculty member's salaries in the study sample were $661.48 less than salaries for men faculty when all other variables were controlled for.
- Asian faculty member's salaries in the study sample were $3586.58 more than salaries for White faculty when all other variables were controlled for.
- Hispanic faculty member's salaries in the study sample were $359.45 more than salaries for White faculty when all other variables were controlled for.

Sample sizes for the American Indian or Alaska Native, Black or African American, Two or More Races, and Unknown Race categories were too small to make sound statistical estimates. The adjusted R^2 value for this model was 0.815[5].

Log Total Population Model

The results of this analysis indicated:

- Women faculty member's salaries in the study sample were 0.4% less than salaries for men faculty when all other variables were controlled for.

models beyond the default method reported here. In addition, this approach is non-standard, can lead to results that are difficult to interpret, and may reproduce any existing inequities present in market salaries. Thus, we excluded it from the report.

[5] In many fields, an R^2 above 0.7 is interpreted to indicate a strong association between the outcome variable and the predictor variables.

- Asian faculty member's salaries in the study sample were 1.8% more than salaries for White faculty when all other variables were controlled for.
- Hispanic faculty member's salaries in the study sample were 0.5% less than salaries for White faculty when all other variables were controlled for.

Sample sizes for the American Indian or Alaska Native, Black or African American, Two or More Races, and Unknown Race categories were too small to make sound statistical estimates. The adjusted R^2 value for this model was 0.859.

White Male Model

Many disciplines had a small number of White men faculty, making it impossible to predict salaries for those disciplines. 443 faculty were in disciplines with enough White men to generate predictions. The results of this analysis indicated:

- 51% of women faculty make less than predicted by the model. 54.3% of males make less than predicted by the model.
- 45.5% of Asian women faculty make less than predicted by the model, and 50% of Asian men faculty make less than predicted by the model.
- 42.6% of Hispanic females make less than predicted by the model, and 65% of Hispanic males make less than predicted by the model.

Sample sizes for the American Indian or Alaska Native, Black or African American, Two or More Races, and Unknown Race categories were too small to make sound statistical estimates. The adjusted R^2 value for this model was 0.747.

Conclusions

There is some evidence of a gender pay gap. When relevant variables are controlled for, the Total Population Model indicates a gap of $661.48 favoring men faculty, and the Log Total Population Model indicates a gap of 0.4% favoring men faculty. The results of the White Male Model do not indicate the presence of a sizeable gender pay gap.

There is also some evidence of a pay gap favoring Asian faculty. When relevant variables are controlled for, the Total Population Model indicates a gap of $3586.58 relative to White faculty, and the Log Total Population Model indicates a gap of 1.8% relative to White faculty. The results of the White Male Model do not indicate the presence of a sizeable pay gap between Asian and White faculty.

Finally, there is inconsistent evidence of pay gaps related to Hispanic faculty. When relevant variables are controlled for, the Total Population Model indicates a gap of $359.45 in favor of Hispanic faculty relative to White faculty, and the Log Total Population Model indicates a gap of 0.5% in favor of White faculty relative to Hispanic faculty. However, the White Male Model indicates that there may be a gender pay gap within this group: 65% of Hispanic men faculty are underpaid relative to White men faculty, but only 42.6% of Hispanic women faculty are underpaid relative to White men faculty.

The fact that there are too few American Indian or Alaska Native, Black or African American, and Two or More Races faculty members to draw precise conclusions about the magnitude of salary inequities is an important conclusion in and of itself. Put bluntly, the representation of Black/African Americans and

American Indian/Alaskan Natives in the faculty ranks is unconscionably poor given NMSU's status as a Minority Serving Institution and the sole land-grant university in New Mexico. Our study included 13 Black/African American faculty members (2% of the faculty) and five American Indian/Native American faculty members (1% of the faculty). By way of comparison, Black/African Americans earned 7% of the doctoral degrees in the U.S. in 2022 (National Science Foundation 2022 Survey of Earned Doctorates). If NMSU's faculty was representative of this group, we should have approximately 50 Black/African American faculty members.

Cautions/Limitations

It is important to keep in mind what these analyses do NOT mean. The existence of salary inequities indicates nothing about when or how those inequities came to exist. We cannot infer that there were intentional or conscious biases in any decisions related to these salaries. Furthermore, the decision about whether and how to address any salary inequities identified in this report is beyond the purview of the Advisory Committee.

It is also important to note that any biases present in the predictor variables themselves can result in underestimating inequities in the data. For example, if women are less likely to be promoted than men, including current rank as a predictor variable may underestimate the magnitude of salary inequities between women and men. In one study, a documented gender bias in rank "masked about a third of the gender bias otherwise shown" (Haignere and Eisenberg, 2002, p. 27).

The analyses are also limited by the data currently available in Banner. For example, gender is recorded in Banner as binary; no category is available for other conceptualizations of gender. To the degree that more nuanced examinations of patterns in faculty salaries are desirable, Human Resources should revise the existing personnel fields recorded in Banner.

Finally, examinations of salary inequities are never "done." It is critical to repeat analyses like these at regular intervals, both to monitor the effectiveness of strategies imposed to address existing inequities and to remain vigilant against the development of new inequities.

References

Haignere, L. (2002). Paychecks: A guide to conducting salary-equity studies for higher education faculty. Washington, DC: American Association of University Professors. URL: https://files.eric.ed.gov/fulltext/ED476226.pdf

Haignere, L., and Eisenberg (2002). Gender and race bias in current rank. In Haignere, L., *Paychecks: A guide to conducting salary-equity studies for higher education faculty*, p. 27-36, Washington, DC: American Association of University Professors. Pp 27-36. URL: https://files.eric.ed.gov/fulltext/ED476226.pdf

Definition of Acronyms and Terms

Adjusted R^2	An estimate of how well the set of control or predictor variables account for variations in salary. The adjusted R^2 considers the number of predictor variables relative to the number of cases (faculty members) in the data set.
Banner	Software used by NMSU to maintain faculty personnel and compensation data. Banner is the most used technology platform in higher education and provides enterprise-wide planning, tracking, and recording capacity for student, faculty, and staff data in the areas of recruiting, admissions, academic administration, student finances, financial aid, human resources, and finance.
Base Salary	The faculty salary conferred by the primary employment contract; on the Las Cruces campus the contract base salary does not include any temporary compensation that may come from teaching overloads, differentials for administrative roles, or temporary rewards, incentives, endowments, etc.
CIP	U.S. Dept. of Education, National Center for Education Statistics Classification of Instructional Programs; used as a control for discipline.
Continuing Appointments	"Regular" faculty appointments as defined by NMSU's Administrative Rules and Procedures (ARP) consisting of individuals hired in a 9-month or 12-month academic position with no pre-determined appointment termination date, as well as faculty hired by contract subject to annual renewal during the pre-tenure period (i.e., tenured, tenure-track, and college-track appointments with an expectation of contract renewal).
CUPA	College and University Professional Association for Human Resources
Department	Administrative organization of faculty and degree-granting programs, typically organized by field or subfields (i.e., an academic unit).
Discipline	Area of study, field, or subfield; faculty compensation rates are subject to market differentials based on the discipline
Equity	When used in the context of faculty compensation, refers to the concept of "comparable pay for comparable work" as required by two federal statutes – the Equal Pay Act of 1963 and Title VII of the Civil Rights Act of 1964 – prohibiting discrimination in the context of compensation based on gender or a protected class.
FTE	Full-time equivalent. When used as a unit of measurement in the context of employment, represents hours worked by one employee on a full-time basis; concept is also used to convert the effort of several part-time employees into the equivalent effort of full-time employees.
FY	Fiscal Year (i.e., a 12-month period; July through the subsequent June)
LTPM	Log Total Population Model; Widely considered to be the gold standard of analyses for equity studies. This model used the full faculty sample to predict the logarithmic conversion of faculty salaries. Evidence for inequities would be provided by the estimated regression coefficients for

	the model. The regression coefficients indicated change in salary as a proportion rather than in real dollars.
Multiple Regression Analysis	A statistical process for estimating the relationships between predictor variables and an outcome variable by estimating the conditional expectations of the outcome variable given various predictor variables.
N	Number in population.
Predictor Variable	Factors contributing to compensation rates.
Rank	Progressive promotion levels available to faculty holding professorial appointments. In order by rank: Assistant Professor, Associate Professor, Professor, and Distinguished Professor
Residual	The difference between a value predicted by a regression model and the actual value in the data.
Terminal Degree	Highest degree possible to attain in each field or discipline (e.g., Ph.D., M.F.A., J.D., etc.).
WMM	White Male Model; widely acknowledged as a useful method for assessing whether salaries potentially reflect the existence of bias in compensation practices or policies.
9-Month Contract	A contract term defined by an academic year; default contract period for regular, continuing faculty member on the Las Cruces campus.
12-month Contract	A contract term defined by a fiscal year; default contract period for faculty executives (e.g., provosts, deans, directs, etc.).

Addendum – Faculty Advisory Committee Members

Name	Department	College
Justin MacDonald* (co-chair)	Psychology	A&S
Laura Madson (co-chair)	Psychology	A&S
Ellen Bosman	Library	Library
Laura Boucheron	Klipsch School of Electrical & Computer Engineering	Engineering
Ivan De La Rosa*	Social Work	HEST
Gaylene Fasenko	Animal & Range Sciences	ACES
Charlotte Gard*	Economics, Applied Statistics, and International Business Department	Business
Manal Hamzeh	Interdisciplinary Studies	A&S
Michael Kalkbrenner*	Counseling & Educational Psychology	HEST
Karim Martinez	Cooperative Extension Service	ACES
Carlo Mora-Monge	Accounting & Information Systems, Management	Business
Young Park	Mechanical & Aerospace Engineering	Engineering
Marshall Taylor*	Sociology	HEST
Joe Tomaka*	Public Health	HEST
Tonghui Wang	Math	A&S

*Member of the Statistics Subcommittee