

female-male pay differences at Rutgers-New Brunswick

Analyses of female-male pay differences at Rutgers-New Brunswick indicate that, during each of the academic years 2004-2005 through 2016-17, female faculty were paid less than male faculty of the same race, age, years at Rutgers, and division within the university.¹ These pay differences are substantial (in the ordinary language sense) and statistically significant.

These analyses of female-male pay differences at Rutgers-New Brunswick are based on a statistical technique known as regression analysis. This technique allows one to investigate factors ("independent variables") that may be related to an outcome of interest (the "dependent variable"). In the present setting, the dependent variable is academic-year salary, and the independent variables are sex, race, age, years at Rutgers, and division. These analyses use data on New Brunswick faculty covering each of the academic years 2004-05 through 2016-17.

Regression analysis provides a measure (a "regression coefficient") of the relationship between the dependent variable (here, academic-year salary) and each of the individual independent variables (sex, age, years at Rutgers, etc.), with all of the other independent variables remaining unchanged. Thus, among other things, regression analysis provides a measure of the relation, "other things being equal," between compensation and sex. This is known as the **regression coefficient** for the relation between compensation and sex.

Regression analysis also provides a measure, called the "**t-statistic**," of the "statistical significance" of the relationship between the dependent variable and each regression coefficient. A regression coefficient that is statistically significant would be very unlikely to have been observed purely as a matter of chance under the null hypothesis that the coefficient is zero.

The results of the regression analyses for each of the years from 2004-05 through 2016-17 appear in the table on the next page.

The first two columns, headed "not controlling for faculty rank," show female-male pay differentials measured in dollars (column (1)) and also in percentage terms (column (2)) for each of the years 2004-05 through 2016-17. In addition to sex, these analyses control for age, years at Rutgers and division, but do *not* control for faculty rank. Thus, these analyses show female-male differences in pay arising from either (a) female-male pay differences within given faculty ranks or (b) female-male pay differences arising from sex differences in access to better-paid faculty ranks.

The third and fourth columns, headed "controlling for faculty rank," show female-male pay differentials measured in dollars (column (3)) and also in percentage terms (column (4)) for each of the years 2004-05 through 2016-17, controlling for age, years at Rutgers, division, *and* faculty rank (defined as assistant professor, associate professor, professor 1, professor 2, distinguished professor, and university professor). Thus, these analyses show female-male differences in pay arising from female-male pay differences for otherwise-similar² faculty *within* given faculty ranks, but do *not* reflect any female-male pay differences for otherwise-similar faculty arising from sex differences in access to better-paid faculty ranks. In other words, these analyses show female-male pay differences for faculty who are otherwise the same (in terms of age, years at Rutgers, and division) *and* hold the same faculty rank.

For further discussion of the results, and to see how to interpret the entries in the table, consult the notes given at the end of the table.

¹ "Division" here refers to distinct units within New Brunswick, either schools (e.g., SEBS) or units within schools (e.g., SAS-Humanities).

² "Otherwise-similar" here refers to faculty who are the same in terms of the other factors included in the regression analysis (e.g., age, race, years at Rutgers, etc.).

female-male differences in academic-year compensation
for Rutgers faculty in New Brunswick

academic year	(1)	(2)	(3)	(4)
	regression coefficient for female-male academic-year salary difference (t-statistic in parentheses)			
	not controlling for faculty rank		controlling for faculty rank	
	pay gap in \$	pay gap in %	pay gap in \$	pay gap in %
2004-05	-4016.00 (2.97)	-4.48 (3.31)	-1816.98 (2.19)	-2.15 (2.52)
2005-06	-4386.00 (3.01)	-4.59 (3.31)	-1569.68 (1.78)	-1.78 (2.08)
2006-07	-4728.00 (3.07)	-4.19 (3.11)	-1965.01 (2.13)	-1.82 (2.19)
2007-08	-6393.00 (3.76)	-5.29 (3.78)	-2822.06 (2.52)	-2.30 (2.52)
2008-09	-8282.00 (4.23)	-6.98 (4.61)	-3030.52 (2.24)	-2.43 (2.40)
2009-10	-6204.00 (3.17)	-5.49 (3.67)	-2913.55 (2.16)	-2.62 (2.57)
2010-11	-4882.00 (2.63)	-4.22 (2.93)	-1522.34 (1.21)	-1.33 (1.37)
2011-12	-8339.00 (4.14)	-6.49 (4.49)	-3737.59 (2.73)	-2.97 (3.08)
2012-13	-7686.00 (3.66)	-5.50 (3.80)	-3638.74 (2.49)	-2.45 (2.48)
2013-14	-7009.00 (3.20)	-5.11 (3.37)	-2615.35 (1.74)	-1.73 (1.73)
2014-15	-7853.00 (3.46)	-5.57 (3.62)	-2543.32 (1.68)	-1.67 (1.67)
2015-16	-9323.00 (3.90)	-6.06 (3.95)	-3628.52 (2.23)	-2.12 (2.08)
2016-17	-8232.00 (3.48)	-5.35 (3.51)	-3279.34 (2.04)	-1.89 (1.86)

Notes to the table

Regression coefficients: Each entry in this table is a regression coefficient, obtained from a regression analysis. This shows the difference in terms of dollars ("in \$") or in units of natural logarithms ("in %"), in the academic-year salaries of female and male faculty, with all other variables in the analysis (see below) taken into account. (Regression results for salary differences measured in units of natural logarithms are approximately the same as percentage differences in salary.)

Negative regression coefficients imply a lower academic-year salary for female faculty, other things being equal; positive regression coefficients imply a lower academic-year salary for male faculty, other things being equal. The first two columns present results when variables for academic rank (assistant professor, associate professor, etc.) are not taken into the account; the next two columns present results when variables for academic rank are taken into account.

t-statistic and statistical significance: The entry in parentheses underneath each regression coefficient is the t-statistic for that regression coefficient; it is equivalent to the regression coefficient immediately above it, expressed in "standard error units." The t-statistic is an indicator of the "statistical significance" of the coefficient. If the t-statistic for a regression coefficient is 1.96 or more, then the coefficient is said to be "statistically significant," i.e., unlikely to have occurred under the null hypothesis of no sex-related differences in salary for women and men with the same characteristics included in the analysis. If the t-statistic for a regression coefficient is less than 1.96, then the coefficient is said to be "not statistically significant," i.e., could plausibly have occurred under the null hypothesis of no sex-related differences in salary for women and men with the same characteristics included in the analysis.

Variables taken into account in the analysis: sex, race, age, years at Rutgers, and academic unit (humanities, sciences, etc.). The analyses reported in the first two columns do not include variables for academic rank; the third and fourth columns do include rank variables.

An example: Consider the first part of the table. In the first line - summarizing the results of an analysis of faculty in academic year 2005 - the regression coefficient in the first column is -4016, and the t-statistic (which appears in parentheses directly underneath the coefficient itself) is 2.97. This means that, in 2005, academic-year salaries of female faculty were on average about \$4,016 less than those of male faculty who are the same in terms of the other variables (race, age, years at Rutgers, and division) taken into account in the analysis. Since the t-statistic for this coefficient is 2.97 (which is substantially above 1.96), this pay disparity is

statistically significant, i.e., unlikely to have occurred under the null hypothesis of no female-male difference in academic year salaries for faculty who are the same in terms of the other factors taken into account in the analysis.

The entry in the second column for 2005 is -4.48, which means that academic-year salaries of female faculty were about 4.48 percent less than those of male faculty who were the same in terms of the other variables taken into account in the analysis . The t-statistic here is 3.31, meaning that this percentage disparity in pay is statistically significant.

The entries in the third and fourth column of the table can be interpreted in the same manner as the entries in the first and second columns, respectively. However, note that the entries in the first and second columns of the table refer to analyses that do *not* control for faculty rank (assistant professor, associate professor, etc.), whereas the entries in the third and fourth columns of the table refer to analyses that *do* control for faculty rank as well as the other factors (age, race, years at Rutgers, etc.) that are taken into account.