

**Analysis of Start-up Package Equity among Men and Women in STEM and SBE Fields at the
University of Virginia**

NSF ADVANCE Annual Report Project Year 2, June 1, 2014

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Executive Summary

In order to examine equity in start-up packages offered to male and female faculty in Science, Technology, Engineering, Mathematics (STEM), and Social and Behavioral Sciences (SBS) at the University of Virginia, offer letters were collected from the respective Associate Deans of the College of Arts and Sciences and the School of Engineering and Applied Science and analyzed on several variables.

The results of these analyses indicate that, while there are slightly lower monetary amounts offered to female faculty candidates when compared to male faculty candidates, there is no statistically significant difference in the start-up packages offered. This analysis reflects equity in these start-up packages in regards to salary at hire, moving expenses, research start-up funds, number of months of summer salary, and total start-up funds. A reduced teaching load for some period of time after hire, usually 1-3 years, was the only variable that differed significantly for men and women. Variability in the features of offers in different departments, such as graduate teaching or research assistants, laboratory renovations, and large equipment purchases did not allow for comparison of these features within the available data. Finally, future analysis would benefit from a standardization of offer letters across departments to include all of the same features, such as graduate student support and space allocation.

Analysis

Offer letters were collected for hires made in the targeted disciplines during the academic years of 2011-2012, 2012-2013, and 2013-2014. Table 1 outlines the departments were included in this analysis.

Table 1: Targeted STEM and SBE departments included in the start-up package analysis

College and Graduate School of Arts and Sciences	School of Engineering and Applied Science
Anthropology	Biomedical Engineering
Astronomy	Chemical Engineering
Biology	Civil & Environmental Engineering
Chemistry	Computer Science
Economics	Electrical and Computer Engineering
Environmental Science	Engineering and Society
Mathematics	Materials Science Engineering
Physics	Mechanical & Aerospace Engineering
Politics	Systems & Information Engineering
Psychology	
Sociology	
Statistics	

Once the offer letters were collected, each letter was carefully read to extract data pertinent to start-up packages. We created a database to include information related to salary at hire, hiring bonuses, moving expenses, months and rate of summer salary, laboratory renovations, teaching load reductions, assignment of graduate teaching and research assistants, research start-up funds, money allocated to hire staff or postdoctoral research associates, supplemental equipment purchase funds, and discretionary funds. Additional data was added to the database for analytical purposes, such as gender, race/ethnicity, College, department, tenure status, rank, Preliminary data were collected by the Office of the Provost, with additional letters collected for the purpose of this analysis. During the three academic years in which offer letters were collected in STEM and SBE fields, 120 offer letters were collected. Of these 120 offers, 84 were extended to males, while 33 were extended to females; three individuals are missing data regarding their gender. Table 2 highlights the representation of offers extended in the targets STEM and SBE departments.

Table 2: Offers extended to faculty in targeted STEM and SBE departments in the academic years 2011-2012, 2012-2013, and 2013-2014.

College and Graduate School of Arts and Sciences			School of Engineering and Applied Science		
Department	N	Percent	Department	N	Percent
Anthropology	6	5.0	Biomedical Engineering	4	3.3
Astronomy	1	0.8	Chemical Engineering	N/A	N/A
Biology	7	5.8	Civil & Environmental Engineering	14	11.7
Chemistry	6	5.0	Computer Science	9	7.5
Economics	14	11.7	Electrical and Computer Engineering	3	2.5
Environmental Science	1	0.8	Engineering and Society	4	3.3
Mathematics	9	7.5	Materials Science Engineering	N/A	N/A
Physics	3	2.5	Mechanical & Aerospace Engineering	11	9.2
Politics	9	7.5	Systems & Information Engineering	6	5.0
Psychology	3	2.5			
Sociology	4	3.3			
Statistics	6	5.0			

N/A indicates that no offer letters were extended during the time frame of this analysis.

In regards to the tenure status of individuals who were offered positions, 81 individuals were offered tenure-track positions, 22 individuals were offered tenured positions, and 17 individuals were offered non tenure-track positions. Of the tenure-track positions, all 81 were at the Assistant Professor level. Associate Professors represented 12 of the tenured positions, while 10 were Professors. Lecturers

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(9), Research Assistant Professors (4), Instructors (1), and Other positions types (3) comprised the individuals who were offered non tenure-track positions. These data include offers made to faculty to begin employment over a 5 year period. Table 3 presents the proposed hire date of faculty who were offered positions at the University of Virginia.

Table 3: Anticipated start date of faculty offered positions in STEM and SBE fields.

Year	N	Percent
2011	2	1.7
2012	9	7.5
2013	37	30.8
2014	47	39.2
2015	3	2.5

Finally, this analysis included 83 individuals were eventually hired, 8 individuals whose hiring status is pending a background check, and 28 individuals who declined their offer. Data regarding the hiring status was missing for one individual. It should be noted that offer letters for individuals who declined offers were only included for those with a proposed 2014 start date.

We completed several analyses to examine equity in start-up packages among prospective male and female faculty members. In order to account for possible differences in results based on imbalanced samples of men and women in the data, we first conducted the analyses comparing the scores of all of the women in the sample against an equal sized group of randomly selected men. In addition, in order to test whether the data for accepted offers differed from all offers (accepted or declined), we executed the analyses utilizing only those individuals who accepted offers of employment. In both cases, no differences in the results were observed. Thus, the analyses presented in this report included all 120 individuals.

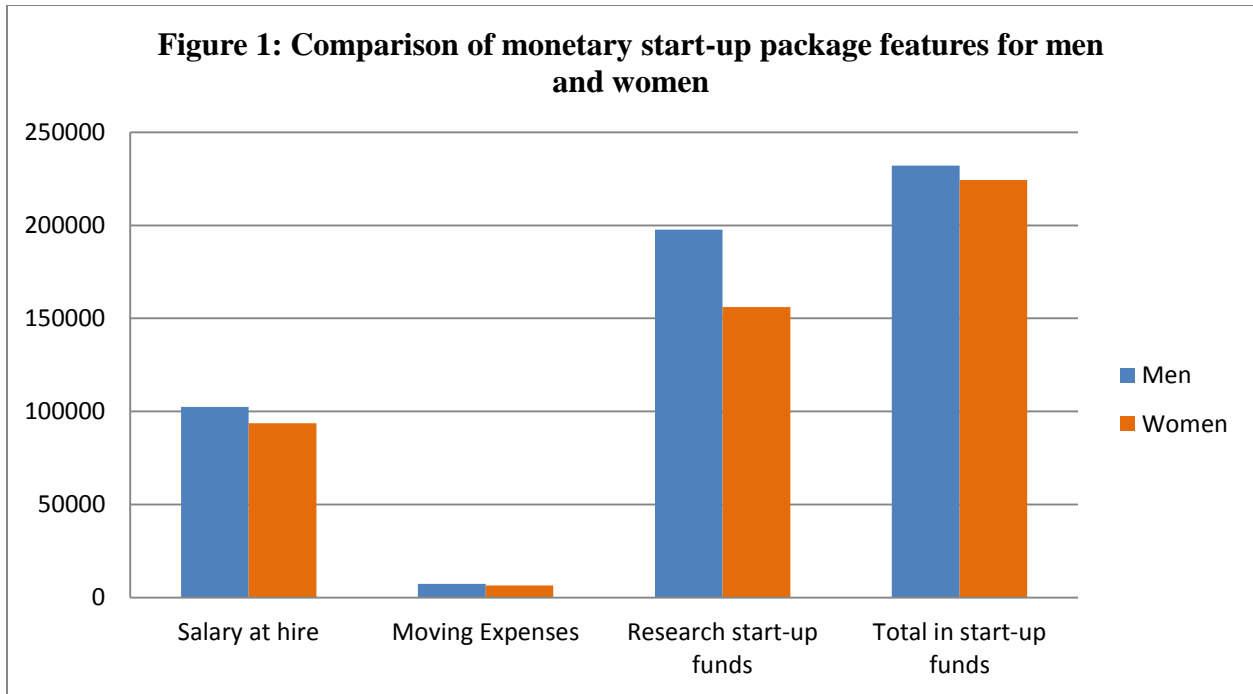
However the sample did vary for different features of the start-up packages. While the offer letters analyzed in the study included a variety of features listed above, we focused on six features that were most consistently included in offers across a variety of disciplines, and thus contained the least amount of missing data. Table 4 outlines the results of *t*-tests that were calculated to determine if discrepancies existed between the start-up packages offered to male and female offers.

Table 4: Mean differences in start-up package offered resources by gender

	Men			Women			<i>t</i>	Sig	Eta sq
	Mean	Std Dev	N	Mean	Std Dev	N			
Salary at hire	102,478.13	38,837.56	80	93,661.29	35,535.52	31	1.10	NS	
Reduced teaching load (1=Yes; 0=No)	0.79	0.41	71	0.59	0.50	27	1.82	0.08	0.03
Moving Expenses	7,525.42	3,645.29	59	6,583.33	2,842.48	24	1.13	NS	
Research start-up funds	197,604.84	265,138.63	62	156,046.00	172,881.52	25	0.72	NS	
Number months summer salary	4.28	1.60	58	4.47	1.35	19	-0.49	NS	
Total in start-up funds	232,067.65	300,625.72	84	224,232.76	29,650.43	33	0.13	NS	

Note: .03 eta squared value indicates small effect size

As noted in Table 4, men and women faculty who were offered positions only statistically varied in relation to a reduced teaching load. However, the effect size of this difference is small. Men were offered reduced teaching loads for some period of time more often than women. Figure 1 displays the mean values for the four monetary variables comparing men and women. While the monetary value of all of these start-up package features is lower for women than men, these are not statistically significant.



We also compared the start-up package features of men and women while controlling for the tenure status of the position. The results of this analysis indicates that there are no statistically significant differences in salary at hire, moving expenses, reduced teaching lead, research start-up funds, or total start-up funds. These results are displayed in Table 5.

Table 5: Adjusted means for offered start-up packages, controlling for tenure-track status and tenured status

	Men			Women			<i>F</i>	Sig	Eta sq
	Mean	Std Dev	N	Mean	Std Err	N			
Salary at hire	105,706.70	2,893.73	69.00	102,534.05	4,476.95	29	0.35	NS	
Reduced teaching load (1=Yes; 0=No)	NA	NA	NA	NA	NA	NA	NA	NA	
Moving Expenses	7,630.24	434.59	57.00	6,836.51	675.44	24	0.96	NS	
Research start-up funds	197,326.91	31,329.25	62.00	157,224.24	50,716.77	24	0.45	NS	
Number months summer salary	4.29	0.20	58.00	4.45	0.37	18	0.13	NS	
Total in start-up funds	281,372.49	36,893.01	70.00	228,476.32	56,568.85	30	0.61	NS	

Note: "NA" results indicate a violation of assumptions of equality of variance during the analysis.

Tenure-track status: 1=Tenured/tenure-track; 0=Non-tenure-track

Tenured status: 1=Tenured; 0=Untenured, but on tenure-track

Finally, we calculated a binary logistic regression model to determine if any of these six selected features of start-up packages are predictive of the likelihood of the offer being made to a man or a woman. As noted in Table 6, this model is not significant.

Table 6: Logistic regression model tests and pseudo R-square results:

	Sig or R ²
Omnibus tests of model coefficients	0.63
Hosmer and Lemeshow test	0.155
Cox & Snell R square	0.069
Nagelkerke R square	0.104

The start-up package features examined in this analysis were not predictive of the likelihood of the offer being made to a man or woman. These results are included in Table 7.

Table 7: Logistic regression predicting likelihood of gender differences in start-up packages

	B	S.E.	Wald	df	Sig	Odds Ratio
Salary at hire	0.00	0.00	0.52	1.00	NS	1.00
Reduced teaching load (1=Yes; 0=No)	0.92	0.93	0.98	1.00	NS	2.50
Moving Expenses	0.00	0.00	1.39	1.00	NS	1.00
Research start-up funds	0.00	0.00	0.17	1.00	NS	1.00
Number months summer salary	0.39	0.31	1.54	1.00	NS	1.47
Total in start-up funds	0.00	0.00	0.51	1.00	NS	1.00

The results of these analyses indicate that, while there are slightly lower monetary amounts offered to female faculty candidates when compared to male faculty candidates, there is no statistically significant difference in the start-up packages offered. This analysis reflects equity in these start-up packages in regards to salary at hire, moving expenses, research start-up funds, number of months of summer salary, and total start-up funds. A reduced teaching load for some period of time after hire, usually 1-3 years, was the only variable that differed significantly for men and women. Variability in the features of offers in different departments, such as graduate teaching or research assistants, laboratory renovations, and large equipment purchases did not allow for comparison of these features within the available data. Finally, future analysis would benefit from a standardization of offer letters across departments to include all of the same features, such as graduate student support and space allocation.