

Texas A&M University
Tenured/Tenure-track Faculty Salary Study
FY 2019

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Executive Summary

Since 2012, the Office of the Dean of Faculties and/or the TAMU ADVANCE Center have sponsored an annual study of faculty salaries at Texas A&M University. The primary goal of these annual studies has been to determine the extent to which statistically significant differences in monthly salary exist between male and female tenured/tenure-track faculty at Texas A&M University, after adjustment for demographic factors such as title, age, race/ethnicity, and years of service. However, these analyses have also been used to determine whether there were any systematic differences by race/ethnicity or national origin, and to identify individuals whose actual salaries were unusually high or unusually low, given the predictions of the salary model.

This report presents the 2019 version of the Texas A&M Tenured/Tenure-track Salary Study. The analyses include tenured/tenure track faculty in 15 divisions of Texas A&M University and cover the 12 fiscal years from 2008 through 2019. Key findings include:

- There were statistically significant salary differentials by sex in seven TAMU divisions, once other demographic factors were taken into account.
 1. **Agriculture and Life Sciences (COALS):** Monthly salaries for female faculty were significantly less than the comparable, demographically adjusted average salaries for male faculty at the assistant, associate and full professor levels in the non-STEM departments. There were no significant differences by sex in the STEM departments.
 2. **College of Liberal Arts:** Monthly salaries for female faculty members were significantly less than comparable, demographically adjusted average salaries for male faculty at all three ranks (assistant, associate, and full) in the STEM departments. However, the differences at the assistant professor level were only statistically significant at the 10-percent level. There were no discernable differences by sex in the non-STEM departments.
 3. **College of Veterinary Medicine:** Monthly salaries for female faculty were significantly less than comparable, demographically adjusted average salaries for male faculty at the full professor level.
 4. **Mays Business School:** Monthly salaries for female faculty were significantly less than comparable, demographically adjusted average salaries for male faculty at the assistant, associate and full professor levels, but the differences at the full professor levels were only statistically significant at the 10-percent level.
 5. **Law School:** Monthly salaries for female faculty were significantly less than comparable, demographically adjusted average salaries for male faculty at the associate and full professor levels, but the differences at the full professor level were only statistically significant at the 10-percent level.
 6. **College of Engineering:** Monthly salaries for female faculty were significantly *higher* than comparable, demographically adjusted average salaries for male faculty at the assistant professor level, but the difference was only statistically significant at the 10-percent level.

7. **College of Pharmacy:** Monthly salaries for female faculty were significantly higher than comparable, demographically adjusted average salaries for male faculty at the assistant professor level, but the difference was only statistically significant at the 10-percent level.
- There was no evidence that salaries were systematically related to sex during fiscal year 2018 in the Colleges of Architecture, Dentistry, Education and Human Development, Geosciences, Medicine, or Science, the Bush School of Government and Public Service, or the School of Public Health.
 - There were statistically significant salary differentials by sex at all three ranks, once other demographic factors were taken into account.
 1. **Assistant Professor Level:** Statistically significant differences by sex were detected in five divisions: the College of Agriculture and Life Sciences (in the non-STEM departments), the College of Engineering; the College of Liberal Arts (in the STEM departments), the College of Pharmacy, and the Mays Business School. The College of Engineering was the only divisions in which salaries for female assistant professors exceeded those of their male counterparts. In three of the five cases (Engineering, Liberal Arts and Pharmacy) differences between the sexes were only significant at the 10-percent level, and were not statistically significant at the 5-percent level.
 2. **Associate Professor Level:** Statistically significant differences by sex were detected in four divisions: the College of Agriculture and Life Sciences (in the non-STEM departments), the College of Liberal Arts (in the STEM departments), the Mays Business School, and the Law School. In all cases, the differences between the sexes among associate professors were statistically significant at the 5 percent level.
 3. **Professor Level:** Statistically significant differences by sex were detected in five divisions: the College of Agriculture and Life Sciences (in the non-STEM departments), the College of Liberal Arts (in the STEM departments), the College of Veterinary Medicine, the Mays Business School, and the Law School. The differences in the Mays School and the Law School were only statistically significant at the 10 percent level.
 - Differentials between male and female salaries have been widening over time in the Mays Business School, and narrowing over time in the School of Public Health and the Colleges of Dentistry and Medicine. No systematic time trends were found in the other colleges.
 - **Race/Ethnicity:** Asian faculty members earned systematically more than non-Asian faculty members in the College of Geosciences, the College of Dentistry, and the STEM and non-STEM departments of the College of Liberal Arts, but significantly less than other faculty in the College of Education and Human Development. In the College of Medicine, foreign-born faculty members earned significantly less than native-born faculty members. There was no other statistically reliable evidence of differences in salary by race/ethnicity or national origin.
 - Individuals with salaries that diverged sharply from the model predictions were flagged for follow-up by division personnel (to whom data files have been provided). *Progress on this*

indicator is measured by the degree of symmetry between male and female faculty members who earn more or less than predicted.

- Evidence that average salaries for female faculty were significantly below those for male faculty (after demographic adjustment) need not indicate that female faculty members were more likely than their male colleagues to have salaries that are unusually low. Such a difference between the sexes could also arise if female faculty members were less likely than their male colleagues to have salaries that were unusually high. In prior years, the problem appeared to be the latter. In 2019, however, the evidence suggests that female faculty members at all ranks were not only less likely than male faculty members to have salaries that were higher than predicted, but also that female assistant professors were more likely than male assistant professors to have salaries that were lower than predicted.
- This analysis compared demographically-adjusted salaries by sex and race. No attempt was been made to control for differences in research productivity or teaching excellence, due to the idiosyncratic nature of such competencies. Thus, evidence that average salaries for female faculty members were significantly below those for male faculty members could be interpreted as evidence that female faculty members were systematically less productive than male faculty members, rather than as evidence that female faculty were paid systematically less than comparable male faculty members.

Report: 2019 Salary Study for Tenured/Tenure Track Faculty

Data Description

The payroll data for this analysis cover fiscal years 2008 through 2019 and come from the Budget/Payroll/Personnel (BPP) Operations Center of the Texas A&M University System. Additional data on faculty characteristics come from the Data Warehouse maintained by the Texas A&M University System, departmental administrative data, and a supplemental review of faculty CVs.

This analysis covers TAMU employees in tenured or tenure track positions in the Colleges of Agriculture and Life Sciences, Architecture, Dentistry, Education and Human Development, Engineering, Geosciences, Liberal Arts, Medicine, Pharmacy, Science, and Veterinary Medicine, the Mays Business School, the Law School, the Bush School and the School of Public Health. With the exception of a handful of outliers, all tenured or tenure-track faculty with at least a half-time appointment in one of these colleges were included in the analysis.¹ Faculty members who retired but continued to work for TAMU were no longer considered tenured or tenure-track employees and were therefore only included in the analysis during the years prior to their retirements.

Model Methodology

This analysis examines the salary history for each tenured or tenure-track faculty member using a series of linear mixed models (also referred to as multilevel models or panel random effects models).² Because salary patterns are likely to be different across colleges, we estimated separate salary models for each college. For the same reason, we estimated separate models for the STEM and non-STEM departments within the Colleges of Agriculture and Life Sciences and Liberal Arts.³

Following the literature on the analysis of salaries in higher education⁴ and the approach taken in prior TAMU salary studies, the dependent variable in each salary model is the natural log of each

¹ Thus, faculty with less than a nine-month contract and those with less than a 50 percent appointment were excluded from the analysis.

² For a detailed discussion of linear mixed models, see Sheather, S. J. (2009). *A Modern Approach to Regression with R*. Springer, New York.

³ For the purposes of this analysis, the STEM departments of the College of Agriculture and Life Sciences are: Animal Science; Biochemistry and Biophysics; Biological and Agricultural Engineering, Entomology; Horticultural Sciences; Nutrition and Food Science, Plant Pathology and Microbiology; Soil and Crop Sciences; and Wildlife and Fisheries. The STEM departments in the College of Liberal Arts are: Anthropology; Economics; Political Science; Psychology; and Sociology.

⁴ See, for example, Ginther, D. (2003) "Is MIT an Exception? Gender Pay Differences in Academic Science," *Bulletin of Science Technology & Society*, 23(1), 21-26; Ginther, D., & Hayes, K. (2003). Gender differences in

faculty member's full-time-equivalent monthly salary.⁵ The independent variables are a set of demographic characteristics (including sex) that could reasonably explain variations in those monthly salaries.

Table 1 illustrates the demographic variables included in the salary models.⁶ As the table indicates, each model includes fixed effects for sex, sex interacted with faculty rank, and sex interacted with a linear time trend. The interaction between sex and faculty rank allows for differences in salary between male and female faculty at the different ranks: assistant professor, associate professor, and professor.⁷ Interactions between sex and a time trend allows differences between male and female salaries to widen or narrow over time. Departmental time trends allow for salary growth to be higher in some departments than in others.⁸ The rank-specific year indicators allow salary growth to be systematically different for the three ranks: assistant professors, associate professors, and professors.

Please note that in addition to the demographic characteristics presented in Table 1, differences in salary may be related to differences in research productivity or teaching excellence. Unfortunately, research productivity and teaching excellence are very difficult to measure consistently, and therefore could not be included in the analysis. To the extent that the included variables (such as sex) are systematically correlated with these important omitted variables, then interpretations of the results may be altered. For example, a finding that female faculty members earn systematically less than male faculty members could be interpreted as evidence that female faculty members are systematically less productive than male faculty members, rather than as evidence that female faculty are paid systematically less than comparable male faculty members.

salary and promotion for faculty in the humanities 1977-1995. *Journal of Human Resources*, 38(1), 34-73; or Carlin, P. S., Kidd, M. P., Rooney, P. M., & Denton, B. (2013). Academic wage structure by gender: The roles of peer review, performance, and market forces. *Southern Economic Journal*, 80(1), 21.

⁵ The full-time-equivalent monthly salary is the current monthly salary for the month of October, divided by the percent time. Thus, the full-time-equivalent monthly salary for a person with a 75 percent appointment is his or her monthly salary divided by 0.75.

⁶ See appendix table A1 for definitions of the variables included in the salary model. All models also include random effects for individuals. Due to their small size, the Bush School of Government and Public Service and the Law School were evaluated using a less detailed model than that used for the other TAMU divisions. The College of Veterinary Medicine model includes an additional indicator for salary compression in 2016, 2017 or 2018. The models for the Colleges of Dentistry, Medicine and Pharmacy, and the School of Public Health do not allow for a possible change in trend in 2011 (upon the implementation of ADVANCE at TAMU).

⁷ Distinguished Professors and Deans/Vice Presidents were considered Professors when constructing the time trends and sex differentials.

⁸ Preliminary analysis indicated that departmental time trends were not statistically significant in the Bush School, the College of Veterinary Medicine, and the STEM departments of the College of Liberal Arts. Therefore, departmental time trends were not used in the salary models for those divisions. Departmental time trends were also not used in the Law School model because only five years of data are available.

Table 1: Demographic Variables Included in the Salary Models

Variable Type	Specific Variables
Sex Indicators	Male Faculty Indicator Male Associate Professor Indicator Male Full Professor or Above Indicator Male Faculty Indicator * Time Trend Male Faculty Indicator * Post 2011 Time Trend
Faculty Rank Indicators	Associate Professor Indicator Dean/VP Indicator Distinguished Professor Indicator Full Professor
Faculty Race/Ethnicity Indicators	Anglo Faculty Indicator Asian Faculty Indicator Foreign Born Faculty Indicator
Administrative Status Indicators	Current Administrator Ever Administrator, 2000-01 through 2018-19
Years Since Degree Indicators	Years Since Degree, and its square Years Since Degree Unknown Indicator
Years Of Service At Texas A&M	Years Since First Hired Break in Service Indicator
Annual Term Length	Months Under Contract per Year (9 to 12)
Rank At Hire Indicators	Hired as Advanced Assistant Professor Hired as Associate Professor Hired as Full Professor Rank at Hire Unknown
Highest Degree Held Indicators	MA Special Degree Dual Degree
Certification Indicators	Board Certified Dual Certified
Change In Status Indicators	Newly Tenured Other Promotion Other Title Change
Degree Field Indicators	Indicators for individuals with doctorates in fields that are salary outliers (accounting, business administration, economics, and management)
Departmental Indicators	Indicator Variables for Each Department
Department Trends	Department Indicators * Time Trend
Year Indicators	Year Indicators
Rank-Specific Year Indicators	Associate Professor Indicator * Year Indicators Full Professor or Above Indicator* Year Indicators

Findings about Sex Differentials

Table 2 compares the predicted fiscal year 2019 salaries for male and female faculty members with identical demographic characteristics.⁹ For example, the first row in the table indicates that the salary model for the Bush School predicts that a female assistant professor would earn 98.3% of the salary of a male assistant professor, all other demographic characteristics in the model being equal. The asterisks indicate salary ratios that are significantly different from 100% at the 1-percent (***) 5-percent (**) or 10-percent (*) levels.¹⁰

Table 2: Female Salaries as a Percentage of Male Salaries, by College, STEM Status and Faculty Rank, Fiscal Year 2019

	Female Salaries as a Percentage of Male Salaries	
Bush School of Government & Public Service		
Assistant Professor	98.3%	
Associate Professor	97.3%	
Full Professor	107.6%	
College of Agriculture and Life Science (COALS)		
STEM Assistant Professor	99.7%	
STEM Associate Professor	98.8%	
STEM Full Professor	104.0%	
Non STEM Assistant Professor	90.8%	**
Non STEM Associate Professor	90.7%	***
Non STEM Full Professor	93.2%	**
College of Architecture		
Assistant Professor	99.3%	
Associate Professor	97.9%	
Full Professor	104.1%	
College of Dentistry		
Assistant Professor	104.4%	
Associate Professor	101.2%	
Full Professor	95.6%	
College of Education and Human Development		
Assistant Professor	102.6%	
Associate Professor	101.6%	
Full Professor	98.9%	
College of Engineering		
Assistant Professor	105.4%	*
Associate Professor	103.5%	
Full Professor	103.2%	

⁹ The regression coefficients that support these salary predictions are presented in Appendix Tables A.2-A.5.

¹⁰ All statistical tests are two sided. The baseline analysis tests for significance with respect to the sex variables using Huber-White standard errors that have been clustered by individual

	Female Salaries as a Percentage of Male Salaries	
College of Geosciences		
Assistant Professor	99.4%	
Associate Professor	99.9%	
Full Professor	101.0%	
College of Liberal Arts		
STEM Assistant Professor	94.4%	*
STEM Associate Professor	91.3%	***
STEM Full Professor	93.4%	***
Non STEM Assistant Professor	100.8%	
Non STEM Associate Professor	99.3%	
Non STEM Full Professor	97.2%	
College of Medicine		
Assistant Professor	93.4%	
Associate Professor	95.4%	
Full Professor	97.5%	
College of Pharmacy		
Assistant Professor	106.5%	*
Associate Professor	103.9%	
Full Professor	n/a	
College of Science		
Assistant Professor	98.1%	
Associate Professor	99.4%	
Full Professor	99.0%	
College of Veterinary Medicine		
Assistant Professor	99.4%	
Associate Professor	97.9%	
Full Professor	91.0%	***
Mays Business School		
Assistant Professor	91.1%	**
Associate Professor	91.3%	**
Full Professor	92.6%	*
School of Law		
Associate Professor	85.0%	***
Full Professor	89.5%	*
School of Public Health		
Assistant Professor	100.5%	
Associate Professor	101.9%	
Full Professor	100.2%	

Note: Salary ratios were based on a regression analysis of monthly salaries from fiscal year 2008 through fiscal year 2019. The salary models controlled for systematic differences in salary arising from differences in the factors described in Table 1, and random effects for individuals. In the School of Law, tenure-track faculty are hired at the rank of associate professor so there are no tenure-track assistant professors. The asterisks indicate that the differences between male and female salaries were statistically significant at the 1-percent (***), 5-percent (**) or 10-percent (*) levels.

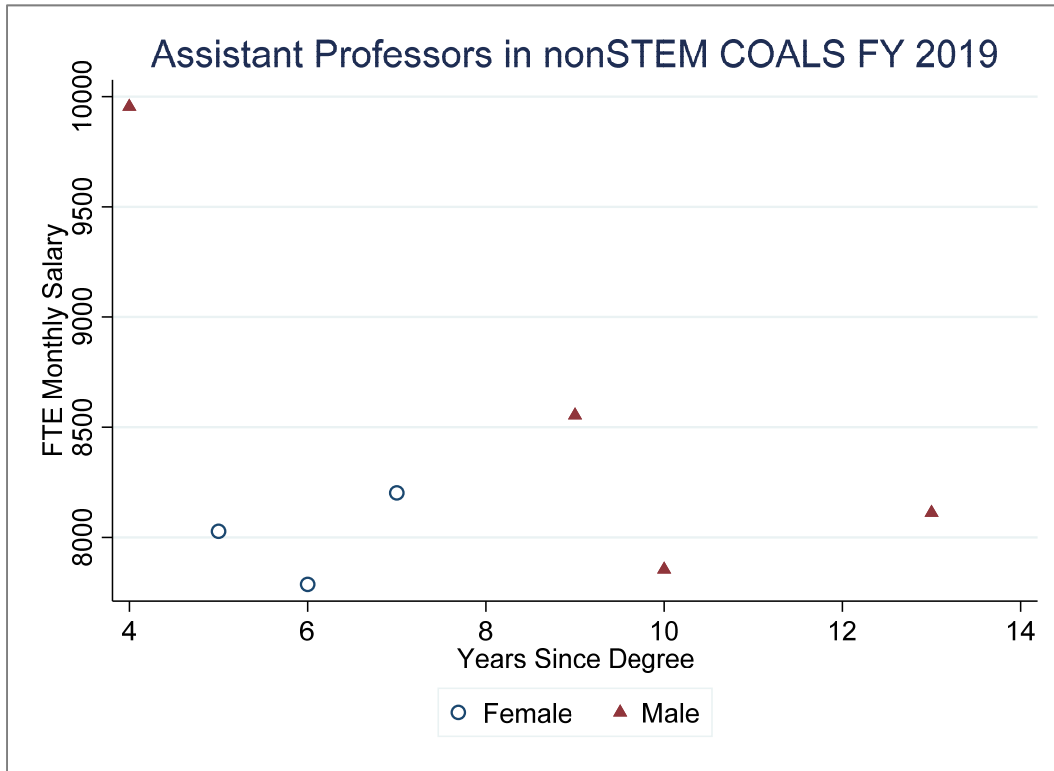
As Table 2 illustrates, statistically significant differences in monthly salaries for male and female tenured/tenure-track faculty in fiscal year 2019 (the 2018-19 school year) were observed in seven of the 15 TAMU divisions under analysis.

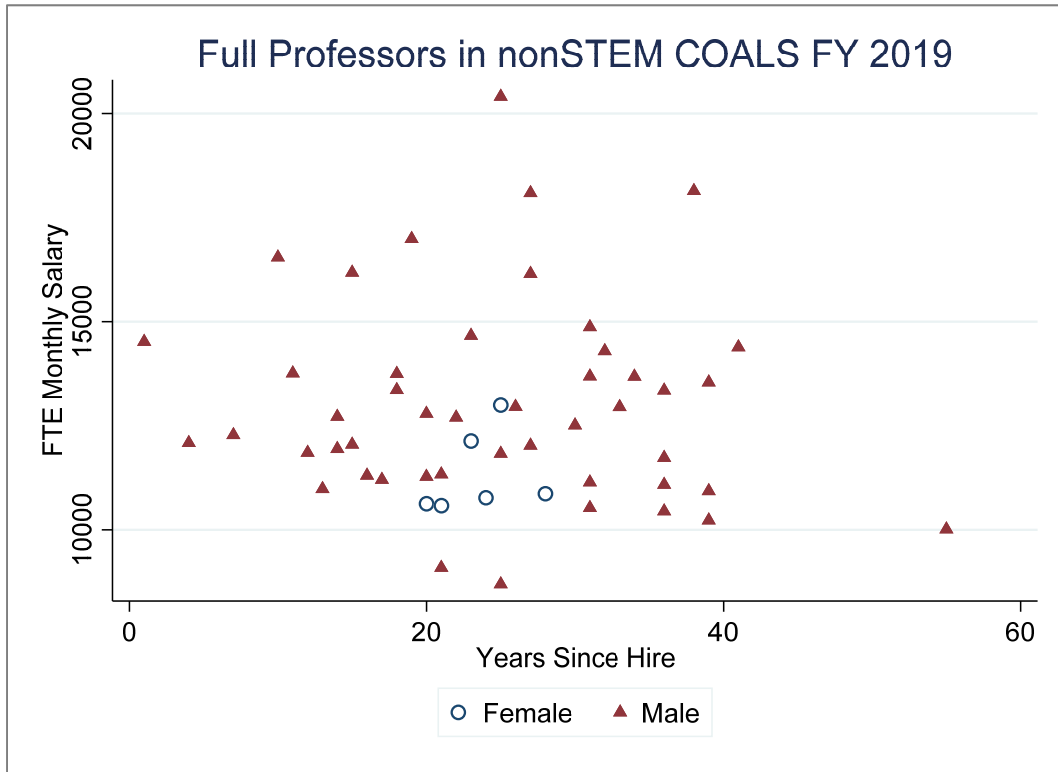
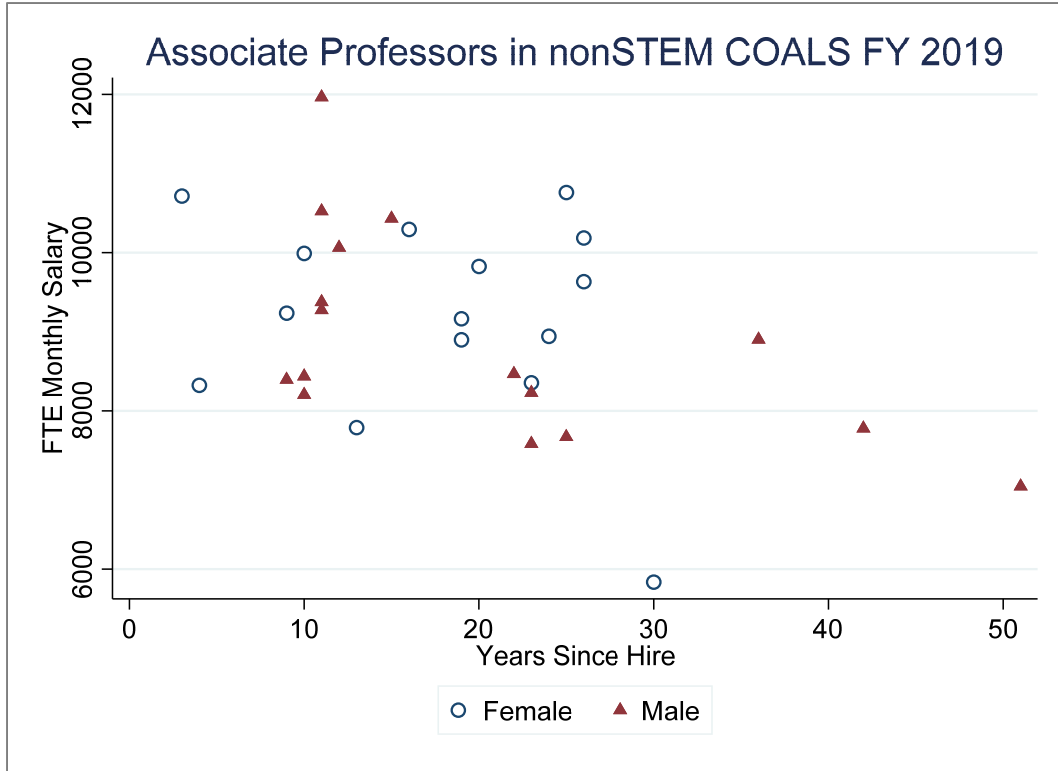
- In COALS, the demographically adjusted average salaries for female faculty were significantly less than the demographically adjusted average salaries for male faculty at the assistant, associate and full professor levels in the non-STEM departments. Sex differences in salary were not statistically significant at any level among the COALS STEM departments. This is consistent with the 2018 findings.
- In the College of Liberal Arts, female faculty in the STEM departments earned less than comparable male faculty at all ranks (assistant, associate, and full). Sex differences in salary were not statistically significant in the non-STEM departments of the College of Liberal Arts. This is consistent with the 2018 findings.
- In the College of Veterinary Medicine, the average salary for female full professors was 91% of the average salary for demographically equivalent male full professors. This is consistent with the 2018 findings.
- In the Mays Business School, female faculty earned less than comparable male faculty at all ranks (assistant, associate, and full). This is consistent with the 2018 findings.
- In the School of Law, female faculty earned significantly less than male faculty at the associate and full professor levels, although the difference at the full professor level was only statistically significant at the 10 percent level. This is consistent with the 2018 findings.
- In the College of Engineering, the average monthly salary of female assistant professors was 5.4% more than the average monthly salary of demographically equivalent male assistant professors, although the difference was only statistically significant at the 10 percent level. This is consistent with the 2018 findings.
- In the College of Pharmacy, female assistant professors earned 6.5% more, on average, than demographically equivalent male assistant professors, although the difference was only statistically significant at the 10 percent level. This is consistent with the 2018 findings.

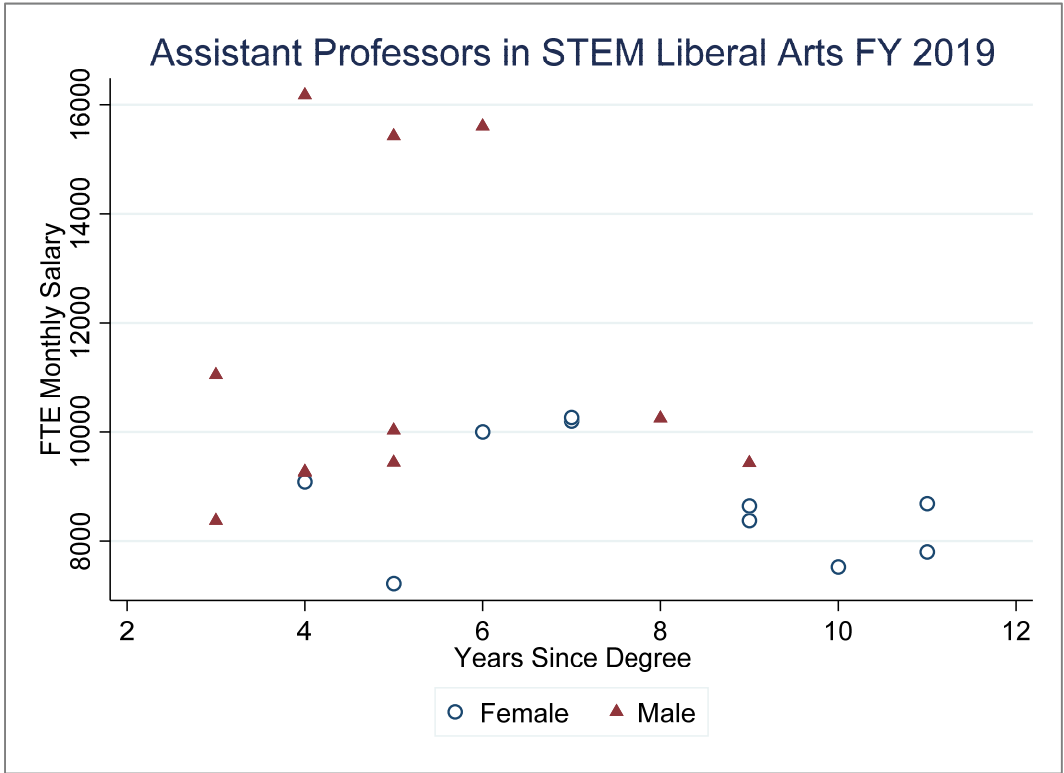
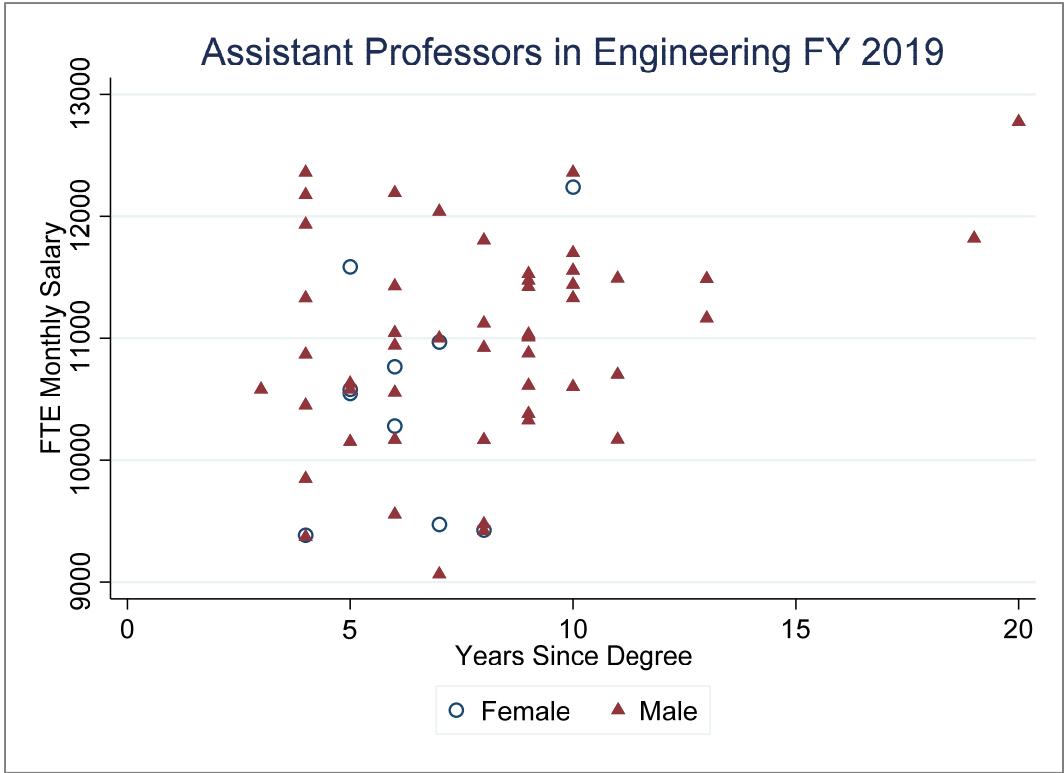
The differential between male and female salaries has been growing over time (on average across all ranks) in the Mays Business School and shrinking over time in the Colleges of Dentistry, Medicine and Pharmacy and the School of Public Health. No discernible time trends were detected in the Colleges of Agriculture and Life Sciences; Architecture; Education and Human Development; Engineering; Geosciences; Liberal Arts; Science; and Veterinary Medicine, or the Bush School (see Appendix Tables A.2 through A.5). It was not possible to describe reliable time trends in the School of Law because only six years of data were available.

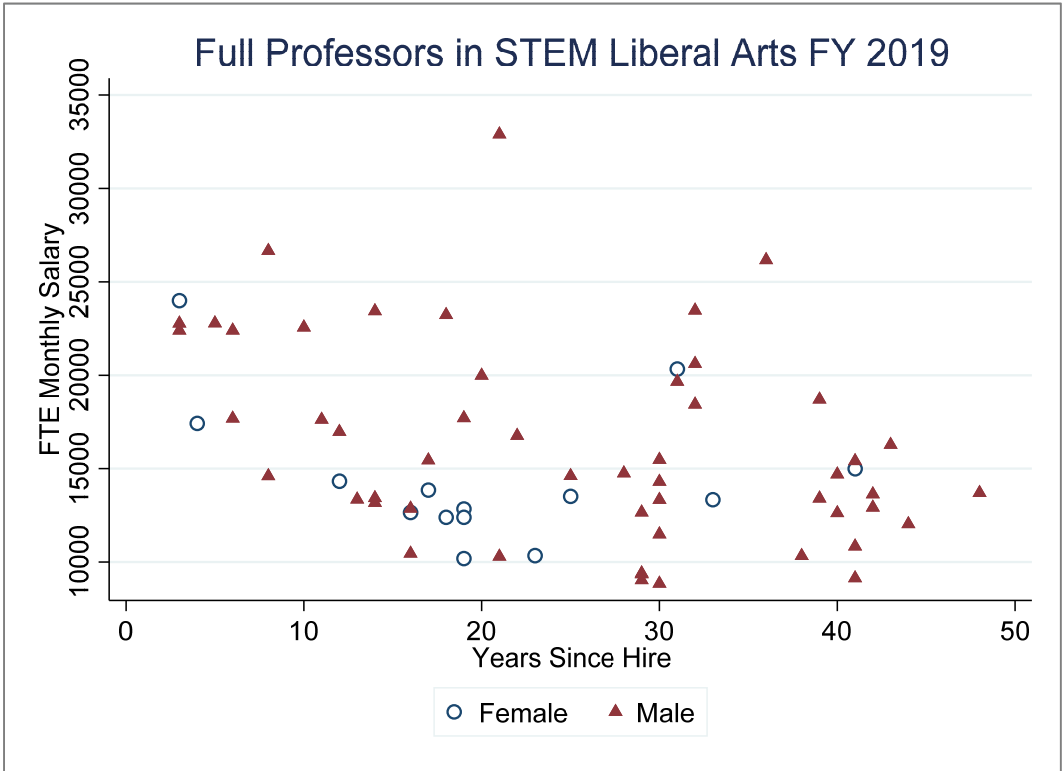
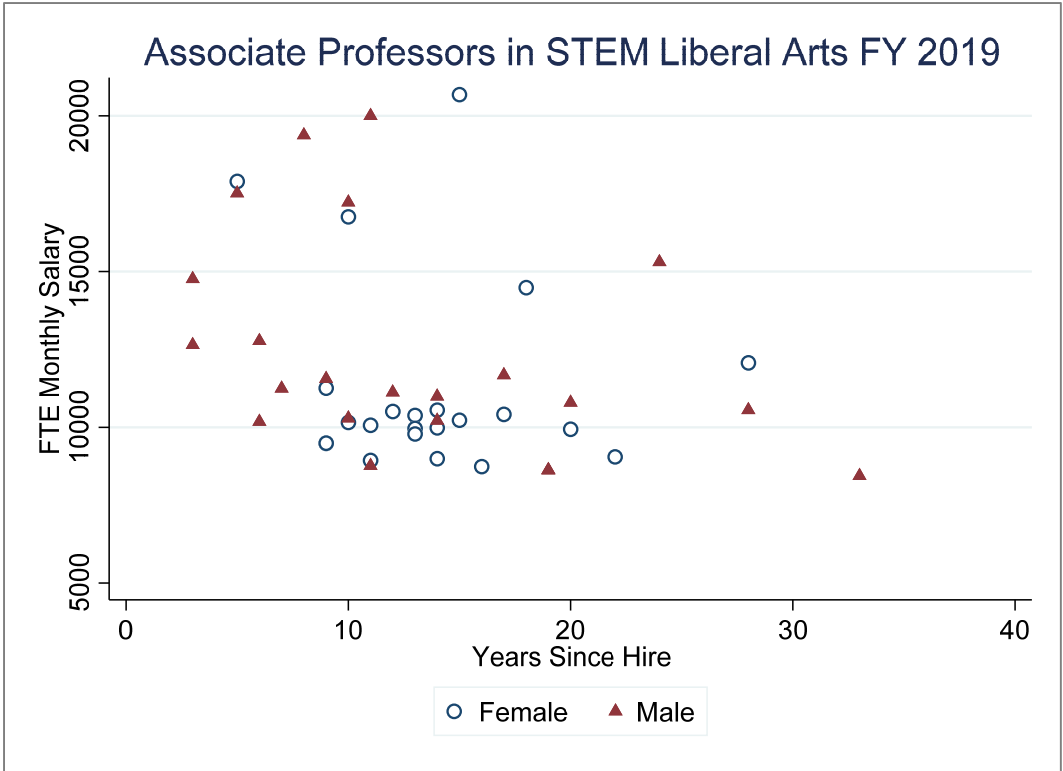
The above analysis identified statistically significant differences in salary by sex for seven TAMU divisions, holding constant the other demographic characteristics of the faculty member.

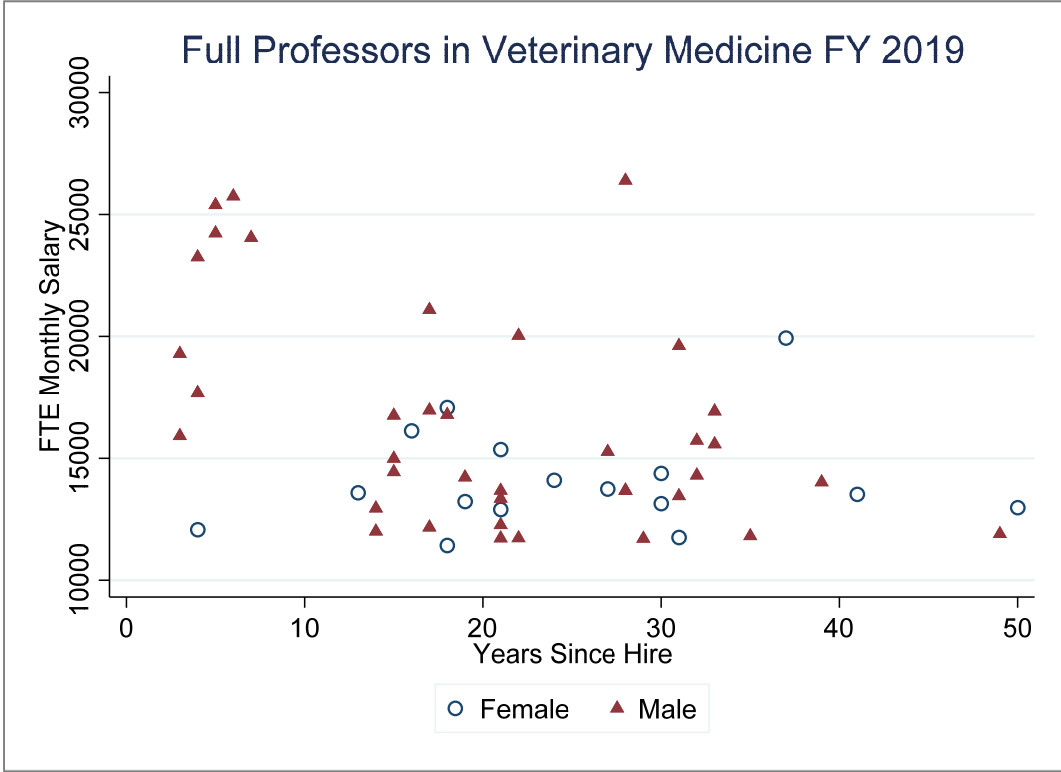
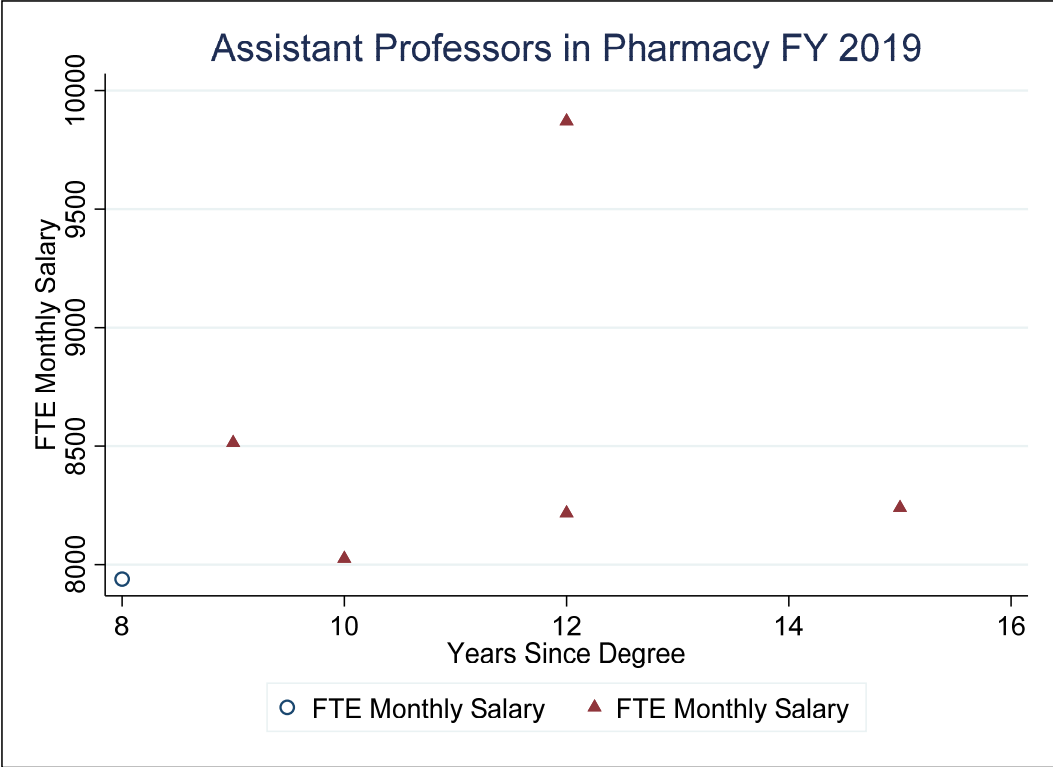
Below, we plotted full-time-equivalent monthly salaries against years of service (for tenured faculty) or years since degree (for tenure-track faculty) for each of the divisions and ranks where we detected statistically significant disparities. These graphs illustrate the raw data, holding nothing constant. As shown in the graphs, some of the salary differentials we have identified are visible to the naked eye. *Similar graphics are available department-by-department upon request.*

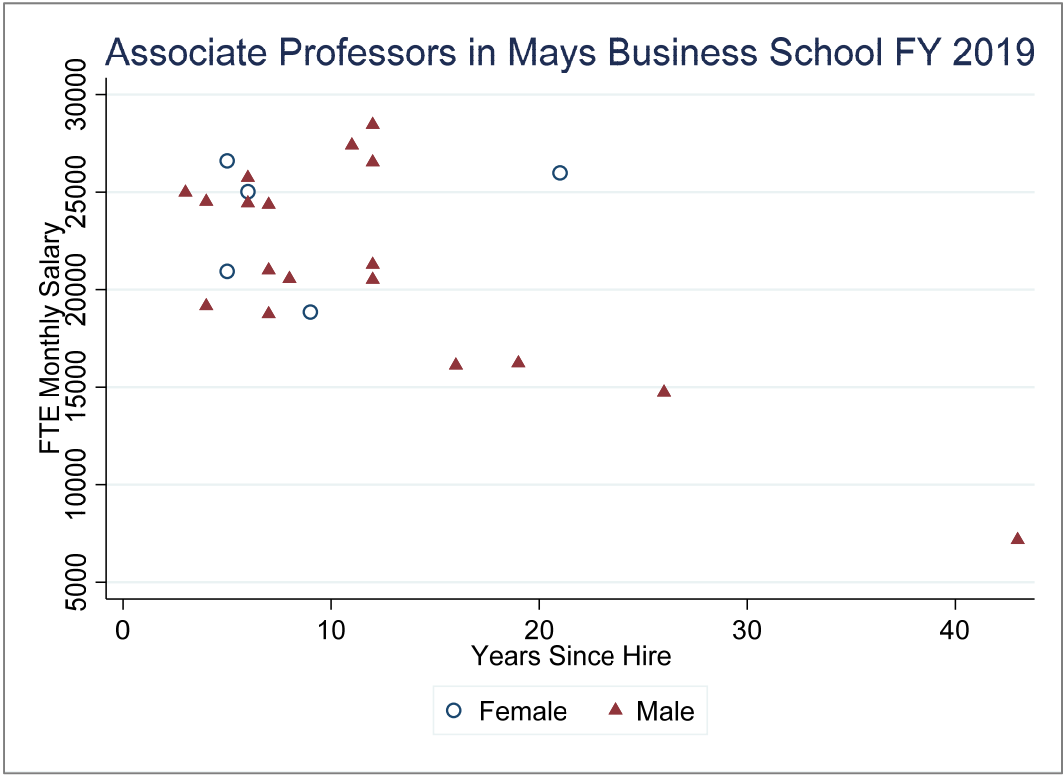
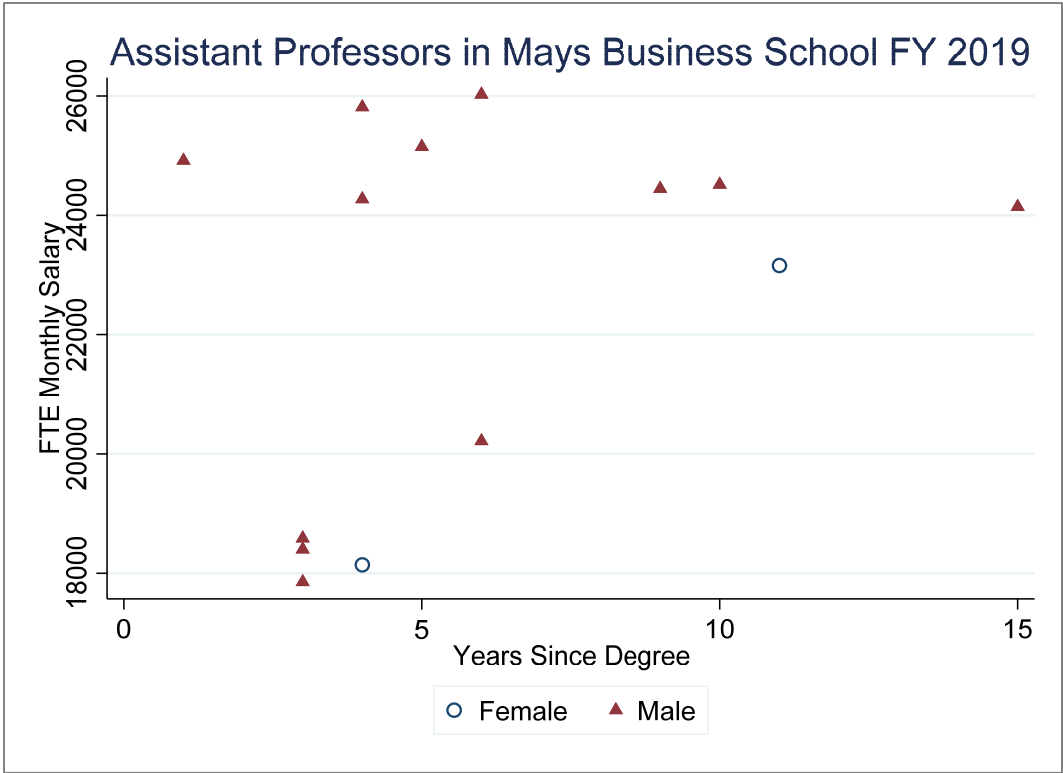


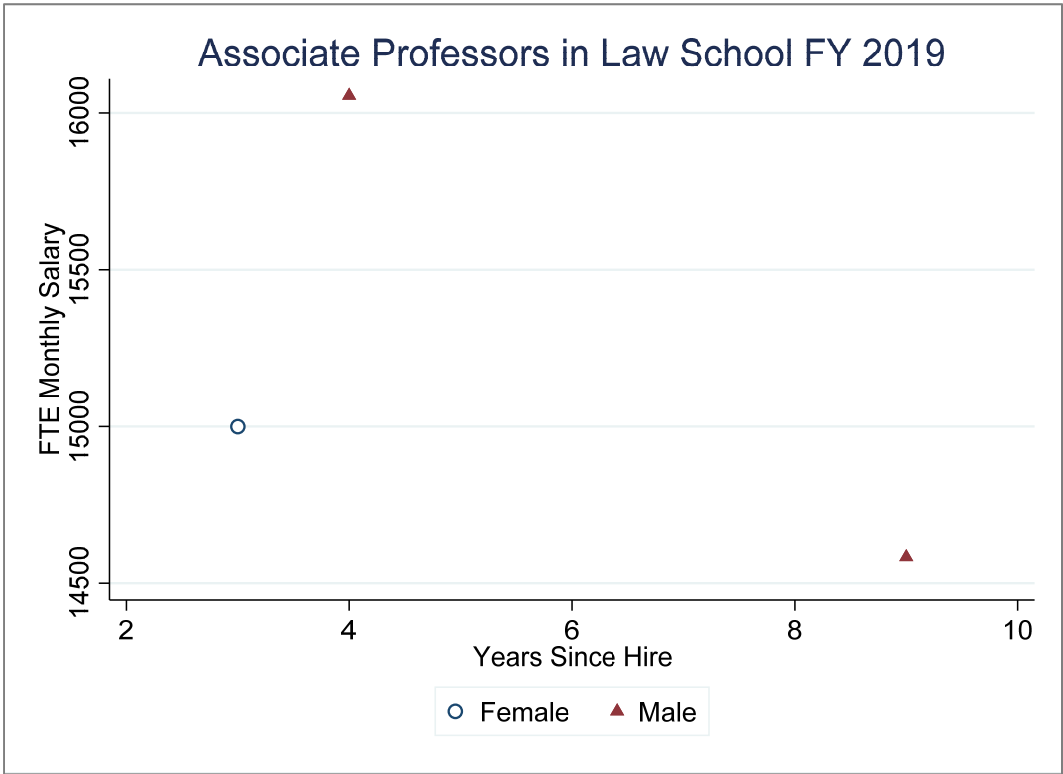
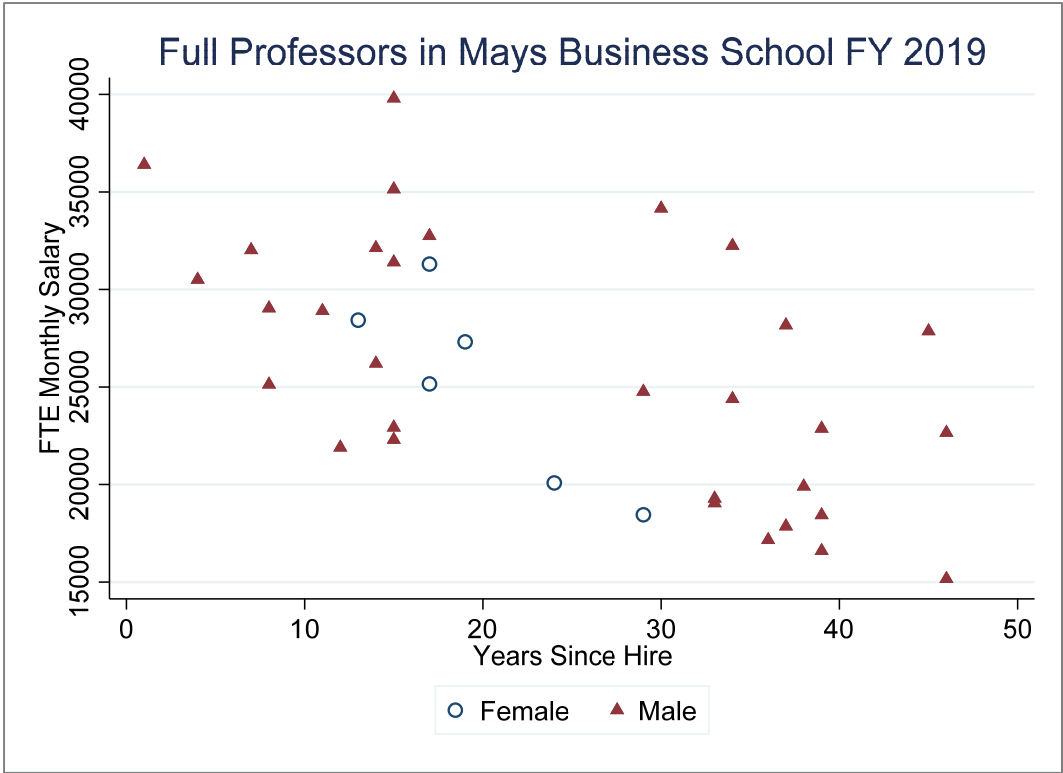


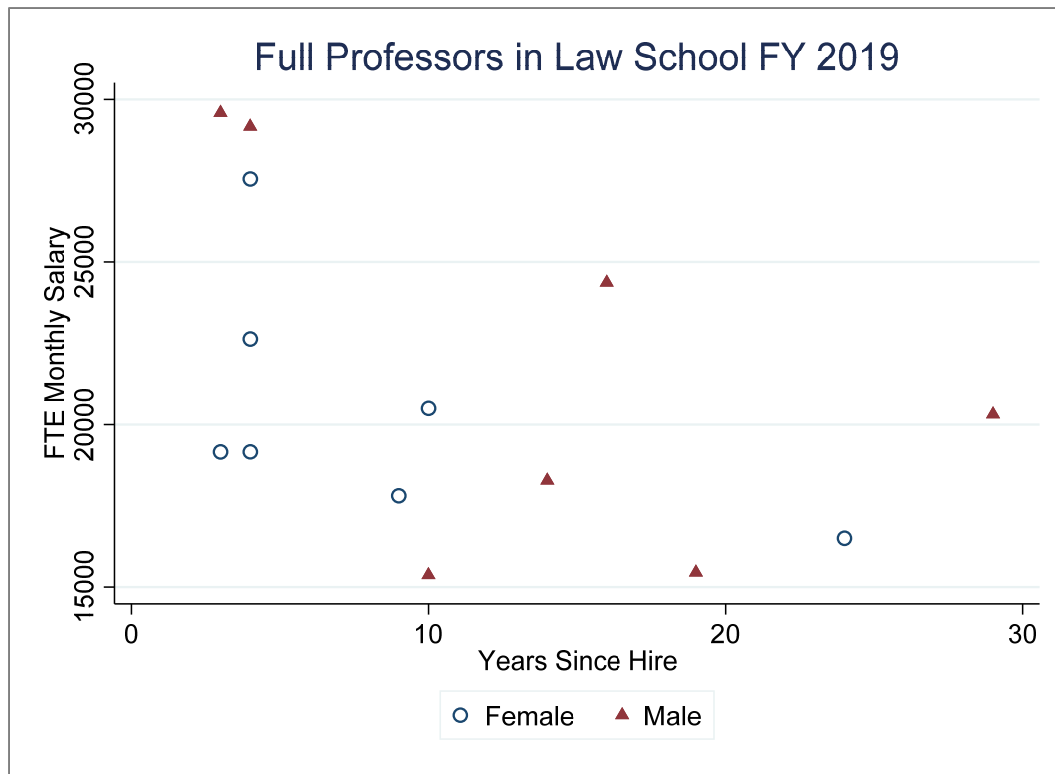












Findings about Race/Ethnicity and National Origin Differentials

Table 3 compares the predicted fiscal year 2019 salaries for non-Hispanic white faculty members with those of otherwise equal Asian and Other Race faculty members, and the predicted salaries for foreign-born faculty with those of otherwise equal native-born faculty.¹¹ For the purposes of this analysis, the category of Other Race faculty includes individuals who self-identify as American Indian, African American, Hispanic, or two or more races, as well as those for whom ethnicity is not reported. (None of these subgroups are large enough to analyze separately.) Native-born faculty members reported that the United States is their national origin; foreign-born faculty members report any other country. Given the small number of individuals involved, estimates for differentials based on race and/or national origin are not available for the Bush School or the School of Law. Again, the asterisks indicate salary ratios that are significantly different from 100% at the 1-percent (***) 5-percent (**) or 10-percent (*) levels.¹²

¹¹ The regression coefficients that support these salary predictions are presented in Appendix Tables A.2, A.3 and A.4.

¹² All statistical tests are two sided. The baseline analysis tests for significance with respect to the sex variables using Huber-White standard errors that have been clustered by individual.

Table 3: Asian and Other Race Salaries as a Percentage of White Salaries and Foreign-born Salaries as a Percentage of Native-born Salaries, by College, Fiscal Year 2019

	Asian Salaries as a Percentage of White Salaries		Other Race Salaries as a Percentage of White Salaries	Foreign-born Salaries as a Percentage of Native Salaries
COALS STEM	103.5%		99.2%	99.3%
COALS Non-STEM	104.3%		99.8%	96.3%
College of Architecture	97.6%		99.8%	100.6%
College of Dentistry	103.7%		94.4%	100.8%
College of Education	92.8%	**	100.3%	103.4%
College of Engineering	97.4%	*	98.6%	100.2%
College of Geosciences	111.5%	***	102.3%	97.6%
College of Liberal Arts STEM	105.2%	*	98.0%	96.2%
College of Liberal Arts Non-STEM	104.1%	*	98.9%	99.8%
College of Medicine	102.8%		108.2%	87.3%
College of Pharmacy	95.8%		97.2%	101.5%
College of Science	98.4%		99.0%	101.5%
College of Veterinary Medicine	100.8%		97.1%	101.3%
Mays Business School	100.1%		95.4%	102.1%
School of Public Health	94.5%		98.3%	100.9%

Note: Salary ratios are based on a regression analysis of monthly salaries from fiscal year 2008 through fiscal year 2019. Given the small number of individuals involved, racial estimates are not available for the Bush School or the Law School. The salary models control for systematic differences in salary arising from differences in the factors described in Table 1 and random effects for individuals. The asterisks indicate that the ratio is significantly different from 100% at the 1-percent (***), 5-percent (**) or 10-percent (*) levels.

As Table 3 illustrates, Asian faculty appear to command a significant wage premium in the STEM and non-STEM departments of the College of Liberal Arts and the College of Geosciences. On the other hand, Asian faculty members in the Colleges of Education and Engineering earned significantly less than white faculty members with equivalent demographics. There was no other evidence of salary differentials for Asian faculty.

In the College of Medicine, foreign-born faculty members earned significantly less than native-born faculty members. There was no other evidence that salaries for foreign-born faculty were systematically different from the salaries of native-born faculty, nor were there any other instances in which Other Race salaries diverged significantly from those of their non-Hispanic white counterparts.

Findings about Individual Outliers

One of the purposes of the annual faculty salary study is to identify individual faculty members whose actual monthly salaries in fiscal year 2019 diverged markedly from salaries predicted by

the empirical model described above. This section of the report outlines that part of the analysis. The predicted salaries used for this exercise were constructed setting the sex, ethnicity and national origin indicators at the values for a native-born, white male faculty member, but allowing all other indicators to reflect the actual characteristics of the individual faculty member.

In each division, the 10 percent of records with the largest difference between actual and predicted were flagged for follow-up, as were the 10 percent of records university-wide with the largest difference for each faculty rank (assistant, associate and full). Only faculty records for individuals holding the rank of assistant, associate or full professor were flagged for follow-up; higher ranks, such as Distinguished Professors, Deans, and Vice Presidents, were not included in this exercise. Because at least 10 percent of the records in each division are flagged for follow-up each year, progress on this indicator is measured by the degree of symmetry between male and female faculty members who earn more or less than predicted.

Please note that while the set of demographic characteristics used in this analysis is extensive, it does not include all the factors that might influence salary. As is discussed above, research productivity and teaching excellence could not be included in the analysis because there are no available indicators that are consistently defined and comparable across the colleges. The differences between actual and predicted salaries that led authors to flag a salary record for follow-up could easily be explained by underlying differences in research or teaching.

Table 4 illustrates the percentage of individuals in each sex and division who were flagged for follow-up because their salaries were higher than expected or lower than expected. For example, the table indicates that 4.2% of the female faculty members and 5.5% of the male faculty members in the College of Medicine were flagged for follow-up because their salaries were lower than predicted. As the table illustrates, approximately the same percentages of male and female faculty members across the University were flagged for follow-up because their salaries were lower than predicted, but the percentage of male faculty members identified as outliers because their salaries were higher than predicted was nearly double the percentage of female faculty members so identified. Male faculty members in the STEM departments of the College of Liberal Arts were almost four times more likely than female faculty members to be flagged for follow-up because their salaries were higher than predicted. No female faculty members had salaries higher than predicted in the College of Agriculture and Life Sciences (non-STEM departments), the College of Architecture, the College of Dentistry, the College of Geosciences, the College of Pharmacy, the Law School, or the Mays Business School.

Table 4: Percentages of Individuals Flagged for Follow-up, by College, Sex and Rank, Fiscal Year 2019

	Lower than Predicted		Higher than Predicted	
	Female	Male	Female	Male
Bush School of Government & Public Service	9.1%	0.0%	9.1%	7.1%
College of Agriculture and Life Sciences STEM	7.9%	6.5%	10.5%	7.5%
College of Agriculture and Life Sciences Non-STEM	8.3%	4.5%	0.0%	4.5%
College of Architecture	0.0%	6.7%	0.0%	8.9%
College of Dentistry	9.1%	8.0%	0.0%	4.0%
College of Education and Human Development	6.1%	9.3%	6.1%	4.7%
College of Engineering	6.4%	9.7%	10.6%	11.3%
College of Geosciences	0.0%	3.3%	0.0%	9.8%
College of Liberal Arts STEM	10.6%	9.4%	2.1%	8.2%
College of Liberal Arts Non-STEM	4.2%	11.9%	4.2%	6.0%
College of Medicine	4.2%	5.5%	4.2%	5.5%
College of Pharmacy	0.0%	8.3%	0.0%	8.3%
College of Science	15.4%	10.6%	3.9%	13.7%
College of Veterinary Medicine	7.3%	3.4%	2.4%	6.8%
Law School	0.0%	22.2%	0.0%	0.0%
Mays Business School	7.7%	6.6%	0.0%	8.2%
School of Public Health	7.1%	9.1%	7.1%	0.0%
Total	6.7%	8.2%	4.6%	8.8%
Assistant Professor	9.1%	5.1%	3.0%	5.1%
Associate Professor	4.5%	7.8%	4.0%	7.5%
Professor	7.6%	9.0%	6.0%	10.1%

Note: Salary outliers are based on a comparison of actual salaries to the salaries that would have been predicted for a native-born white male, given the parameter weights in Appendix tables A.2 through A.4.

As Table 4 illustrates, there are a few divisions where female faculty members were much more likely than male faculty members to have lower than predicted salaries. Such individuals represent potential “low hanging fruit” when it comes to gender equity because such gaps—if they are not explained by differences in productivity or teaching excellence—could be addressed by salary adjustments for one or two individuals.

Unexplained gaps at the high end are much more common and much more difficult to address because they require a downward adjustment for a few individuals (which is difficult) or an upward adjustment in salary for a large number of individuals (which is even more difficult).

Appendix Table A1: Variables Included in the Salary Model

Variable	Definition
Log monthly salary	Natural log of the individual's full-time-equivalent salary for the month of October. The full-time-equivalent salary is the monthly salary divided by the percent time. This is the dependent variable.
Male	Takes on the value of 1 if the person is male, and zero otherwise.
Male Trend	Male * time trend. The time trend takes on the value of zero in fiscal year 2001 and of 18 in fiscal year 2019.
Male Trend post 2011	Male * time trend post 2011. The time trend takes on the value of zero in fiscal year 2011 (or before) and of 8 in fiscal year 2019.
Male Associate	Takes on the value of one if the person is a male associate professor, and zero otherwise.
Male Full Plus	Takes on the value of one if the person is a male full professor, dean or vice-president, or distinguished professor, and zero otherwise.
Associate Professor	Takes on the value of one if the person is an associate professor, and zero otherwise.
Dean/VP	Takes on the value of one if the person has the title of Dean, and zero otherwise.
Distinguished Professor	Takes on the value of one if the person is a Distinguished Professor, and zero otherwise.
Full Professor	Takes on the value of one if the person is a full professor, and zero otherwise.
Anglo	Takes on the value of one if the person is non-Hispanic white, and zero otherwise.
Asian	Takes on the value of one if the person is Asian, and zero otherwise.
Foreign born	Takes on the value of one if the person is born in a country other than the United States, and zero otherwise.
Current Administrator	Takes on the value of one if the person holds an administrator title, and zero otherwise.
Ever Administrator	Takes on the value of one if the person has held an administrator title at any time since 2000-2001, and zero otherwise.
Years Since Degree and Its Square	Number of years since the highest degree awarded. If the date of the highest degree is unknown, the year of degree is imputed based on an analysis of the relationship between year of degree, year originally hired, rank at hire and other key demographic variables. If the person holds both a PhD and a DVM, then years since degree is the number of years since the first of the two degrees was awarded.
Years Since Degree, Unknown	Takes on the value of one if the year of degree is unknown, and zero otherwise.
Years Since First Hired	The number of years since the original employment year.
Break In Service	Takes on the value of one if the year originally hired is not equal to the year currently hired, and zero otherwise.
Term length	Natural log of the number of months under contract.
Hired as Advanced Assistant professor	Takes on the value of one if the person was hired as an assistant professor with less than five years on the tenure clock, and zero otherwise.
Hired as Associate professor	Takes on the value of one if the person was hired as an associate professor, and zero otherwise.
Hired as Full Professor	Takes on the value of one if the person was hired as a full professor or dean and zero otherwise.

Rank at Hire Unknown	Takes on the value of one if the person's rank at hire is unknown, and zero otherwise.
MA or Below	Takes on the value of one if the highest degree held is a master's degree or below, and zero otherwise.
Special Degree	Takes on the value of one if the highest degree held is a special degree, and zero otherwise.
Dual Degree	Takes on a value of one if the person holds both a PhD and a DVM or MD, and zero otherwise. Colleges of Veterinary Medicine and Medicine only.
Board Certified	Takes on the value of one if the person is board certified, and zero otherwise. College of Veterinary Medicine only.
Dual Certified	Takes on the value of one if the person is board certified in two or more specialties, and zero otherwise. College of Veterinary Medicine only.
Newly Tenured	Takes on a value of one if the person just received tenure, and zero otherwise.
Other Promotion	Takes on a value of one if the person was just promoted, and zero otherwise.
Other Title Change	Takes on a value of one if the person's title changed from the previous observation, and zero otherwise.
Salary Compression Indicator	Takes on a value of one if the person's salary was compressed, and zero otherwise. This variable only applies to the College of Veterinary Medicine in fiscal years 2016, 2017, 2018, and 2019.
Degree Field Indicators	Each indicator takes on the value of one if the person's doctoral area was in the corresponding degree field, and zero otherwise. There are four degree-field indicators, one for each of the fields identified through preliminary analysis as leading to salary outliers. Those degree fields are: accounting, business administration, economics and management.
Department Indicators	Takes on a value of one if the person is from the designated department, and zero otherwise.
Department Trends	Interaction between a department indicator and a time trend. The time trend takes on the value of zero in fiscal year 2000 and of 18 in fiscal year 2019. Department trends are not used in the models for the Bush School, the College of Veterinary Medicine and the STEM departments of the College of Liberal Arts because they are not statistically significant.
Year Indicators	Sequence of indicator variables, one for each fiscal year.
Rank * year indicators	Interaction between two indicators for faculty rank (associate professor, and full professor or above) and the series of year indicators.

Appendix Table A2: The Estimated Relationship between Salaries and Faculty Demographics in STEM Departments, 2007-08 through 2018-19

VARIABLES	COALS STEM	Engineering	Geosciences	Science	Liberal Arts STEM
Male	-0.0448 (0.0459)	0.0105 (0.0359)	-0.0171 (0.0418)	-0.0391 (0.0382)	0.0772* (0.0401)
Male Trend	0.00626 (0.00403)	-0.00409 (0.00431)	0.00728** (0.00358)	0.00611* (0.00329)	-0.00112 (0.00452)
Male Trend after FY 2011	-0.00810 (0.00495)	0.00137 (0.00478)	-0.0136** (0.00628)	-0.00643* (0.00357)	3.89e-05 (0.00469)
Male Associate	0.00870 (0.0213)	0.0178 (0.0161)	-0.00506 (0.0219)	-0.0131 (0.0168)	0.0336* (0.0202)
Male Full Plus	-0.0427 (0.0273)	0.0205 (0.0244)	-0.0151 (0.0438)	-0.00971 (0.0333)	0.0111 (0.0261)
Associate Professor	0.105*** (0.0234)	0.123*** (0.0187)	0.107*** (0.0248)	0.125*** (0.0247)	0.155*** (0.0161)
Dean/VP	0.399*** (0.0510)	0.323*** (0.0434)	0.290*** (0.0663)	0.213*** (0.0511)	0.429*** (0.0985)
Distinguished Professor	0.419*** (0.0380)	0.400*** (0.0370)	0.307*** (0.0761)	0.373*** (0.0381)	0.393*** (0.0323)
Full Professor	0.285*** (0.0292)	0.292*** (0.0245)	0.272*** (0.0361)	0.281*** (0.0351)	0.329*** (0.0221)
White	0.00809 (0.0364)	0.0137 (0.0230)	-0.0247 (0.0323)	0.0102 (0.0356)	0.0198 (0.0251)
Asian	0.0429 (0.0404)	-0.0125 (0.0219)	0.0841* (0.0451)	-0.00594 (0.0431)	0.0707** (0.0348)
Foreign Born	-0.00657 (0.0329)	0.00167 (0.0142)	-0.0245 (0.0259)	0.0149 (0.0235)	-0.0386 (0.0271)
Current Admin	0.0298*** (0.0111)	0.125*** (0.0197)	0.121*** (0.0183)	0.101*** (0.0170)	0.0846*** (0.0204)
Ever Admin	0.0617* (0.0353)	0.108*** (0.0239)	0.0646** (0.0259)	0.209*** (0.0379)	0.157*** (0.0496)
Years Since Degree	0.0145*** (0.00354)	0.0176*** (0.00264)	0.0296*** (0.00494)	0.0294*** (0.00331)	0.0238*** (0.00426)
Years Since Degree Unknown	0.0489 (0.0535)	0.131 (0.0806)	0.0282 (0.0515)	0.0117 (0.0490)	-0.0818 (0.118)

Years Since Degree, Squared	-0.000178*** (5.54e-05)	-0.000148*** (3.95e-05)	-0.000553*** (7.17e-05)	-0.000239*** (3.71e-05)	-0.000226*** (5.03e-05)
Years Since First Hired	-0.00371 (0.00319)	-0.00531*** (0.00180)	-0.000299 (0.00337)	-0.0137*** (0.00223)	-0.0145*** (0.00365)
Break in Service	0.0857** (0.0361)	0.0261 (0.0218)	0.0313 (0.0337)	-0.0389 (0.0508)	0.0859 (0.0673)
Term Length	-0.130*** (0.0431)	0.207*** (0.0519)	0.0165 (0.0260)	0.0143 (0.0231)	-0.0410 (0.0488)
Hired as Advanced Assistant	0.314** (0.143)	0.0553 (0.0478)	0.0678 (0.0475)	-0.0174 (0.0422)	-0.0346 (0.0757)
Hired as Associate	0.0386 (0.0441)	-0.0198 (0.0241)	-0.0368 (0.0436)	-0.0655* (0.0363)	0.00887 (0.0466)
Hired as Full	0.281*** (0.0889)	0.0746* (0.0417)	0.130 (0.0882)	0.0390 (0.0557)	0.102 (0.0745)
Rank at Hire Unknown	0.0485 (0.0679)	-0.0442 (0.0572)	0.157*** (0.0559)	-0.127*** (0.0473)	0.128 (0.125)
MA or Less	-0.0478 (0.0492)	-0.0128 (0.0279)	-0.00749 (0.0157)	0.0182 (0.0112)	0.0643*** (0.0165)
Special Degree	0.0498 (0.0977)	-0.0158 (0.0354)		0.0231** (0.0117)	-0.00442 (0.0210)
Dual Degree	-0.109* (0.0646)				
Newly Tenured	-0.0132 (0.00813)	-0.0163*** (0.00459)	0.0186** (0.00907)	0.00981* (0.00567)	-0.0268** (0.0111)
Other Promotion	-0.0166** (0.00765)	-0.00870 (0.00694)	-0.00896 (0.0133)	-0.00711 (0.00659)	0.00136 (0.00922)
Title Change	0.00380 (0.0125)	0.0319*** (0.0121)	0.00218 (0.0198)	-0.00398 (0.0102)	-0.0215 (0.0198)
Year Indicators	yes	yes	yes	yes	yes
Year X Rank Indicators	yes	yes	yes	yes	yes
Department Indicators	yes	yes	yes	yes	yes
Department*Trend Indicators	yes	yes	yes	yes	no
Degree Field Indicators	yes	yes	yes	yes	yes
Observations	2247	4428	1090	2896	1829
Number of UINs	277	569	141	335	246

Robust standard errors clustered by UIN, in parentheses *** p<0.01, ** p<0.05, * p<0.10

Appendix Table A3: The Estimated Relationship between Salaries and Faculty Demographics in Selected Non-STEM Departments, 2007-08 through 2018-19

VARIABLES	Architecture	COALS Non-STEM	Education	Liberal Arts Non-STEM	Veterinary Medicine
Male	0.0847** (0.0428)	0.00447 (0.0491)	0.0213 (0.0456)	0.0677* (0.0412)	0.0363 (0.0456)
Male Trend	-0.00551 (0.00397)	0.00490 (0.00516)	-0.00149 (0.00429)	-0.00657 (0.00451)	-0.000764 (0.00455)
Male Trend after FY 2011	0.00266 (0.00468)	0.000544 (0.00543)	-0.00249 (0.00518)	0.00528 (0.00583)	-0.00212 (0.00553)
Male Associate	0.0144 (0.0149)	8.65e-05 (0.0184)	0.00929 (0.0176)	0.0150 (0.0133)	0.0152 (0.0203)
Male Full Plus	-0.0474 (0.0350)	-0.0270 (0.0325)	0.0366 (0.0314)	0.0362 (0.0251)	0.0890*** (0.0324)
Associate Professor	0.0869** (0.0410)	0.0653*** (0.0184)	0.0972*** (0.0293)	0.147*** (0.0193)	0.0996*** (0.0234)
Dean/VP	0.287*** (0.104)	0.320*** (0.102)	0.291*** (0.0488)	0.433*** (0.0524)	0.440*** (0.0573)
Distinguished Professor		0.471*** (0.0483)	0.274*** (0.0454)	0.556*** (0.0420)	-0.0152 (0.201)
Full Professor	0.309*** (0.0558)	0.257*** (0.0330)	0.287*** (0.0382)	0.347*** (0.0260)	0.179*** (0.0303)
White	0.00216 (0.0279)	0.00173 (0.0358)	-0.00295 (0.0246)	0.0115 (0.0224)	0.0293 (0.0436)
Asian	-0.0219 (0.0352)	0.0442 (0.0474)	-0.0776** (0.0331)	0.0516* (0.0293)	0.0301 (0.0448)
Foreign Born	0.00579 (0.0336)	-0.0380 (0.0332)	0.0338 (0.0296)	-0.00223 (0.0215)	0.0126 (0.0373)
Current Admin	0.119*** (0.0376)	0.0898*** (0.0171)	0.0917*** (0.0200)	0.104*** (0.0173)	0.0598*** (0.0212)
Ever Admin	0.157*** (0.0416)	0.0750* (0.0423)	0.110*** (0.0320)	0.169*** (0.0374)	0.121*** (0.0334)
Years Since Degree	0.00446 (0.00285)	0.0175*** (0.00393)	0.0133*** (0.00403)	0.0140*** (0.00291)	0.0139*** (0.00252)

Years Since Degree Unknown	-0.0199 (0.0415)	0.0556 (0.0485)	-0.0938 (0.0826)	-0.0898 (0.0867)	-0.0548 (0.139)
Years Since Degree, Squared	-1.35e-05 (5.49e-05)	-0.000228*** (5.53e-05)	-0.000272*** (5.88e-05)	-0.000112** (4.62e-05)	-0.000219*** (4.84e-05)
Years Since First Hired	-0.00261 (0.00161)	-0.00533 (0.00343)	0.00202 (0.00281)	-0.00704*** (0.00228)	-0.00247 (0.00197)
Break In Service	0.0444 (0.0360)	0.0608* (0.0355)	0.0712*** (0.0266)	-0.00436 (0.0382)	0.0810*** (0.0259)
Term Length	0.0390 (0.0366)	-0.0635 (0.0407)	-0.102 (0.0783)	0.130* (0.0756)	-0.225* (0.132)
Hired as Advanced Assistant	-0.0544 (0.0433)	0.0960* (0.0520)	0.0309 (0.0610)	-0.0168 (0.0323)	0.133* (0.0771)
Hired as Associate	0.159*** (0.0533)	0.0713 (0.0497)	0.0478 (0.0326)	-0.00445 (0.0353)	-0.00642 (0.0287)
Hired as Full	0.277*** (0.0489)	0.101 (0.0667)	0.313*** (0.0625)	0.0942* (0.0561)	0.302*** (0.0663)
Rank at Hire Unknown	0.112** (0.0443)	0.00499 (0.0645)	0.111** (0.0515)	-0.0685 (0.0581)	0.116 (0.0888)
MA or Less	-0.0182 (0.0169)	0.00555 (0.0317)	0.00635 (0.0289)	-0.0386 (0.0283)	0.0571*** (0.0186)
Special Degree	0.00914 (0.0229)	0.0244 (0.0185)	0.132 (0.203)	-0.331*** (0.0663)	0.0350 (0.0349)
Dual Degree					0.0147 (0.0322)
Board Certified					0.0475 (0.0374)
Dual Certified					-0.00558 (0.0279)
Newly Tenured	-0.0132* (0.00774)	0.00225 (0.0120)	0.00567 (0.00969)	-0.0125** (0.00629)	-0.00353 (0.00775)
Other Promotion	-0.0271** (0.0121)	-0.0224* (0.0118)	-0.0140 (0.0136)	-0.0352*** (0.00953)	-0.0113 (0.00853)
Title Change	-0.0187 (0.0143)	0.0227* (0.0122)	0.0125 (0.0119)		-0.00946 (0.0151)
Salary Compression Indicator					0.0437*** (0.0102)

Year Indicators	yes	yes	yes	yes	yes
Year X Rank Indicators	yes	yes	yes	yes	yes
Department Indicators	yes	yes	yes	yes	yes
Department*Trend	yes	yes	yes	yes	no
Degree Field Indicators	yes	yes	yes	yes	yes
Observations	983	1078	1312	2175	1353
Number of UINs	147	163	186	277	191

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10

Appendix Table A4: The Estimated Relationship between Salaries and Faculty Demographics in Selected Non-STEM Divisions, 2007-08 through 2018-19

VARIABLES	Bush School	Law School	Mays School
Male	-0.0528 (0.102)	0.111* (0.0575)	0.00609 (0.0459)
Male Trend	0.00743 (0.0101)		0.000104 (0.00396)
Male Trend after FY 2011	-0.00792 (0.00956)		0.0107*** (0.00411)
Male Associate	0.00936 (0.0189)	0.0516 (0.0445)	-0.00182 (0.0202)
Male Full Plus	-0.0904* (0.0475)		-0.0168 (0.0321)
Associate Professor	0.100*** (0.0161)	-0.218*** (0.0313)	0.0600** (0.0255)
Dean/VP		0.372*** (0.0734)	0.275*** (0.0639)
Distinguished Professor	0.381*** (0.0616)		0.285*** (0.0555)
Full Professor	0.339*** (0.0478)		0.213*** (0.0320)
White			0.0470 (0.0455)
Asian			0.0475 (0.0629)
Foreign Born			0.0211 (0.0426)
Current Admin	0.00857 (0.0274)		0.0913*** (0.0189)
Ever Admin	0.0517 (0.0434)	-0.150* (0.0833)	0.0956* (0.0495)
Years Since Degree	0.00474 (0.00361)	0.0313*** (0.00703)	0.00939*** (0.00277)
Years Since Degree Unknown		0.0839 (0.0716)	-0.0123 (0.0376)
Years Since Degree, Squared	6.86e-05 (8.08e-05)	-0.000489*** (8.97e-05)	-0.000322*** (5.68e-05)
Years Since First Hired	0.00599* (0.00343)	-0.0142*** (0.00356)	-0.00434 (0.00279)
Break in Service	-0.318*** (0.0517)	-0.00604 (0.0924)	0.182** (0.0789)
Term Length	0.101 (0.0872)	-0.948*** (0.304)	-0.147** (0.0690)
Hired as Advanced Assistant			0.0246 (0.0891)
Hired as Associate	0.115*** (0.0371)	-0.129** (0.0520)	0.107** (0.0449)
Hired as Full	0.223** (0.0876)		0.338*** (0.0730)
Rank at Hire Unknown	0.340***		0.000865

	(0.0487)		(0.0976)
MA or Less		0.0680*	-0.0321**
		(0.0372)	(0.0126)
Special Degree		0.0715	0.140
		(0.0525)	(0.111)
Newly Tenured			-0.0125
			(0.0117)
Other Promotion			0.00790
			(0.00989)
Other Title Change			-0.00215
			(0.0123)
Year Indicators	yes	yes	yes
Year X Rank Indicators	no	no	yes
Department Indicators	no	no	yes
Department*Trend	no	no	yes
Degree Field Indicators	yes	yes	yes
Observations	303	242	1127
Number of UINs	43	63	169

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10

Appendix Table A5: The Estimated Relationship between Salaries and Faculty Demographics in HSC Divisions, 2006-07 through 2017-18

VARIABLES	Public Health	Dentistry	Medicine	Pharmacy
Male	0.168** (0.0673)	0.116** (0.0588)	0.228*** (0.0504)	0.0764 (0.0731)
Male Trend	-0.00965** (0.00446)	-0.00881** (0.00442)	-0.00892*** (0.00328)	-0.00775 (0.00492)
Male Associate	-0.0133 (0.0379)	0.0312 (0.0293)	-0.0206 (0.0307)	0.0251 (0.0300)
Male Full Plus	0.00290 (0.0452)	0.0874* (0.0449)	-0.0428 (0.0543)	0.217 (0.173)
Associate Professor	0.132** (0.0513)	0.0358 (0.130)	-0.0240 (0.0567)	0.0959*** (0.0114)
Dean/VP	0.302*** (0.0740)	0.162 (0.130)	0.147 (0.128)	0.372 (0.253)
Distinguished Professor	0.368*** (0.0757)		0.357*** (0.0725)	
Full Professor	0.295*** (0.0733)	0.0800 (0.130)	0.213*** (0.0618)	-0.0336 (0.178)
White	0.0164 (0.0419)	0.0580 (0.0373)	-0.0789 (0.0550)	0.0290 (0.0414)
Asian	-0.0407 (0.0786)	0.0937** (0.0383)	-0.0508 (0.0639)	-0.0145 (0.0417)
Foreign Born	0.00999 (0.0609)	0.00794 (0.0289)	-0.135** (0.0546)	0.0151 (0.0525)
Current Admin	0.0326* (0.0195)	0.0788** (0.0333)	0.0617* (0.0355)	0.112*** (0.0216)
Ever Admin	0.138*** (0.0355)	0.119*** (0.0451)	0.118* (0.0624)	-0.0132 (0.0663)
Years Since Degree	0.00798 (0.00509)	0.0107*** (0.00369)	0.0110*** (0.00385)	-0.00428 (0.00402)
Years Since Degree Unknown	0.0960* (0.0515)	0.0199 (0.0381)	-0.110** (0.0460)	-0.0636 (0.0620)
Years Since Degree, Squared	-0.000122 (0.000122)	-0.000144** (7.34e-05)	-0.000198** (8.44e-05)	-2.61e-05 (6.15e-05)
Years Since First Hired	0.000562 (0.00351)	0.000859 (0.00166)	-0.000145 (0.00331)	0.0218*** (0.00698)
Break in Service	0.00541 (0.0450)	-0.00644 (0.0277)	-0.0192 (0.0491)	0.0145 (0.0727)
Term Length	-0.215 (0.240)	1.002*** (0.323)	0.496 (0.340)	1.772*** (0.340)
Hired as Associate	0.0256 (0.0491)	0.0622 (0.0695)	0.173** (0.0712)	0.132** (0.0644)
Hired as Full	0.153** (0.0738)	0.258*** (0.0626)	0.422*** (0.0876)	0.284** (0.111)
Rank at Hire Unknown	-0.0339 (0.0526)	0.122*** (0.0413)	0.221*** (0.0709)	
MA or Less	-0.187* (0.113)	-0.113*** (0.0417)	-0.00100 (0.0345)	0.123 (0.0976)
Special Degree	0.378***	0.0156	0.504***	0.0835

	(0.0466)	(0.0457)	(0.0540)	(0.0649)
Dual Degree			0.203***	
			(0.0525)	
Newly Tenured	-0.0322	-0.0218**	0.0191	-0.0220**
	(0.0203)	(0.0102)	(0.0128)	(0.00999)
Other Promotion	-0.0344	0.0326	0.00442	-0.00634
	(0.0215)	(0.0211)	(0.0216)	(0.0128)
Other Title Change	0.00195	-0.0771**	-0.0424*	0.00184
	(0.0345)	(0.0307)	(0.0222)	(0.0211)
Year Indicators	yes	yes	yes	yes
Year X Rank Indicators	yes	yes	yes	yes
Department Indicators	yes	yes	yes	no
Department*Trend	yes	yes	yes	no
Degree Field Indicators	yes	yes	yes	yes
Observations	489	1290	1239	372
Number of UINs	87	223	238	75
Robust standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.10			