# Salary Equity Study
## Virginia Tech
## Spring 2004
Prepared by the Office of Institutional Research
Advance Institutional Transformation Program

### *Introduction*

Virginia Tech recently received funding from NSF under the auspices of Advance to promote the participation of women faculty in science and engineering.  As a grant recipient, the university is required to investigate equity issues and, in particular, salary equity, as evaluated here.  Models to assess salary equity were constructed by the Office of Institutional Research using data available in the University's database and multiple regression techniques. Regressions followed a methodology recommended by NSF and developed by AAUP (Paychecks: A Guide to Conducting Salary Equity Studies for Higher Education Faculty, by Lois Haignere, AAUP, 2002). This report summarizes the findings of the study conducted and discusses which factors significantly affected the salary of tenured and tenure-track faculty in January, 2004, at Virginia Tech.

The report proceeds with an explanation of the variables considered in the analysis, a description of the population involved in the study, a summary of the models generated in the analysis, an interpretation of the results, and some known short-comings of the report dealing with data quality issues.

### *Factors*
In the Paychecks' methodology, a number of variables are identified as likely predictors of faculty salary: gender, race/ethnicity, academic discipline, academic rank category, time in rank (the length of time the faculty member held that particular rank), tenure status, US citizenship status, time at the University (length of time since the faculty member's most recent hire date), and prior experience (calculated as the length of time between the date a faculty member was awarded his/her highest degree and that faculty member's most recent hire date at Virginia Tech).  Additional information regarding each of these factors is given in Appendix 1. The outcome variable was academic year (9-month) salary. Faculty on calendar year appointments had their salaries converted to a 9-month base so that salaries would be comparable.

The present analysis does not include a number of factors likely to influence salary differences—especially those related to individual job performance. These data are not available on institutional data bases and were beyond the scope of this effort to collect from departmental files or elsewhere. The models presented here can be seen as a first step in the analysis process and, in fact, do explain a large amount of the variance in faculty salaries. Further examination of data will depend upon institutional interests and needs which can be better assessed in light of the findings reported here.

### *Population*

One-thousand two-hundred thirty-eight tenured and tenure-track teaching and research faculty were included in the analysis; tenured or tenure-track administrative faculty were excluded. Faculty members were classified into one of four academic rank categories (assistant professor, associate professor, professor, Eminent Scholars). While "Eminent Scholars" is not a true academic rank, it was created to distinguish those professors with Eminent Scholars' status from other full professors. University Distinguished Professors were included in the Eminent Scholars category.

Twenty-one percent of the population were female and 79% were male (Table 1). Just over 20% of the population held the rank of assistant professor; 35% were associate professors; and 36% were categorized as professors, with another 9% of faculty falling into the Eminent Scholars category. While 51% of the men in the population were considered either professors or Eminent Scholars, only 23 % of the women in the population fell into these categories.

Just over three-quarters of the population had been awarded tenure at Virginia Tech with the remaining members of the population considered tenure-track faculty (Table 1). Eighty-one percent of the men and 65% of the women in the population had been awarded tenure.

The majority of the population (84%) was white (Table 1). This was consistent for men and women. Asians accounted for 8% of the population; African-Americans comprised 3%; and non-resident aliens accounted for 3%. The remaining 2% of faculty were of other ethnicities. Interestingly, nearly 6% of the women in the study were African-American, compared to 2% of the men. Nearly 90% of the population held US citizenship.

Table 1. Basic demographics of the study's population.

| | | | Women | | Men | |
|---|---|---|---|---|---|---|
| | **Number in Population** | **Percentage of Population** | **Number in Population** | **Percentage of Women** | **Number in Population** | **Percentage of Men** |
| **Gender** | | | | | | |
| Men | 972 | 78.5% | 0 | 0.0% | 972 | 100.0% |
| Women | 266 | 21.5% | 266 | 100.0% | 0 | 0.0% |
| Total | 1238 | 100.0% | 266 | 100.0% | 972 | 100.0% |
| **Academic Rank** | | | | | | |
| Assistant Professor | 250 | 20.2% | 91 | 34.2% | 159 | 16.4% |
| Associate Professor | 431 | 34.8% | 113 | 42.5% | 318 | 32.7% |
| Professor | 450 | 36.4% | 55 | 20.7% | 395 | 40.6% |
| Eminent Scholars | 107 | 8.6% | 7 | 2.6% | 100 | 10.3% |
| Total | 1238 | 100.0% | 266 | 100.0% | 972 | 100.0% |
| **Tenure Status** | | | | | | |
| Tenure-track | 278 | 22.5% | 94 | 35.3% | 184 | 18.9% |
| Tenured | 960 | 77.5% | 172 | 64.7% | 788 | 81.1% |
| Total | 1238 | 100.0% | 266 | 100.0% | 972 | 100.0% |
| **Ethnicity** | | | | | | |
| White | 1043 | 84.2% | 227 | 85.3% | 816 | 83.9% |
| Asian | 94 | 7.6% | 13 | 4.9% | 81 | 8.3% |
| African-American | 38 | 3.1% | 15 | 5.6% | 23 | 2.4% |
| Non-Resident Alien | 36 | 2.9% | 4 | 1.5% | 32 | 3.3% |
| Latino/Native American | 27 | 2.2% | 7 | 2.6% | 20 | 2.1% |
| Total | 1238 | 100.0% | 266 | 100.0% | 972 | 100.0% |
| **Citizenship Status** | | | | | | |
| US Citizen | 1110 | 89.7% | 252 | 94.7% | 858 | 88.3% |
| Non-US Citizen | 128 | 10.3% | 14 | 5.3% | 114 | 11.7% |
| Total | 1238 | 100.0% | 266 | 100.0% | 972 | 100.0% |

Women in the study, on average, had earned their highest degrees more recently than men in the study (Table 2). The average length of time since earning their highest degrees for the female faculty was 13 years. For the male faculty, the average was 20 years. Not surprisingly, then, the average length of time at Virginia Tech was longer for men (16 years) than for women (11 years).

Table 2. Descriptive measures for work experience variables by gender.

|  | Women | | Men | |
|---|---|---|---|---|
|  | Number[*] | Average number of years | Number[*] | Average number of years |
| Time Since Earning Highest Degree | 266 | 13.2 | 971[**] | 19.9 |
| Time at VT | 266 | 10.6 | 972 | 15.8 |

[*]Number of observations used in calculation of mean
[**]Degree data were unavailable for one male faculty member

At the lower academic ranks, male and female faculty members have similar patterns in terms of time in rank. Female assistant professors have spent proportionally slightly more time in rank than male assistant professors (Table 3). Fifty-six percent of female assistant professors have spent 3 or more years as assistant professors compared with 49% of male assistant professors. At the associate professor level, 73% of female associate professors have spent 3 or more years at this rank compared to 78% of male associate professors. The major differences occur at the professor rank. Female professors were more likely to have been awarded the rank of professor within the last 6 years (58%) than were male professors (37%). Nearly two-thirds of male professors have been full-professors for more than six years.

The average academic year salary for the 1,238 faculty members in the study was $78,282. At first glance, salaries for female faculty members appeared to lag behind those for male faculty members in the same academic rank and with the same amount of time in rank (Table 3). However, these summary statistics do not take into account disciplinary differences in salary unit.[1] In order to determine if there is *systemic* gender bias in salaries at Virginia Tech, the data were further analyzed.

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[1] For example, the Electrical Engineering faculty would be likely to earn higher salaries than the English faculty regardless of the gender composition of either faculty. This effect is compounded by the fact that some disciplines, particularly in science and engineering, have many more male than female faculty.

Table 3. Mean salaries of study population by rank and time in rank

| Rank | Time in Rank | Women | | Men | |
|---|---|---|---|---|---|
| | | Number[*] | Average Salary[**] | Number[*] | Average Salary[**] |
| Assistant Professor | Less than 3 years | 40 | $57,250 | 81 | $62,557 |
| | At least 3 years, but less than 6 years | 48 | $55,741 | 70 | $60,358 |
| | 6 years or more | 3 | $60,703 | 8 | $63,184 |
| | Total | 91 | $56,568 | 159 | $61,620 |
| | | | | | |
| Associate Professor | Less than 3 years | 31 | $68,633 | 70 | $68,288 |
| | At least 3 years, but less than 6 years | 29 | $67,596 | 72 | $69,757 |
| | 6 years or more | 53 | $66,448 | 176 | $70,247 |
| | Total | 113 | $67,342 | 318 | $69,705 |
| | | | | | |
| Professor | Less than 3 years | 15 | $75,640 | 74 | $83,784 |
| | At least 3 years, but less than 6 years | 17 | $78,343 | 73 | $83,421 |
| | 6 years or more | 23 | $82,472 | 248 | $89,107 |
| | Total | 55 | $79,332 | 395 | $87,059 |
| | | | | | |
| Eminent Scholars | Total | 7 | $104,956 | 100 | $127,054 |

[*]Number in population
[**]Average *academic year* salary of faculty members
 of the designated gender within the designated rank

*Analysis*

In standard salary equity study methodology, developing multiple models for predicting salaries is recommended.[2]  If the models produce similar results with respect to which variables have significant effects on salaries, then a certain measure of validity is afforded all of the models.  In that vein, multiple models were developed for the Virginia Tech data. However, this discussion is focused on two particular models developed.  The first model used multiple regression to analyze the effects of academic unit, academic rank, gender, tenure status, US citizenship, ethnicity, time in rank, time at Virginia Tech, and experience prior to joining VT on academic year salary.   The second model employed multiple regression as well, but academic rank and time in rank factors were removed from the analysis.

Model 1 – Full Model

As outlined in the Paychecks' methodology, a multiple regression model was developed with academic year salary as the predicted value (i.e., outcome variable).  Academic unit was included in the model as a set of dummy or indicator variables with the statistics department being the "reference" unit or the academic unit to which all other academic units are compared. Statistics was chosen because its mean was very close to the total University mean, so comparisons are roughly the same as comparing to the overall University average. Ethnicity was coded as a set of 4 dummy variables with Asian, African-American, nonresident alien, Latino/Native American/other and white, with "white" being the reference ethnicity.  Differences in academic rank were tested using 3 dummy variables; the rank of assistant professor was the reference rank.  Time in rank comprised 2 dummy variables with "less than 3 years" being the reference time in rank.  Binary variables included gender (reference gender was male), tenure status (reference status was tenured), and US citizenship (reference citizenship was US).  Using the SAS® statistics package, a regression model was generated and the program's output is provided in Appendix 2.  Nearly 80% of the variation in salaries was accounted for by the factors in the model (adjusted $R^2 = 0.79$).  Factors that were significant in explaining the variation in salaries included academic unit ($p < 0.0001$),

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[2] Haignere, L., ( 2002). Paychecks: A Guide to Conducting Salary-Equity Studies for Higher Education Faculty. Washington, D.C.: American Association of University Professors, p. 43.

academic rank (p < 0.0001), time at VT (p < 0.0001), experience prior to joining VT (p < 0.0001), tenure status (p < 0.0169) and time in rank (p = 0.0333). Gender was *not* significant in explaining differences in salaries, with women, on average making about $100 less than men with comparable rank, time in rank, and prior work experience in the same discipline.

There were few surprises in terms of which factors exercised a significant effect on salary. Work experience, tenure status and rank were all positively associated with salary. Work experience prior to joining Virginia Tech had a positive effect on salary, as did time working at Tech, especially for those who had worked here more than six years. Untenured faculty earned significantly less than tenured faculty. Finally, Eminent Scholars and full professors had significantly higher salaries than did assistant professors. However, associate and assistant professors did not demonstrate a significant difference—an indicator of salary compression. An interaction between gender and rank was included in a subsequent model to see whether rank might have a differential impact in male and female faculty groups. The interaction was not significant and so dropped from the model.

Disciplinary effects, while once again predictable, are still telling. Disciplinary comparisons were with Statistics, as that department's mean salary was close to the overall University mean. Salaries within Agriculture, Natural Resources and Architecture, tended to be lower than the comparison group/University mean, although differences did not always reach significance. Salaries within Engineering and especially Business were well above the mean. Humanities salaries were relatively low and those in educational fields were approximately equal to the campus mean. Disciplines within the College of Science varied, with, for example, Biology and Physics below the University mean, Geosciences, Math and Statistics (the reference group for this comparison) roughly at the mean and Economics and Chemistry roughly above the mean ('roughly' indicating that some of the differences are borderline in terms of significance.) Interestingly, Biology-based disciplines (Biochemistry, Biology, Biomedical Sciences, Biological Systems Engineering) tended to be significantly below the campus mean or just about equal to the mean. This pattern may reflect market factors, but combined with low to moderate salaries in agriculture and animal sciences, may also warrant further consideration in light of current aspirations to enhance NIH funding.

A general gender by discipline interaction was tested by adding a gender by college interaction to the model to examine whether gender might exercise differential effects by college. The interaction was not significant indicating compensation practices vis-à-vis gender are relatively similar across campus, and the interaction was removed from the model. Despite this, there were some differences in the direction of gender effects in several of the colleges, including science and engineering. Overall models carried out did not suggest any type of significant gender effects, but the lower parameter estimates and lower salary figures for women in a subset of colleges warrant further investigation which we can pursue over the next academic year.

Other variations of the model were undertaken to improve the explanatory power of the model and to enhance its accuracy. For example, an additional model included quadratic terms for the work experience variables to accommodate a possible non-linear relationship between experience and salary. Another model allowing for an interaction between academic rank and time in rank was developed because it seemed possible that full professors and Eminent Scholars who had been in rank for more than 6 years would receive larger salary increases than assistant or associate professors who had been in rank for more than 6 years. In both cases, the amount of salary variance explained was about the same or slightly less than in the original model, as was the pattern of significance for the individual factor effects, so we opted to stay with the simpler model for predicting academic year salaries.

Model 2 – Reduced Model

Prior research on salary equity has raised the question of whether men and women have different promotion patterns, with men being promoted to higher ranks more frequently and more quickly than women. If so, gender and rank variables are confounded and will mask at least part of the effect of gender in the model.  Concerned about this issue, colleagues at the University of Michigan developed a model that omits academic rank and time in rank as factors. In this way, all the variance attributable to the overlap in rank/time in rank and gender would accrue to gender and help uncover any effect that gender might exercise.  We decided to try the same approach and the output from the resulting model, model 2, is presented in Appendix 3.

Again, multiple regression techniques were used to develop a model that predicts academic year salary.  Once again, academic unit was included in the model as a set of dummy or indicator variables with the Statistics department being the "reference" unit or the academic unit to which all other academic units are compared.  Ethnicity was also included as a set of 4 dummy variables with "white" being the reference ethnicity.   Binary variables included gender (reference gender was male), tenure status (reference status was tenured), and US citizenship (reference citizenship was US).  As with Model 1, the SAS® statistics package was used to generate the regression.

Using the reduced list of factors, only 60% of the variation in salaries was accounted for by the factors in the model (adjusted $R^2$ = 0.60).  Thus the model's explanatory power decreased markedly when rank and time in rank were not in the model, indicating the importance of seniority in determining salary level.  Factors that were significant in explaining the variation in salaries included academic unit ($p < 0.0001$),  time at VT ($p < 0.0001$), experience prior to joining VT ($p < 0.0001$), and tenure status ($p < 0.0001$).  Gender, however, remained non-significant even when controlling for rank and time in rank. Thus model 2 simply proved to be a less acceptable version of model 1, not revealing any indication of gender effects in the absence of rank variables and explaining less variance overall.

*Data Quality Issues*

In this context it is appropriate to discuss one of the major limitations of the data used in the study. "Time in rank" was coded as a categorical variable with three possible levels: less than 3 years, at least 3 years but less than 6 years, and 6 or more years. This is in contrast to simply recording data as a continuous variable e.g., of 1 to 30 years. The three data categories were created to accommodate the loss of data that occurred with Administrative Information Systems' the conversion of the IMS computer system to the Banner data management system. When a faculty member has a change in rank, the date of that change is recorded in the Banner system. However, during the conversion to Banner, changes in ranks that occurred prior to January 1, 1997, were recorded as January 1, 1997. Therefore, a person who achieved professor rank in 1996 fell into the same category as a person who achieved professor rank in 1986. Data efforts are underway to collect data to remedy this problem and future analyses will incorporate more fine-grained, accurate data on years in rank.

*Conclusions*

Using a fairly restricted set of variables, two models of faculty salary were developed. Both models explained much of the variation in faculty salaries with adjusted $R^2$ values of 0.79 and 0.60. The Paychecks volume notes that, "most analyses of faculty salaries have adjusted $R^2$ values greater than .50, and values above .70 are common" (p.6). Therefore, the models developed in this analysis were considered adequate, at least as a starting point for the investigation. Importantly, gender effects on faculty salaries did not reach statistical significance despite several different statistical approaches to test gender as an individual effect and in interaction with other key factors like college and rank. Future work will examine the suggestion that some colleges may have more deeply–embedded gender-based

salary differentials.  More accurate years in rank data may help sharpen data patterns and clarify trends.

Women's compensation appears to be less the issue at this juncture than female representation in tenure-track ranks. Women have constituted about 20% to 22% of all full-time tenure-track/tenured faculty positions for the past five years at Virginia Tech. Thus, while women seem to be doing better at achieving parity with their male colleagues in pay, the relatively slow progress made in improving numbers of female faculty somewhat offsets this gain.  As encouraging as current findings may be, they do suggest that parity in salary must now be combined with parity in opportunity, with greater efforts to attract and retain female faculty.

Appendix 1.
Variables and Levels of Factors in Equity Study.

| Variable | Variable Name in Models | Number | Levels |
|---|---|---|---|
| Academic Rank Category | RANK | 250 | Assistant Professor |
| | | 431 | Associate Professor |
| | | 450 | Professor |
| | | 107 | Eminent Scholar[*] |
| | | | |
| Gender | GENDER | 266 | Female |
| | | 972 | Male |
| | | | |
| Race/ethnicity | MINORITY | 94 | Asian |
| | | 38 | African-American |
| | | 36 | Non-Resident Alien |
| | | 1043 | White |
| | | 27 | Other including Latino or Native American |
| | | | |
| Tenure Status | TENCODE | 278 | Pending Tenure |
| | | 960 | Tenured |
| | | | |
| US Citizenship Status | CITIZEN | 128 | Non-US Citizen |
| | | 1110 | US Citizen |
| | | | |
| Time in Rank[**] | YEARS_RANK_CAT | 313 | Less than 3 years |
| | | 321 | At least 3 years, but less than 6 years |
| | | 604 | 6 years or more |
| | | | |
| Academic Discipline | DEPT | 1238 | 66 unique department identifiers |
| | | | |
| Experience prior to VT | YEARS_PRE_VT | 1238 | Time between date of highest degree and hire date at VT |
| | | | |
| Time at VT | YEARS_AT_VT | 1238 | Time since most recent hire date at VT |
| Academic year salary | AY_SALARY | 1238 | Nine month salary |

[*]The Eminent Scholars Rank is not a true academic rank. All faculty members in the Eminent Scholars category held the rank of (full) professor.
[**]The data base does not have an accurate record of time in rank prior to 1997 when data was transferred from the IMS mainframe computer systems to Banner.

Appendix 2.
Regression Predicting Academic Year Faculty Salary

**Analysis for Untransformed AY Salary Values**
**MODEL 1 (All time variables entered as linear components)**

**The GLM Procedure**
**Dependent Variable: AY_SALARY**

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| Model | 79 | 553340278770.0 | 7004307326 | 60.47 | <.0001 |
| Error | 1158 | 134125623314.0 | 115825236 | | |
| Corrected Total | 1237 | 687465902084.0 | | | |

| Adjusted R-Square | Coeff Var | Root MSE | AY_SALARY Mean |
|---|---|---|---|
| 0.79177 | 13.74806 | 10762.21 | 78281.69 |

| Source | DF | Type III SS | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| DEPT | 65 | 139030100075.0 | 2138924617 | 18.47 | <.0001 |
| RANK | 3 | 121925055770.0 | 40641685257 | 350.89 | <.0001 |
| GENDER | 1 | 1689463.0 | 1689463 | 0.01 | 0.9039 |
| MINORITY | 4 | 433571048.2 | 108392762 | 0.94 | 0.4423 |
| TENCODE | 1 | 663085619.1 | 663085619 | 5.72 | 0.0169 |
| CITIZEN | 1 | 30881786.0 | 30881786 | 0.27 | 0.6057 |
| YEARS_RANK_CAT | 2 | 790412492.6 | 395206246 | 3.41 | 0.0333 |
| YEARS_PRE_VT | 1 | 20297840978.0 | 20297840978 | 175.25 | <.0001 |
| YEARS_AT_VT | 1 | 3561045775.5 | 3561045776 | 30.74 | <.0001 |

| Parameter | Estimate | | Standard Error | t Value | Pr > |t| |
|---|---|---|---|---|---|
| Intercept | 59278.77 | B | 3465.68 | 17.1 | <.0001 |
| DEPT ARECS - Combined | -12524.93 | B | 3623.54 | -3.46 | 0.0006 |
| DEPT Accounting & Inf | 32257.19 | B | 3813.41 | 8.46 | <.0001 |
| DEPT Aerospace and Oc | 11257.21 | B | 3805.63 | 2.96 | 0.0032 |
| DEPT Agricultural & A | -7242.42 | B | 3952.75 | -1.83 | 0.0672 |
| DEPT Agricultural & E | -11671.65 | B | 4810.80 | -2.43 | 0.0154 |
| DEPT Animal and Poult | -9346.30 | B | 3722.20 | -2.51 | 0.0122 |
| DEPT Apparel, Housing | -10313.60 | B | 4208.89 | -2.45 | 0.0144 |
| DEPT Architecture | -8570.86 | B | 3333.90 | -2.57 | 0.0103 |
| DEPT Art | -14362.96 | B | 4505.33 | -3.19 | 0.0015 |
| DEPT Biochemistry | -9067.92 | B | 3900.33 | -2.32 | 0.0202 |
| DEPT Biological Syste | 3816.29 | B | 4167.51 | 0.92 | 0.3600 |
| DEPT Biology | -7598.69 | B | 3405.79 | -2.23 | 0.0259 |
| DEPT Biomedical Scien | 484.94 | B | 3465.09 | 0.14 | 0.8887 |
| DEPT Building Constru | -4312.99 | B | 5327.73 | -0.81 | 0.4184 |
| DEPT Business Informa | 23660.35 | B | 3694.47 | 6.4 | <.0001 |
| DEPT COE Northern Vir | 14784.65 | B | 3969.26 | 3.72 | 0.0002 |
| DEPT Chemical Enginee | 11115.51 | B | 4364.36 | 2.55 | 0.0110 |

| | | | | | |
|---|---|---|---|---|---|
| **DEPT Chemistry** | 6121.30 | B | 3554.86 | 1.72 | 0.0853 |
| **DEPT Civil & Environm** | 10537.29 | B | 3377.14 | 3.12 | 0.0019 |
| **DEPT Communication St** | -11704.39 | B | 4246.87 | -2.76 | 0.0059 |
| **DEPT Computer Science** | 14750.01 | B | 3701.19 | 3.99 | <.0001 |
| **DEPT Crop & Soil Envi** | -11720.80 | B | 3661.50 | -3.2 | 0.0014 |
| **DEPT Ctr. for Interdi** | -7907.18 | B | 3964.99 | -1.99 | 0.0464 |
| **DEPT Dairy Science** | -9801.47 | B | 4347.99 | -2.25 | 0.0244 |
| **DEPT Economics** | 6864.14 | B | 4251.31 | 1.61 | 0.1067 |
| **DEPT Educational Lead** | -415.84 | B | 3773.94 | -0.11 | 0.9123 |
| **DEPT Electrical and C** | 10735.86 | B | 3222.48 | 3.33 | 0.0009 |
| **DEPT Engineering Fund** | -7119.62 | B | 4269.52 | -1.67 | 0.0957 |
| **DEPT Engineering Scie** | 9637.67 | B | 3580.64 | 2.69 | 0.0072 |
| **DEPT English** | -13791.49 | B | 3413.91 | -4.04 | <.0001 |
| **DEPT Entomology** | -13777.25 | B | 4156.62 | -3.31 | 0.0009 |
| **DEPT Finance, Insuran** | 28847.12 | B | 3877.15 | 7.44 | <.0001 |
| **DEPT Fisheries and Wi** | -8284.48 | B | 4241.27 | -1.95 | 0.0510 |
| **DEPT Food Science and** | 1137.73 | B | 4479.39 | 0.25 | 0.7995 |
| **DEPT Foreign Language** | -13403.73 | B | 3922.84 | -3.42 | 0.0007 |
| **DEPT Forestry** | -5455.18 | B | 3739.22 | -1.46 | 0.1449 |
| **DEPT Geography** | -6761.40 | B | 5619.78 | -1.2 | 0.2292 |
| **DEPT Geosciences** | 1934.69 | B | 3897.08 | 0.5 | 0.6197 |
| **DEPT History** | -11938.21 | B | 3733.21 | -3.2 | 0.0014 |
| **DEPT Horticulture** | -11372.66 | B | 4004.68 | -2.84 | 0.0046 |
| **DEPT Hospitality and** | 3737.21 | B | 4795.84 | 0.78 | 0.4360 |
| **DEPT Human Developmen** | -5189.69 | B | 3693.11 | -1.41 | 0.1602 |
| **DEPT Human Nutrition,** | -1304.79 | B | 3871.16 | -0.34 | 0.7361 |
| **DEPT Industrial and S** | 10565.57 | B | 3706.68 | 2.85 | 0.0044 |
| **DEPT Landscape Archit** | -9580.65 | B | 4791.08 | -2 | 0.0458 |
| **DEPT Large Animal Cli** | -1164.08 | B | 3727.15 | -0.31 | 0.7549 |
| **DEPT Management** | 16437.34 | B | 3906.57 | 4.21 | <.0001 |
| **DEPT Marketing** | 23543.84 | B | 4163.85 | 5.65 | <.0001 |
| **DEPT Materials Engine** | 11762.57 | B | 4793.95 | 2.45 | 0.0143 |
| **DEPT Mathematics** | 1618.99 | B | 3296.92 | 0.49 | 0.6235 |
| **DEPT Mechanical Engin** | 8706.33 | B | 3438.87 | 2.53 | 0.0115 |
| **DEPT Mining and Miner** | 15287.52 | B | 4790.82 | 3.19 | 0.0015 |
| **DEPT Music** | -16514.76 | B | 4173.70 | -3.96 | <.0001 |
| **DEPT Philosophy** | -6259.54 | B | 4481.68 | -1.4 | 0.1628 |
| **DEPT Physics** | -6177.84 | B | 3809.13 | -1.62 | 0.1051 |
| **DEPT Plant Pathology,** | -12991.24 | B | 4080.71 | -3.18 | 0.0015 |
| **DEPT Political Scienc** | -8626.50 | B | 4246.07 | -2.03 | 0.0424 |
| **DEPT Psychology** | -5888.85 | B | 3769.26 | -1.56 | 0.1185 |
| **DEPT School of Pub &** | -148.16 | B | 3692.95 | -0.04 | 0.9680 |
| **DEPT Science and Tech** | -12670.68 | B | 4797.45 | -2.64 | 0.0084 |
| **DEPT Small Animal Cli** | -4134.49 | B | 3735.72 | -1.11 | 0.2686 |
| **DEPT Sociology** | -9085.54 | B | 4025.29 | -2.26 | 0.0242 |
| **DEPT Teaching and Lea** | -2081.74 | B | 3437.02 | -0.61 | 0.5448 |
| **DEPT Theatre Arts** | -18344.44 | B | 4806.57 | -3.82 | 0.0001 |
| **DEPT Wood Science & F** | -4480.45 | B | 4257.19 | -1.05 | 0.2928 |

| | | | | | |
|---|---|---|---|---|---|
| **DEPT Statistics** | 0.00 | B | . | . | . |
| **RANK** 1 - Professor ES | 43766.47 | B | 2311.51 | 18.93 | <.0001 |
| **RANK** 2 - Professor | 13880.93 | B | 2051.48 | 6.77 | <.0001 |
| **RANK** 3 - Associate Pr | 170.41 | B | 1791.87 | 0.1 | 0.9242 |
| **RANK** 4 - Assistant Pr | 0.00 | B | . | . | . |
| **GENDER** F | -103.42 | B | 856.31 | -0.12 | 0.9039 |
| **GENDER** M | 0.00 | B | . | . | . |
| **MINORITY** Asian | -615.16 | B | 1276.99 | -0.48 | 0.6301 |
| **MINORITY** Black | 1897.41 | B | 1872.01 | 1.01 | 0.3110 |
| **MINORITY** NR Alien | 2363.64 | B | 2262.53 | 1.04 | 0.2964 |
| **MINORITY** Other | -2228.10 | B | 2170.90 | -1.03 | 0.3049 |
| **MINORITY** White | 0.00 | B | . | . | . |
| **TENCODE** P | -4135.40 | B | 1728.36 | -2.39 | 0.0169 |
| **TENCODE** T | 0.00 | B | . | . | . |
| **CITIZEN** N | 674.01 | B | 1305.32 | 0.52 | 0.6057 |
| **CITIZEN** Y | 0.00 | B | . | . | . |
| **YEARS_RANK_CAT** <br> 1 -- > 6 yrs | 2046.09 | B | 1095.62 | 1.87 | 0.0621 |
| **YEARS_RANK_CAT** <br> 2 -- 3-6 yrs | -469.67 | B | 906.27 | -0.52 | 0.6044 |
| **YEARS_RANK_CAT** <br> 3 -- < 3 yrs | 0.00 | B | . | . | . |
| **YEARS_PRE_VT** | 945.45 | | 71.42 | 13.24 | <.0001 |
| **YEARS_AT_VT** | 373.49 | | 67.36 | 5.54 | <.0001 |

# Appendix 3.
## Regression Predicting Academic Year Faculty Salary:
## Rank and Time in Rank Deleted from Model

**Analysis for Untransformed AY Salary values**

**Model 2 (All time variables entered as linear components)**

**The GLM Procedure**
**Dependent Variable: AY_SALARY**

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| **Model** | 74 | 431076046266.0 | 5825351977 | 26.42 | <.0001 |
| **Error** | 1163 | 256389855818.0 | 220455594 | | |
| **Corrected Total** | 1237 | 687465902084.0 | | | |

| Adjusted R-Square | Coeff Var | Root MSE | AY_SALARY Mean |
|---|---|---|---|
| 0.60366 | 18.96708 | 14847.75 | 78281.69 |

| Source | DF | Type III SS | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| **DEPT** | 65 | 216225189489.0 | 3326541377 | 15.09 | <.0001 |
| **GENDER** | 1 | 180531271.4 | 180531271 | 0.82 | 0.3657 |
| **MINORITY** | 4 | 1975944803.5 | 493986201 | 2.24 | 0.0627 |
| **TENCODE** | 1 | 3985556160.9 | 3985556161 | 18.08 | <.0001 |
| **CITIZEN** | 1 | 19235628.2 | 19235628 | 0.09 | 0.7678 |
| **YEARS_PRE_VT** | 1 | 76555798228.0 | 76555798228 | 347.26 | <.0001 |
| **YEARS_AT_VT** | 1 | 67183196177.0 | 67183196177 | 304.75 | <.0001 |

| Parameter | Estimate | | | Standard Error | t Value | Pr > |t| |
|---|---|---|---|---|---|---|
| **Intercept** | 51731.79 | | B | 4234.52 | 12.22 | <.0001 |
| **DEPT ARECS - Combined** | -11726.12 | | B | 4997.30 | -2.35 | 0.0191 |
| **DEPT Accounting & Inf** | 37608.06 | | B | 5243.33 | 7.17 | <.0001 |
| **DEPT Aerospace and Oc** | 17902.08 | | B | 5239.23 | 3.42 | 0.0007 |
| **DEPT Agricultural & A** | -2798.68 | | B | 5442.45 | -0.51 | 0.6072 |
| **DEPT Agricultural & E** | -12314.82 | | B | 6600.53 | -1.87 | 0.0623 |
| **DEPT Animal and Poult** | -6642.70 | | B | 5130.32 | -1.29 | 0.1956 |
| **DEPT Apparel, Housing** | -4435.05 | | B | 5788.66 | -0.77 | 0.4437 |
| **DEPT Architecture** | -7118.15 | | B | 4590.47 | -1.55 | 0.1213 |
| **DEPT Art** | -11035.12 | | B | 6190.82 | -1.78 | 0.0749 |
| **DEPT Biochemistry** | -11664.06 | | B | 5374.77 | -2.17 | 0.0302 |
| **DEPT Biological Syste** | 7409.13 | | B | 5741.32 | 1.29 | 0.1971 |
| **DEPT Biology** | -5455.92 | | B | 4690.59 | -1.16 | 0.2450 |
| **DEPT Biomedical Scien** | 1651.03 | | B | 4769.02 | 0.35 | 0.7293 |
| **DEPT Building Constru** | 9366.46 | | B | 7315.13 | 1.28 | 0.2007 |
| **DEPT Business Informa** | 37436.48 | | B | 5054.66 | 7.41 | <.0001 |
| **DEPT COE Northern Vir** | 15890.57 | | B | 5471.32 | 2.9 | 0.0037 |
| **DEPT Chemical Enginee** | 18363.76 | | B | 5999.79 | 3.06 | 0.0023 |
| **DEPT Chemistry** | 10475.70 | | B | 4897.75 | 2.14 | 0.0327 |

| | | | | | |
|---|---|---|---|---|---|
| **DEPT Civil & Environm** | 17468.33 | B | 4640.74 | 3.76 | 0.0002 |
| **DEPT Communication St** | -8763.04 | B | 5852.00 | -1.5 | 0.1345 |
| **DEPT Computer Science** | 17495.41 | B | 5101.51 | 3.43 | 0.0006 |
| **DEPT Crop & Soil Envi** | -6960.88 | B | 5043.59 | -1.38 | 0.1678 |
| **DEPT Ctr. for Interdi** | -7922.07 | B | 5460.51 | -1.45 | 0.1471 |
| **DEPT Dairy Science** | -7386.70 | B | 5989.59 | -1.23 | 0.2177 |
| **DEPT Economics** | 11004.47 | B | 5857.98 | 1.88 | 0.0606 |
| **DEPT Educational Lead** | -630.79 | B | 5199.26 | -0.12 | 0.9035 |
| **DEPT Electrical and C** | 15508.70 | B | 4436.35 | 3.5 | 0.0005 |
| **DEPT Engineering Fund** | -9846.84 | B | 5875.49 | -1.68 | 0.0940 |
| **DEPT Engineering Scie** | 15156.98 | B | 4926.40 | 3.08 | 0.0021 |
| **DEPT English** | -8871.02 | B | 4702.30 | -1.89 | 0.0595 |
| **DEPT Entomology** | -11838.45 | B | 5730.38 | -2.07 | 0.0391 |
| **DEPT Finance, Insuran** | 42016.50 | B | 5308.71 | 7.91 | <.0001 |
| **DEPT Fisheries and Wi** | -3557.04 | B | 5841.80 | -0.61 | 0.5427 |
| **DEPT Food Science and** | 5477.99 | B | 6164.95 | 0.89 | 0.3744 |
| **DEPT Foreign Language** | -11469.03 | B | 5404.12 | -2.12 | 0.0340 |
| **DEPT Forestry** | 2801.98 | B | 5137.78 | 0.55 | 0.5856 |
| **DEPT Geography** | -1834.66 | B | 7742.50 | -0.24 | 0.8127 |
| **DEPT Geosciences** | 5929.25 | B | 5371.02 | 1.1 | 0.2698 |
| **DEPT History** | -13675.49 | B | 5140.57 | -2.66 | 0.0079 |
| **DEPT Horticulture** | -9056.04 | B | 5522.23 | -1.64 | 0.1013 |
| **DEPT Hospitality and** | 8625.58 | B | 6594.90 | 1.31 | 0.1912 |
| **DEPT Human Developmen** | 641.43 | B | 5083.69 | 0.13 | 0.8996 |
| **DEPT Human Nutrition,** | -414.82 | B | 5324.44 | -0.08 | 0.9379 |
| **DEPT Industrial and S** | 17090.44 | B | 5097.37 | 3.35 | 0.0008 |
| **DEPT Landscape Archit** | -10744.17 | B | 6601.42 | -1.63 | 0.1039 |
| **DEPT Large Animal Cli** | 305.04 | B | 5130.38 | 0.06 | 0.9526 |
| **DEPT Management** | 20277.60 | B | 5366.89 | 3.78 | 0.0002 |
| **DEPT Marketing** | 31229.20 | B | 5727.24 | 5.45 | <.0001 |
| **DEPT Materials Engine** | 14472.48 | B | 6603.35 | 2.19 | 0.0286 |
| **DEPT Mathematics** | 3022.89 | B | 4544.70 | 0.67 | 0.5061 |
| **DEPT Mechanical Engin** | 15419.84 | B | 4729.72 | 3.26 | 0.0011 |
| **DEPT Mining and Miner** | 26515.05 | B | 6586.41 | 4.03 | <.0001 |
| **DEPT Music** | -23242.89 | B | 5736.78 | -4.05 | <.0001 |
| **DEPT Philosophy** | -2191.24 | B | 6172.44 | -0.36 | 0.7227 |
| **DEPT Physics** | -8350.70 | B | 5248.32 | -1.59 | 0.1119 |
| **DEPT Plant Pathology,** | -12706.65 | B | 5627.54 | -2.26 | 0.0241 |
| **DEPT Political Scienc** | -5936.43 | B | 5850.84 | -1.01 | 0.3105 |
| **DEPT Psychology** | -4654.83 | B | 5185.36 | -0.9 | 0.3695 |
| **DEPT School of Pub &** | 3187.04 | B | 5086.07 | 0.63 | 0.5310 |
| **DEPT Science and Tech** | -10259.86 | B | 6610.11 | -1.55 | 0.1209 |
| **DEPT Small Animal Cli** | -218.74 | B | 5146.20 | -0.04 | 0.9661 |
| **DEPT Sociology** | -9779.55 | B | 5550.13 | -1.76 | 0.0783 |
| **DEPT Teaching and Lea** | -2358.25 | B | 4732.76 | -0.5 | 0.6184 |
| **DEPT Theatre Arts** | -25828.98 | B | 6599.66 | -3.91 | <.0001 |
| **DEPT Wood Science & F** | 2687.55 | B | 5862.10 | 0.46 | 0.6467 |
| **DEPT Statistics** | 0.00 | B | . | . | . |

| | | | | | |
|---|---|---|---|---|---|
| **GENDER F** | -1066.21 | B | 1178.22 | -0.9 | 0.3657 |
| **GENDER M** | 0.00 | B | . | . | . |
| **MINORITY Asian** | 3684.03 | B | 1744.82 | 2.11 | 0.0349 |
| **MINORITY Black** | 2000.03 | B | 2579.70 | 0.78 | 0.4383 |
| **MINORITY NR Alien** | 5190.75 | B | 3089.33 | 1.68 | 0.0932 |
| **MINORITY Other** | -4018.26 | B | 2990.64 | -1.34 | 0.1793 |
| **MINORITY White** | 0.00 | B | . | . | . |
| **TENCODE P** | -5825.36 | B | 1370.06 | -4.25 | <.0001 |
| **TENCODE T** | 0.00 | B | . | . | . |
| **CITIZEN N** | 531.21 | B | 1798.36 | 0.3 | 0.7678 |
| **CITIZEN Y** | 0.00 | B | . | . | . |
| **YEARS_PRE_VT** | 1593.21 | | 85.50 | 18.63 | <.0001 |
| **YEARS_AT_VT** | 1122.42 | | 64.30 | 17.46 | <.0001 |