Final Report of the Faculty Senate Council Gender Pay Equity Committee

May 15, 2012

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Executive Summary

The committee was given two charges: (i) replicating the analyses in the 2010 Report on Gender Pay Equity using current data from the 2011-12 academic year; and (ii) deciding whether the models developed in the prior report should be adjusted in some way and making recommendations for the future.

Focusing on the first charge, the committee selected 6 models used in the 2010 Report and asked that the models be re-run using 2011-12 data on salaries for tenure stream faculty on the Danforth Campus. For a variety of reasons, it was impossible to exactly replicate the prior methodology using the new data. The report that follows details the difficulties with replicating the models and the choices made in these situations. It also identifies some potential problems with the models that warrant further study and may call for adjustments in the models used.

The principal finding of the study is that after controlling for discipline group, rank, experience level, and administrative role:

- Women's salaries are on average higher than men's in several models in multiple schools on the Danforth campus.
- Men's salaries are on average higher than women's in several models in multiple schools on the Danforth campus.
- The statement in the 2010 report that there is a "persistent pattern of gender differences in pay" in all schools on the Danforth Campus is not true for the analysis of the 2011-12 data.

Specific findings include:

- For the Brown School of Social Work and the Fox School of Design & Visual Arts, the gender differences are positive in all models, suggesting that after controlling for rank, experience level and administrative role, women's salaries are on average higher than men's in these schools.
- For the School of Engineering and Applied Science, the gender differences are positive in all models in which 6 individuals are coded as having additional administrative roles. For models in which 15 individuals are coded as having additional administrative roles, the gender differences are negative for five of the six models. The first set of models has higher adjusted R^2 values than the second set of models.
- For the Olin School of Business, three models have positive gender coefficients for women and three have negative coefficients, suggesting that after controlling for rank, experience level and administrative role, women's salaries are on average close to the same as men's.
- For Arts & Sciences, models were run with 5 (as was used in the 2010 report) and 8 discipline groups. Using 8 discipline groups, the gender coefficient was negative for all six models, but smaller in magnitude than for 2008-09 data. Using 5 discipline groups, the gender coefficient was negative for all six models. The magnitude of the

coefficient was larger than for 2008-09 data for three of the models, smaller in two of the models, and unchanged in one model.
- For the Law School, the gender coefficient was negative for all six models. The magnitude of the coefficient was larger than for 2008-09 for three of the models and smaller for three of the models.
- The "fit" of these models varied greatly, with the adjusted R^2 value for all schools except Law falling in the 0.66-0.92 range. The models for the Law School have adjusted R^2 values ranging from 0.29 to 0.43.

These results are subject to several caveats.
- The 2010 Report did not report statistical significance of the gender coefficients, and, in keeping with our charge to replicate the prior methodology, we have not done so either. (The 2010 Report explained that it did not report statistical significance because the analysis was performed on a complete population rather than a sample of a population.) For the current data, with one exception, all of the differences for all models are within one standard error, which suggests uncertainty about the magnitude (and sometimes the direction) of any gender differences observed.
- For several of the schools, the number of faculty members is small (e.g. Brown (37), Law (43), and Fox (44)), which means that the addition or exclusion of a single faculty member can potentially change the results. The small numbers also mean that it is difficult to draw strong conclusions from the analyses. This difficulty is compounded in the Law School due to the much lower adjusted R^2 values than for other schools. In addition, the small numbers mean that decisions regarding which individuals to exclude from the analysis could also change the results.
- The results of the analyses are sensitive to the assumptions in the model. For example, for Arts & Sciences, it is not clear whether faculty should be divided into 5, 8, or some other number of discipline groups, and the magnitude of the gender coefficient varies depending upon this choice.
- As detailed in the report, committee members had concerns about whether the models appropriately account for administrative roles for which faculty may or may not be compensated. In general, a higher proportion of men took additional roles with additional pay (70% in Arts & Sciences; 93% in Engineering; 70% in the Brown School; 100% in Olin) than women, except in the Fox School for which 100% of additional roles were taken by women faculty. How these administrative roles are treated can also affect the results. For example, for the School of Engineering, if 6 individuals are coded as having administrative roles, the results suggest that women are paid more than men. If 15 individuals are coded as having administrative roles, the results of 5 of the 6 models suggest that women are paid less than men.
- All of the models take rank as a given. If there are gender differences in promotion and retention, real differences in pay attributable to gender will be masked in the models used in this report.

The committee recommends continued monitoring of gender pay equity as part of "an on-going examination of University practices relating to diversity and gender equality." (2010 Gender Pay Equity Committee Final Report)

I. Introduction

Under the auspices of the Faculty Senate Council, there has been a sequence of studies over the past twenty five years on whether salaries differ systematically between men and women faculty. Every prior study has noted a difference in faculty salary indicating that after controlling for area, rank, and years of experience, women are paid on average less than men. The studies prior to 2010 reported statistical significance. In 2000, the committee wrote:

> "We conclude that for the Schools of Arts & Sciences, Art, Architecture, Business, Engineering and Applied Science, Law, and Social Work, our analyses give no statistically significant evidence of gender bias in the setting of salaries."

The 2010 committee made several changes in the types of analyses done of faculty salaries, ultimately reporting the results of between 6 and 12 different models for each of the schools. The 2010 report did not report statistical

significance for the results of the models on the basis that the analyses were performed on a complete population rather than a sample of a population. That committee wrote:

> "In every model the gender coefficient was negative indicating that after controlling for discipline group, rank and experience level, women on average are paid less than men in all schools on the Danforth Campus."

and:

> "The persistent pattern of gender differences in pay revealed by this study warrants further close attention as part of an on-going examination of University practices relating to diversity and gender equality."

The charge for the gender pay equity committee was set by Heather Corcoran, chair of the Faculty Senate Council in two parts: (i) using current data (2011-2012, AY12) from the Provost's office, conduct the same analysis that was used for the last gender pay equity report in order to allow for reasonable comparison between 2008-2009 (AY09) and now; (ii) decide if that model should be adjusted in some way, and make recommendations for the future.

The committee met regularly, with a focus on the first charge. Between meetings, Lynn McCloskey and Tao Zhang ran the analyses that the committee requested. The committee is grateful for their diligence in responding to all requests. The committee members did not see actual salaries of individuals; Lynn McCloskey and Tao Zhang had direct access to all data. All salaries were adjusted to an equivalent nine month salary.

For a number of reasons, the analysis of the AY09 faculty salary data could not be exactly replicated. Most obviously, there have been changes in the composition of the faculty, and in particular, changes in the number of type of additional roles assigned to faculty. In addition, the method of adjusting salaries so that the numbers are comparable across individuals needed to be adjusted to reflect the practices of different schools. In addition, a few coding errors were discovered in the AY09 data which were corrected. These issues are discussed in greater detail in the relevant section of the study description below.

II. Framing the Study: Population Selection, Salary Calculation, and Independent Variables

Population: The tenured and tenure track populations for analysis were selected using similar rules for AY09 and AY12. The faculty population for analysis in this study includes tenured and tenure track faculty who were here on November 1, 2011 and whose primary role is regular faculty. Tenured persons in full-time administrative roles such as provost and chancellor are excluded from the analysis. The study includes faculty on leave. Faculty with joint appointments across schools were included only in the school with their primary (>50% FTE) appointment, with one exception. One person holding a joint appointment split 51%/49% across two schools was included in the analysis for both schools for both studies. The population is summarized in Table 1.

Some faculty members were excluded from the analysis, following the approach used by the previous committee. Deans were excluded for all schools (seven in AY09, and nine in AY12; these nine include the six deans of the schools, the deans of art and architecture, and the dean of the graduate school of arts and sciences); former deans who have returned to regular faculty roles were also excluded (two in AY09 and two in AY12). Seven faculty members in AY09 and six in AY12 were excluded due to special circumstances. The six faculty members excluded from analysis of the AY12 data included three faculty members who are not currently functioning in a full time faculty role on the Danforth Campus; one faculty member who could be regarded as having a unique salary market; and two faculty members who hold positions with salaries set by the central fiscal unit rather than a school.

A total of seventeen faculty members were excluded from the AY12 analysis: fourteen men and three women. Sixteen were excluded from the AY09 analysis.

	2008-09				2011-12			
School	**Men**	**Women**	**Total**	**Additional Roles**	**Men**	**Women**	**Total**	**Additional Roles**
Arts & Sciences	271	110	381	52	264	111	375	53
School of Engineering & Applied Science	73	8	81	6	66	7	73	15(6)*
Olin Business School	47	10	57	7	52	15	67	11
School of Law	25	20	45	10	21	22	43	13
Sam Fox School of Design & Visual Arts	24	14	37	3	26	18	44	5
George Warren Brown School of Social Work	17	15	32	12	16	21	37	10
Total	**457**	**177**	**633**	**90**	**445**	**194**	**639**	**98**

Table 1. Population for the comparative studies, AY09 and AY12. The number of faculty with additional roles in Engineering and Applied Science is discussed below.

Calculation of Total 9-Month Salary: Salary was defined as total 9-month salary. For faculty holding 12-month contracts, the 12-month salary was adjusted to 9-month equivalency. The computation of income was the same in AY12 as in AY09, except that the 12 to 9 month adjustment was uniformly 9/12 in AY09 but changed to 9/11 for the business school in AY12 to match their actual practice. One error in the AY09 calculation pertaining to a 12-month salary misinterpreted as a 9-month salary was detected and correctly calculated for AY12.

The data collection process for the five smaller schools changed slightly. In AY09, schools were given a list of faculty with total WU salary and were asked to (a) designate the length of contract, (b) designate the portion of total salary regarded as stipend for an additional role and (c) provide any missing degree or start dates. In AY12, the schools were given a similar list of their faculty, but with additional fields showing human resources information for length of contract and for secondary appointments associated with additional pay and were asked to clarify areas of uncertainty. Thus, the schools received additional prompts to better ensure that these elements were consistently examined and coded.

Faculty with Additional Administrative Role: For both the AY09 and AY12 studies, a variable was included to capture whether a faculty member had an additional administrative role with additional pay beyond their normal faculty duties. The number of faculty coded as having an additional role is reported in Table 1. This attribute was assigned to all faculty performing an additional role that carried with it a discrete stipend—i.e. faculty members whose salaries would decrease if they gave up their additional roles. However, due to the large number and variety of additional roles taken on by faculty, it was challenging to code this attribute consistently across schools and across time. Many of these additional roles are within departments as chairs, associate chairs, and program directors, but some cross departmental and school boundaries. In addition, there have been changes in the number of administrative roles and how schools compensate for these roles since the last study. These changes make it difficult to replicate exactly the analysis of the AY09 data using AY12 data.

In engineering, for example, there are 15 faculty in AY12 identified as having additional roles using the same definition applied in the 2010 study, but arguably not all of the 15 additional roles are comparable to the six positions coded as "additional roles" in the 2010 study. We report the results of two analyses for engineering, one coding the same 6 as in the AY09 data as having aditional roles and one coding 15 such individuals.

The compensation for additional roles also raised some questions. Some additional roles are not associated with additional pay, as they may be part of regular faculty service or be compensated with course relief. For those additional roles that have additional pay, not all cases have clearly separable amounts specified for the additional role. That is, the additional role pay may be combined into total faculty salary, paid as summer salary or identified by a discrete amount for the additional role appointment. For each faculty member flagged as having an additional role the stipend for that role had to be determined, and 9/12 of the additional stipend was added to the regular 9-month salary base.

For the AY12 analysis, all additional roles associated with a discrete stipend were assigned the additional role attribute for Arts & Sciences, Business, Fox School and Law. Two schools were exceptions to this guideline, Engineering and Social Work, for which the committee chose to follow the additional role assignment used in AY09 for the purpose of comparability across time.

Arts & Sciences Discipline Groups: Five discipline groups were used for the AY09 analysis based upon the design of the previous study; the question of Arts & Sciences discipline groups was not assessed by the 2010 Faculty Senate Council Pay Equity Committee. Following the 2010 Pay Equity Committee Report, Arts & Sciences presented a rationale for eight discipline groups and that case was brought to the 2012 Pay Equity Committee, along with additional evidence about national discipline differences in faculty salaries. The analyses reported here were run using both 5 and 8 discipline groups for the AY09 and AY12 data.

Corrections: During the data cleaning process it was discovered that there were some errors in the AY09 data in the variables "years since terminal degree" and "years at Washington University on tenure track" for faculty who had previously been employed at the university in other roles. These errors were corrected for AY12 data. In addition, the AY09 analysis reported here for comparison purposes is restated to reflect these corrections.

III. Summary Results and Observations

Shown below in Figures 1 and 2 are charts summarizing the AY12 analysis and comparing the results to the AY09 analysis for each school. Figure 1 uses the natural logarithm of salary as the dependent variable. Figure 2 uses salary in dollars as the dependent variable. The three models are labeled D1, D2, and D3 and were used in the AY09 analysis. Model D1 includes variables for:

- Years since terminal degree and years since degree squared
- Years at Washington University on the tenure track and years at WU squared
- Four rank titles: assistant, associate, full, and endowed professor [in the law school only 3 rank variables are used: associate, full and endowed professor to reflect actual practice]
- Under-represented minority
- Discipline group or department (as appropriate)
- Additional administrative role with additional pay

Model D1 predicts salaries based on all faculty, then examines the differences between the average residual for men and the average residual for women.

Model D2 includes the same variables and an additional indicator variable for female faculty and reports the coefficient. Model D3 is the same as model D2 except that it replaces the four measures of time with a single time variable—that is, the ratio of years at Washington University on the tenure track divided by the number of years since terminal degree. As for model D2, the coefficient for the female faculty variable is reported.

In Figure 1, we note that using models to explain log salary, for Social Work, Engineering, Business, and the Fox School, the residuals for women (and the coefficient for women) in the models are positive, indicating that on average women are paid more than men after controlling for the other variables. For Arts & Sciences and the School of Law, the residuals and gender coefficients are negative.

Figure 2 summarizes the models using salary in dollars. For these models, for the Brown School, Engineering and Applied Science, and the Fox School, the residuals for women (and the coefficient for women) in the models are positive, indicating that on average women are paid more than men after controlling for the other variables. For Arts & Sciences, the Olin School and the Law School, the residuals and gender coefficients are negative. The models for log salary had higher adjusted R^2 values than the models for salary in dollars.

Figure 3 shows the results of additional analyses for Arts and Sciences and Engineering. For Arts and Sciences, Figure 3 shows the results using the same 5 discipline groups used in the 2010 study. The gender coefficients are negative for all models.

For Engineering and Applied Science, Figure 3 shows the results of the analysis in which 15 individuals are coded as having additional administrative roles in AY12 and 6 individuals are so coded in AY09. There were no other individuals meeting the definition for faculty with additional roles in AY09. In five of the six models, the gender coefficient is negative. The adjusted R^2 values are all lower than for the models assigning the additional role variables to only the 6 individuals so identified in 2010.

In 21 of the 36 models in Figures 1 and 2 and in one of the 12 models in Figure 3, the gender coefficient was positive. These results suggest that the statement in the 2010 report that there is a “persistent pattern of gender differences in pay” in all schools on the Danforth Campus is not true for the analysis of the 2011-12 data.

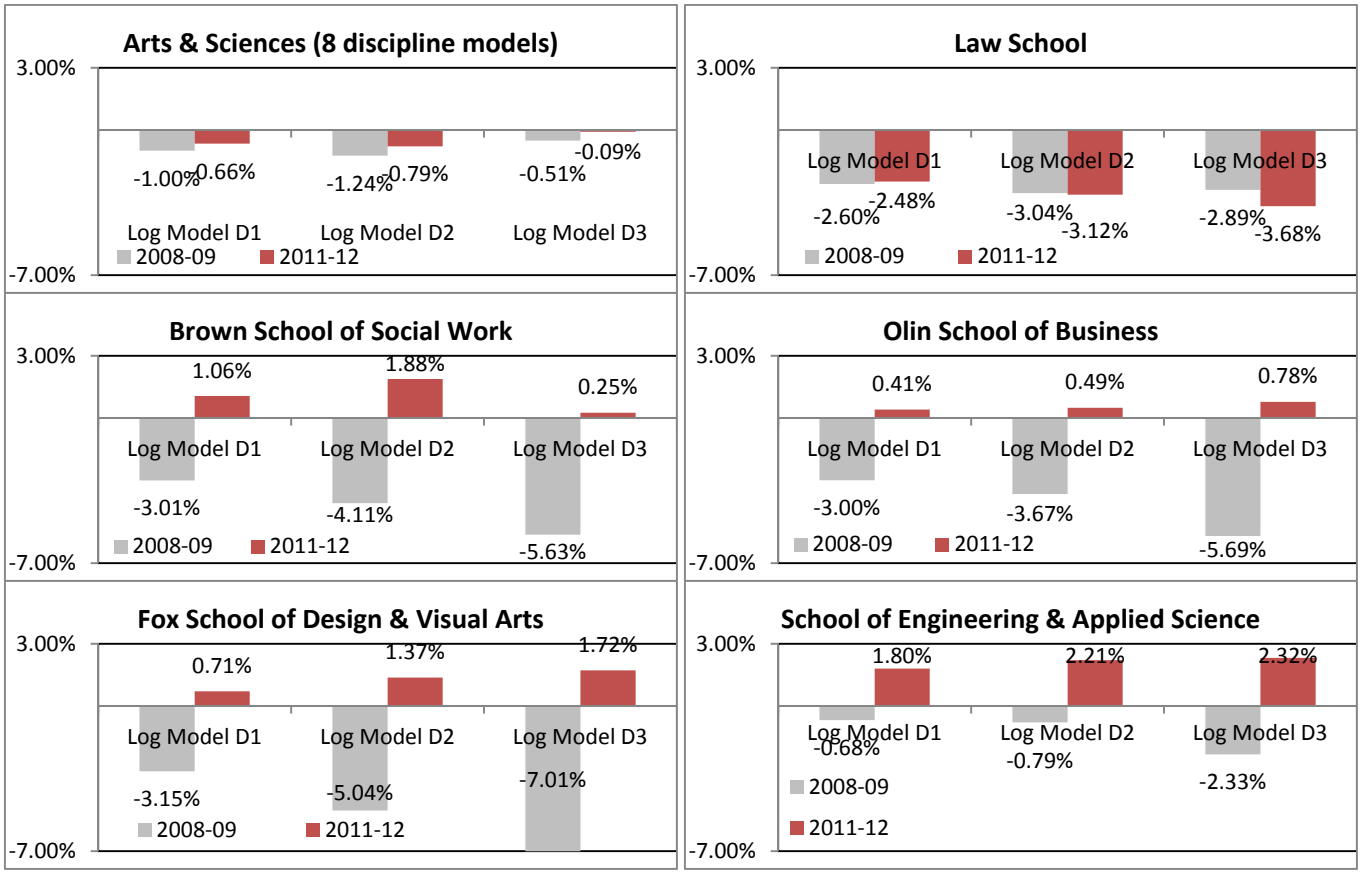

Figure 1. Comparison of gender pay differences using salary data from AY09 and AY12, on a percentage basis.

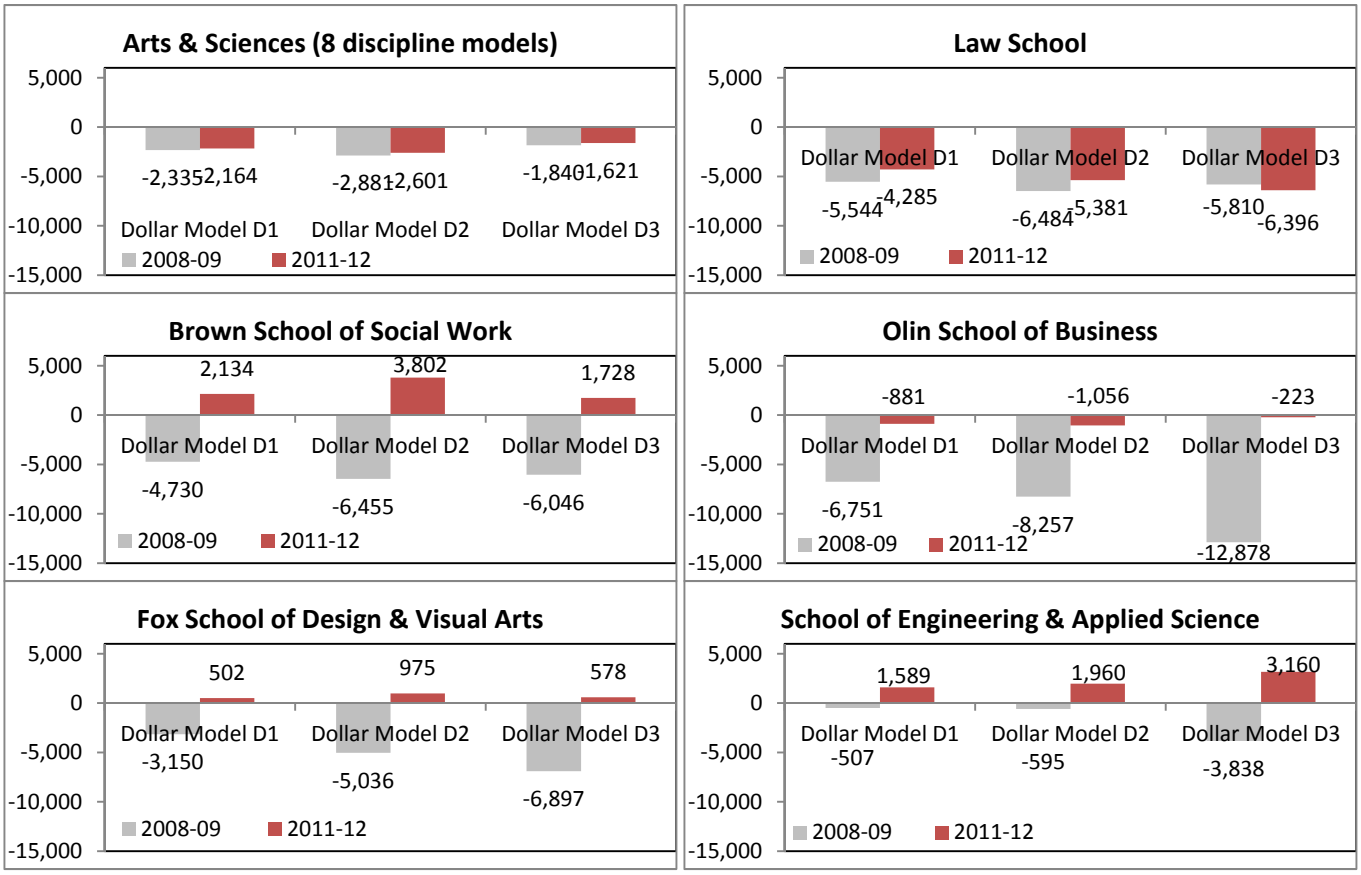

Figure 2. Comparison of gender pay differences using salary data from AY09 and AY12, on a dollar basis.

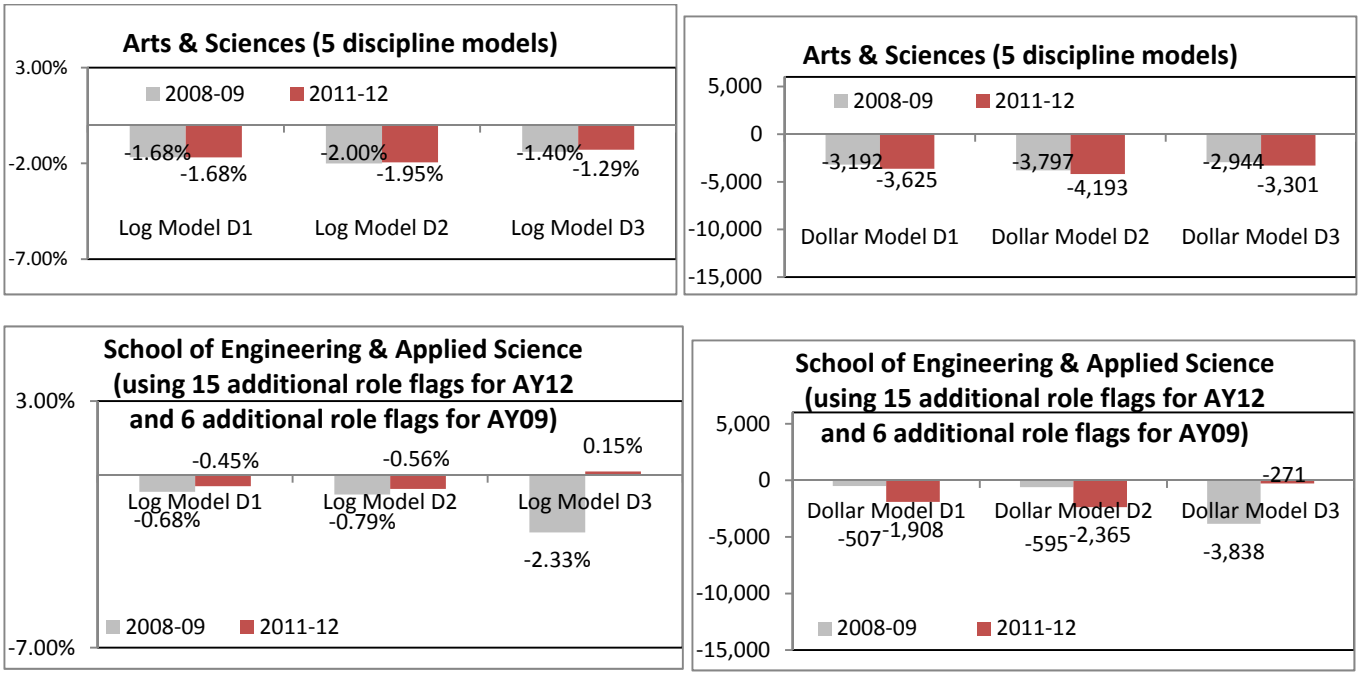

Figure 3. The top two graphs show the AY09 and AY12 results of log and dollar models using five discipline groups in Arts and Sciences. The bottom two models show the AY09 and AY12 results of log and dollar models for Engineering and Applied Science using 15 additional role flags for AY12 and 6 additional role flags for AY09.

Limitations of the study

The committee, following previous committees, started with a model developed for Arts & Sciences and then applied that model, with some adjustments, to the other schools. There are several limitations to this approach. Most obviously, the other schools are smaller and may set salaries by different methods.

In addition, the administrative roles are necessarily different in different schools. The committee tried to use a uniform definition of additional roles, but found this definition was challenging to apply and did not necessarily capture relevant differences in role that might affect salary. Using different definitions of additional roles or a different method of accounting for how they are compensated may change the results. For example, for the School of Engineering and Applied Science, if 6 individuals are coded as having administrative roles, the results suggest that women are paid more than men. If 15 individuals are coded as having administrative roles, the results of 5 of the 6 models suggest that women are paid less than men.

There are clearly gender differences in the composition of deans and former deans. To the extent that deans are paid more than faculty, excluding them from the analysis means that this source of gender difference will not be observed in the data.

This study does not include direct measures of productivity or quality. The methodology does not attempt to capture directly how salaries are set by deans. Thus, the models say nothing about the salary of any individual. They are meant to capture the variability in the ensemble of salaries within a school.

Three of the schools on the Danforth campus have less than fifty faculty members (Brown (37), Law (43), and Fox (44)), so there is the real possibility that including or excluding a few faculty members may change the sign of the gender difference, potentially impacting the conclusions. The committee was not in uniform agreement in all cases about which faculty members should be excluded; in this analysis, faculty were excluded based on the criteria for exclusion used in the 2010 study rather than revisiting the criteria for exclusion. The small numbers also mean that it is difficult to draw strong conclusions from the analyses. This difficulty is compounded in the Law School due to the much lower adjusted R^2 values than for other schools.

The 2010 Report did not report statistical significance of the gender coefficients, on the basis that the analysis was performed on a complete population rather than a sample of a population. For the current data, with one exception, all of the differences for all models are within one standard error, which suggests uncertainty about the magnitude (and sometimes the direction) of any gender differences observed.

The results of the analyses are sensitive to the assumptions in the model. For example, for Arts & Sciences, it is not clear whether faculty should be divided into 5, 8, or some other number of discipline groups, and the magnitude of the gender coefficient varies depending upon this choice.

The methodology reported here does not address promotion rates, even though historically rank has been an important predictor of salary. If there are gender differences in promotion, real differences in pay attributable to gender will be masked in the models used in this report, all of which take rank as given. For example, if women are promoted to full professor at much lower rates, women would receive substantially less pay due to gender differences, but the models, which control for rank, might show that men and women are paid equally.

IV. Suggestions for Further Work

The committee recommends that any future gender pay equity committee under the auspices of the faculty senate council not be restricted to repeating the methodology used in previous studies. As discussed above, inevitable changes in the composition of faculty and their roles make exact replication impossible, and the effort to repeat the prior analysis may lead to the use of less than optimal models given the new situation. For example, the appropriateness of excluding certain faculty members from the analysis may change over time, and those decisions should be made in light of current circumstances.

The committee did not revise the models from the 2010 study to address potential problems that it identified. Instead, this section outlines areas that the committee believes require further study and may warrant adjustments of the model.

Chair, Director and other Additional Roles need further study

Two key and interrelated issues of concern in the salary analysis that the committee identified were: (1) additional roles that faculty members assume and (2) compensation for additional roles that faculty members assume. For the analysis these roles were defined as *"…any joint administrative role that contributes to total academic year salary. This variable flags persons who hold a joint role that contributes to total salary; it does not matter whether the additional amount is designated separately as a stipend or combined in setting the annual salary. Typically this means that if the person gave up the joint role and remained a member of the faculty, their salary would be reduced."* Two interrelated concerns arose. First, it is possible that some faculty members assumed significant additional administrative responsibilities for which they were not compensated; as such, these additional responsibilities were not designated as "additional roles" in the analysis. It is possible that gender differences exist in the frequency with which these additional responsibilities were compensated. Second, flagging faculty members with "additional roles" in the analysis essentially controlled for the additional compensation associated with these roles. As such, it is possible that gender differences in total compensation were masked, particularly if "additional roles" were assumed with greater frequency by faculty members of one gender versus the other. Although it is difficult to make comparisons across faculty members with differing roles and compensation configurations, the committee believes these concerns require further examination.

Some schools consistently capture the additional role attribute by recording secondary appointments in the human resources system so that the additional role title and any associated additional pay can be objectively observed. Other schools combine the additional Chair/Director role and salary into a single appointment salary record or use a combination of methods. Careful consideration might be given to the advantages and disadvantages of having the Danforth schools adopt a common system of identifying faculty who have additional administrative roles and recording any associated additional compensation.

Choice of discipline groups for Arts and Sciences needs further study

In Arts and Sciences, there remains an issue of proper categorization of faculty into discipline groups. Five discipline groups were used in the AY09 analysis. Eight discipline groups have been used by the Dean of Arts & Sciences. Others have suggested using 11 or more. For this study, the models were run using 5 and 8 discipline groups.

Discipline groups could be determined by factors intrinsic to Washington University, by extrinsic factors accounting for market by discipline, or by a combination. Relying on historical groupings of disciplines ignores trends such as emergence of new disciplines. Grouping disciplines based on comparable compensation levels within Washington University potentially masks gender effects if compensation were determined in part by gender. Grouping disciplines based on compensation levels among a set of comparable universities potentially ignores unique strengths of Washington University that determine compensation.

Analysis of one or two exclusions

There was debate on the committee about the appropriateness of one or two faculty excluded from the analysis. As noted above, particularly in the smaller schools, decisions about whom to exclude could affect the results. The appropriate criteria for exclusion should be revisited.

Models for compensation in the School of Law

The Faculty Senate Council Gender Pay Equity Committee from 2010 recommended that future committees consider more effective models for the School of Law. Our models that repeated the analysis from their study have much lower adjusted R^2 values (between 0.43 and 0.29) than the other schools in this study, and slightly lower adjusted R^2 values than for the School of Law in 2010. The results of this study for the School of Law are essentially the same as the results were in 2010.

Due to the comparatively low fraction of salary variation explained by the current model for the School of Law, future analyses should attempt to find additional explanatory variables that might account for differences in compensation.

Looking at Pay in a Broader Context

This committee is one of a series of faculty committees appointed over the years with the limited charge of examining gender pay equity. While pay equity is important, it is only one aspect of gender equity. A narrow focus on pay may exclude from view other potential sources of gender inequity, such as differences in rates of appointment, retention or promotion; in research support; in service expectations, etc. While the committee continues to endorse recommendations from 2010 of continued close attention to gender pay equity, future examination of the issue should be part of a broader examination of "University practices relating to diversity and gender equality."

V. Detailed Study Results for Each School

For each school, we summarize the characteristics of the faculty in the school who are included in the analysis and give the results of the analysis. Issues that arose in the analysis are highlighted. Future work is also discussed.

Arts & Sciences

Arts and Sciences is the largest school on the Danforth Campus with 375 faculty members included in the analysis, 111 of whom are women. 53 have some identified additional role with additional compensation, 16 of whom are women. Aside from the additional roles, it was straightforward to rerun the analysis from AY09. However, the breakdown into discipline groups quickly became a focus.

Studies prior to 2000 had used eleven discipline groups. This committee understands those groups to have been determined by an external consultant. In 2000 and 2010, five discipline groups were used. We note that some of the departments grouped together have signficantly different salaries, reflecting both internal and national trends. Political science, for example, may have a different salary structure than Anthropology.

The administration in Arts and Sciences has recommended using eight discipline groups, obtained by separating the five groups used previously. In order to gain some insight into the role that discipline groups play in the analysis, analyses were run using both five and eight discipline groups. In addition, some analyses not reported here used eleven discipline groups. The committee has been provided with some data on external trends in compensation by discipline among peer institutions. Information of this type may help inform future studies.

We note that salaries within some disciplines may evolve differently than in other disciplines. Therefore, the discipline groups may need to be periodically revisited. The choice of discipline groups may take into account factors at Washington University along with national trends.

The residuals for women/gender coefficients are smaller for models using eight than five discipline groups. The z-scores decrease as well. The adjusted R^2 values decrease marginally (about 0.01) using eight discipline groups as opposed to five. For a fair comparison between the years, the AY09 results were restated using eight discipline groups. For any choice of discipline groups, the AY09 results could be restated.

Arts & Sciences Tenured and Tenure Track Faculty Included in the Analysis

	2008-09				2011-12		
	Men	Women	Total		Men	Women	Total
By rank							
Assistant Professors	52	44	96		53	33	86
Associate Professors with Tenure	56	32	88		54	42	96
Full Professors	119	24	143		110	25	135
Full Professors with Endowed Chairs	44	10	54		47	11	58
Total	271	110	381		264	111	375
By 5 Discipline Groups (Used for 2008-09 Analysis)							
Natural Sciences, Math, Psychology	120	28	148		117	26	143
Anthropology and Political Science	38	12	50		37	16	53
Economics	23	2	25		22	1	23
English and History	30	19	49		28	24	52
Foreign Languages & Lit, Philosophy, Other	60	49	109		60	44	104
Total	271	110	381		264	111	375
By 8 Discipline Groups							
Natural Sciences, Math, Psychology	120	28	148		117	26	143
Anthropology	17	6	23		16	9	25
Political Science	21	6	27		21	7	28
Economics	23	2	25		22	1	23
English and History	30	19	49		28	24	52
Foreign Languages & Lit, Classics, Art History	27	34	61		26	31	57
Philosophy, Education, Other	18	12	30		18	10	28
Music, Performing Arts, Film & Media	15	3	18		16	3	19
Total	271	110	381		264	111	375
By Ethnicity							
African American	7	5	12		6	7	13
Hispanic and Native American	9	3	12		11	2	13
Underrepresented Minority Total	16	8	24		17	9	26
Asian	14	11	25		15	14	29
White, Other	241	91	332		232	88	320
Total	271	110	381		264	111	375
Additional Role Titles	Addl A&S Role with Stipend				Addl Roles with Explicit Addl Pay		
Department (1 Acting in AY09) Chair	15	6	21		16	5	21
Director (3 Acting in AY09, one woman)	13	10	23		14	10	24
Associate Chair	5	1	6		6		6
Associate Dean	1		1			1	1
Chair, Danforth Human Studies					1		1
Special Assistant to Dean	1		1				
Total	35	17	52		37	16	53

A&S Based on 8 Discipline Groups

log models 8disc		Adj. R^2	Standard error	Mean Female residual	Mean Male residual	Difference female minus male residuals	z-scores for female	z-scores for male
model D1	2008-2009	0.83	1.70%	-0.71%	0.29%	-1.00%	-0.42	0.17
	2011-2012	0.81	1.79%	-0.46%	0.19%	-0.66%	-0.26	0.11
		Adj. R^2	Std error	n.a.	n.a.	Difference as female coeff.	Female coefficient divided by its standard error	
model D2	2008-2009	0.82	2.21%			-1.24%	-0.56	
	2011-2012	0.81	2.30%			-0.79%	-0.34	
model D3	2008-2009	0.82	2.23%			-0.51%	-0.23	
	2011-2012	0.80	2.36%			-0.09%	-0.04	

A&S Based on 8 Discipline Groups

dollar models 8disc		Adj. R^2	Standard error	Mean Female residual	Mean Male residual	Difference female minus male residuals	z-scores for female	z-scores for male
model D1	2008-2009	0.74	2,855	-1,661	674	-2,335	-0.58	0.24
	2011-2012	0.75	3,003	-1,524	641	-2,164	-0.51	0.21
		Adj. R^2	Std error	n.a.	n.a.	Difference as female coeff.	Female coefficient divided by its standard error	
model D2	2008-2009	0.74	3,886			-2,881	-0.74	
	2011-2012	0.75	4,048			-2,601	-0.64	
model D3	2008-2009	0.72	3,943			-1,840	-0.47	
	2011-2012	0.74	4,135			-1,621	-0.39	

A&S Based on 5 Discipline Groups

log models 5disc		Adj. R^2	Standard error	Mean Female residual	Mean Male residual	Difference female minus male residuals	z-scores for female	z-scores for male
model D1	2008-2009	0.81	1.80%	-1.20%	0.49%	-1.68%	-0.67	0.27
	2011-2012	0.80	1.90%	-1.19%	0.50%	-1.68%	-0.62	0.26
		Adj. R^2	Std error	n.a.	n.a.	Difference as female coeff.	Female coefficient divided by its standard error	
model D2	2008-2009	0.81	2.27%			-2.00%	-0.88	
	2011-2012	0.80	2.35%			-1.95%	-0.83	
model D3	2008-2009	0.80	2.27%			-1.40%	-0.61	
	2011-2012	0.79	2.39%			-1.29%	-0.54	

A&S Based on 5 Discipline Groups:

dollar models 5disc		Adj. R^2	Standard error	Mean Female residual	Mean Male residual	Difference female minus male residuals	z-scores for female	z-scores for male
model D1	2008-2009	0.73	2,929	-2,271	922	-3,192	-0.78	0.31
	2011-2012	0.74	3,099	-2,552	1,073	-3,625	-0.82	0.35
		Adj. R^2	Std error	n.a.	n.a.	Difference as female coeff.	Female coefficient divided by its standard error	
model D2	2008-2009	0.73	3,897			-3,797	-0.97	
	2011-2012	0.74	4,060			-4,193	-1.03	
model D3	2008-2009	0.71	3,948			-2,944	-0.75	
	2011-2012	0.73	4,132			-3,301	-0.80	

School of Engineering and Applied Science

Seven of the 73 (10%) faculty members in engineering are women. There are no women full professors or endowed chairs in engineering. As a side note, there are no underrepresented minority faculty members in engineering.

We considered two methods for repeating the 2010 study for the School of Engineering and Applied Science. One method is to use exactly the same role flags for additional roles as in 2010. Six roles deemed equivalent to department chair roles were flagged, five department chairs and the dean of the UMSL/Washington University Joint Undergraduate Engineering Program. A second method is to strictly apply the definition that any person receiving additional compensation for an additional role should be flagged, with the result that 15 individuals are coded as having an additional administrative role. We applied both methods, yielding two sets of results. All 6 faculty members with the additional role flags are men, and 14 of the 15 additional roles are held by men.

Discipline groups are associated with the five departments.

The models coding only 6 individuals as having additional roles had higher R^2 values than coding 15 individuals. These models all yielded positive residuals. Using 15 additional role flags changes the nature of the conclusions: five of the six models yield negative residuals, with small z-scores.

The model with 15 additional role flags groups together faculty with widely varying responsibilities and additional role compensation.

Engineering Tenured and Tenure Track Faculty Included in the Analysis

		2008-09				2011-12		
		Men	Women	Total		Men	Women	Total
By Rank								
	Assistant Professors	13	4	17		11	5	16
	Associate Professors on Tenure Track					1		1
	Associate Professors with Tenure	20	2	22		20	2	22
	Full Professors	15	1	16		13		13
	Full Professors with Endowed Chairs	25	1	26		21		21
	Total	73	8	81		66	7	73
By Discipline Groups								
	BME-Biomedical	14	1	15		15	1	16
	CSE-Computer Sci & Eng	21	3	24		17	3	20
	EECE-Energy, Envir & Chem	12	2	14		13	2	15
	ESE-Electrical & Systems	15	1	16		11	1	12
	MASE-Mech, Aero & Structural	11	1	12		10		10
	Total	73	8	81		66	7	73
By Ethnicity								
	African American	0	0	0		0	0	0
	Hispanic and Native American	0	0	0		0	0	0
	Underrepresented Minority Total	0	0	0		0	0	0
	Asian	22	3	25		24	4	28
	White, Other	51	5	56		42	3	45
	Total	73	8	81		66	7	73
Additional Role Titles								
	Associate Chairs			0		5	1	6
	Director			0		3		3
	Chairs, Interim Chair, Dean UMSL Program	6		6		6		6
	Total Additional Roles with Stipend	6	0	6		14	1	15
Additional Roles (same as 08-09)								
	Chair, Interim Chair, Dean UMSL Program	6		6		6		6

Comparison for **Engineering**: 2008-09 vs. 2011-12, using 6 additional role flags

	Dependent variable		Adj. R^2	Std error	Mean female residual	Mean male residual	female minus male residuals	z-score for female	z-score for male
Model D1	log	2008-2009	0.75	2.24%	-0.61%	0.07%	-0.68%	-0.27	0.03
		2011-2012	0.80	2.71%	1.62%	-0.17%	1.80%	0.60	-0.06
	dollar	2008-2009	0.74	2,613	-457	50	-507	-0.17	0.02
		2011-2012	0.80	3,263	1,437	-152	1,589	0.44	-0.05
	Dependent variable		Adj. R^2	Std error	n.a.	n.a.	Difference as female coeff.	Female coefficient divided by std error	
Model D2	log	2008-2009	0.75	5.24%			-0.79%	-0.15	
		2011-2012	0.80	5.53%			2.21%	0.40	
	dollar	2008-2009	0.74	6,728			-595	-0.09	
		2011-2012	0.79	7,677			1,960	0.26	
Model	log	2008-2009	0.74	5.14%			-2.33%	-0.45	

D3		2011-2012	0.79	5.66%		2.32%	0.41
	dollar	2008-2009	0.72	6,732		-3,838	-0.57
		2011-2012	0.78	7,990		3,160	0.40

Comparison for **Engineering**: 2008-09 vs. 2011-12, using 15 additional role flags

	Dependent variable		Adj. R^2	Std error	Mean female residual	Mean male residual	female minus male residuals	z-score for female	z-score for male
Model D1	log	2008-2009	0.75	2.24%	-0.61%	0.07%	-0.68%	-0.27	0.03
		2011-2012	0.72	2.18%	-0.41%	0.04%	-0.45%	-0.19	0.02
	dollar	2008-2009	0.74	2,613	-457	50	-507	-0.17	0.02
		2011-2012	0.68	2,817	-1,725	183	-1,908	-0.61	0.06
	Dependent variable		Adj. R^2	Std error	n.a.	n.a.	Difference as female coeff.	Female coefficient divided by std error	
Model D2	log	2008-2009	0.75	5.24%			-0.79%	-0.15	
		2011-2012	0.71	6.63%			-0.56%	-0.08	
	dollar	2008-2009	0.74	6,728			-595	-0.09	
		2011-2012	0.68	9,671			-2,365	-0.24	
Model D3	log	2008-2009	0.74	5.14%			-2.33%	-0.45	
		2011-2012	0.70	6.77%			0.15%	0.02	
	dollar	2008-2009	0.72	6,732			-3,838	-0.57	
		2011-2012	0.66	10,026			-271	-0.03	

Brown School of Social Work

There are 37 faculty from the Brown School included in the analysis, 21 (57%) of whom are women. Thus, there are more women than men in AY12 (21 women, 16 men), whereas there were more men than women in AY09 (15 women, 17 men). Of the 10 faculty members identified as having an additional role, 3 are women. Among women faculty 71% are assistant or associate professors, whereas among men 44% hold similar ranks. Among male faculty, approximately 56% are full or endowed professors, whereas among women, 29% hold similar ranks.

One set of models was run, using public health as a separate discipline. The adjusted R^2 values are high for all models (0.83 to 0.92). The best fitting models are D1 and D2 for AY12 log-salary data. The residuals are positive for women, with corresponding z-scores around 0.5. This represents a distinct change from the AY09 data, for which all models produced negative residuals for women.

As a side note, the number of underrepresented minority faculty members increased from 5 in AY09 to 9 in AY12.

As done for every school, the committee discussed the additional roles in the Brown School. Of the ten faculty assigned the attribute of additonal role in 2012, seven were men and three were women of which only two had discrete stipends associated with the additional roles. The committee directed that eight additional roles designated in 2009 that still exist also receive the attribute in 2012, for the purpose of comparability.

Brown School of Social Work Tenured and Tenure Track Faculty Included in the Analysis

	2008-09			2011-12		
	Men	Women	Total	Men	Women	Total
By Rank						
Assistant Professors	4	4	8	5	9	14
Associate Professors with Tenure	3	6	9	2	6	8
Full Professors	6	1	7	6	3	9
Full Professors with Endowed Chairs	4	4	8	3	3	6
Total	17	15	32	16	21	37
By Discipline Group						
Public Health	4	2	6	7	8	15
Social Work	13	13	26	9	13	22
Total	17	15	32	16	21	37
By Ethnicity						
African American	1	2	3	3	3	6
Hispanic and Native American	2	0	2	2	1	3
Underrepresented Minority Total	3	2	5	5	4	9
Asian	2	3	7	1	1	2
White, Other	12	10	12	10	16	26
Total	17	15	32	16	21	37
Number of Faculty with Additional Roles						
Faculty with Director/Other Role	7	5	12	7	3	10
Additional Role Titles	Director/Other Addl Roles			Addl Roles Comparable to 08-09		
Associate Dean	1	2	3	1	1	2
Director	6		6	6		6
Program chair		1	1			
Assoc Dean/ Director		2	2		2	2
Total	7	5	12	7	3	10

Comparison for **Social Work**: 2008-09 vs. 2011-12 (n=37)

	Dependent variable		Adj. R^2	Std error	Mean female residual	Mean male residual	Difference female minus male residuals	z-score for female	z-score for male
Model D1	Log	2008-2009	0.90	3.26%	-1.60%	1.41%	-3.01%	-0.49	0.43
		2011-2012	0.92	2.75%	0.46%	-0.60%	1.06%	0.17	-0.22
	dollar	2008-2009	0.83	5,126	-2,513	$2,217	-4,730	-0.49	0.43
		2011-2012	0.88	4,563	923	-$1,211	2,134	0.20	-0.27
	Dependent variable		Adj. R^2	Std error	n.a.	n.a.	Difference as female coeff.	Female coefficient divided by std error	
Model D2	Log	2008-2009	0.90	4.76%			-4.11%	-0.86	
		2011-2012	0.92	4.13%			1.88%	0.46	
	dollar	2008-2009	0.83	7,492			-6,455	-0.86	
		2011-2012	0.88	6,715			3,802	0.57	
Model D3	Log	2008-2009	0.87	5.11%			-5.63%	-1.10	
		2011-2012	0.88	4.38%			0.25%	0.06	
	dollar	2008-2009	0.83	7,491			-6,046	-0.81	
		2011-2012	0.84	6,862			1,728	0.25	

Fox School of Design and Visual Arts

There are 44 total faculty members included in the analysis, 18 (41%) of whom are women. In addition to the school dean, the school has deans of art and of architecture who are excluded from the analysis.

The models for the Fox School used two discipline groups: art and architecture. The committee discussed the need to look carefully at how additional roles are accounted for in the Fox School. In the models shown below, one choice of that accounting is used. There is no additional role flag assigned to the associate dean. There are additional role flags assigned to five directors and program chairs, all of whom are women. A subcommittee met with Dean Colangelo to discuss additional roles in the Fox School. Future analyses should consider the most appropriate way to account for additional roles and their compensation in the Fox School.

The adjusted R^2 values are high for all models (0.82 to 0.87). All models based on log-salary have nearly identical adjusted R^2 values of 0.87. The residuals for women are positive for all models for AY12 salary data; they were all negative for AY09.

Sam Fox School of Design & Visual Arts Tenured and Tenure Track Faculty Included in the Analysis

	2008-09				2011-12		
	Men	Women	Total		Men	Women	Total
By Rank							
Assistant Professors	4	5	9		3	6	9
Associate Professors with Tenure	9	7	16		11	8	19
Full Professors	7		7		8	2	10
Full Professors with Endowed Chairs	3	2	5		4	2	6
Total	23	14	37		26	18	44
By Discipline Group							
Architecture	13	4	17		14	7	21
Art	10	10	20		12	11	23
Total	23	14	37		26	18	44
By Ethnicity							
African American	1	1	2		1	1	2
Hispanic and Native American	0	0	0		0	0	0
Underrepresented Minority Total	1	1	2		1	1	2
Asian	1	1	2		2	1	3
White, Other	21	12	33		23	16	39
Total	23	14	37		26	18	44
Additional Role Titles	Director/Other Addl Roles				Addl Roles with Explicit Addl Pay		
Associate Dean	1		1				0
Director		1	1			3	3
Program chair	1		1			2	2
Total Additional Roles with Stipend	2	1	3		0	5	5

Comparison for Fox School: 2008-09 vs. 2011-12

					Residuals: average % difference between actual and predicted salaries			Z-scores (mean residual divided by corresponding standard error)	
	Dependent variable		Adj. R^2	Std error	Mean female residual	Mean male residual	Difference female minus male residuals	z-score for female	z-score for male
Model D1	log	2008-2009	0.83	3.11%	-1.96%	1.19%	-3.15%	-0.63	0.38
		2011-2012	0.87	2.44%	0.42%	-0.29%	0.71%	0.17	-0.12
	dollar	2008-2009	0.84	2,757	-1,958	1,192	-3,150	-0.71	0.43
		2011-2012	0.84	2,585	297	-205	502	0.11	-0.08
	Dependent variable		Adj. R^2	Std error	n.a.	n.a.	Difference as female coeff.	Female coefficient divided by std error	
Model D2	log	2008-2009	0.83	4.55%			-5.04%	-1.11	
		2011-2012	0.87	4.03%			1.37%	0.34	
	dollar	2008-2009	0.84	4,086			-5,036	-1.23	
		2011-2012	0.83	4,284			975	0.23	
Model D3	log	2008-2009	0.82	4.49%			-7.01%	-1.56	
		2011-2012	0.87	3.78%			1.72%	0.45	
	dollar	2008-2009	0.83	3,987			-6,897	-1.73	
		2011-2012	0.84	3,976			$578	0.15	

Olin School of Business

There are 67 faculty members included in the analysis, of whom 15 (22%) are women (an increase of five women at the assistant professor level compared with AY09). As a side note, there are four faculty who are underrepresented minority, an increase from two in AY09.

The models for the Olin School use seven discipline groups, as recommended during the previous study by the dean of business. There are four more director roles in AY12 than in AY09, with all of the 11 faculty members receiving additional pay for an additional role assigned the additional role flag. All 11 of these faculty members are men.

All residuals for the log-salary models for AY12 data are positive for women. All residuals for the dollar models for AY12 data are negative for women. As previously noted, all models for AY09 data had negative residuals for women.

Olin Business School Tenured and Tenure Track Faculty Included in the Analysis

		2008-09			2011-12		
		Men	Women	Total	Men	Women	Total
By Rank							
	Assistant Professors	20	5	25	22	10	32
	Associate Professors without Tenure	1	1	2	1	1	2
	Associate Professors with Tenure	6	2	8	8	1	9
	Full Professors	6	1	7	7	2	9
	Full Professors with Endowed Chairs	14	1	15	14	1	15
	Total	47	10	57	52	15	67
By Discipline Groups							
	Accounting	5	2	7	5	2	7
	Economics	6	1	7	8	2	10
	Finance	12	0	12	14	1	15
	Marketing	8	2	10	8	3	11
	Operations & Mfg Management	5	2	7	5	2	7
	Organizational Behavior	6	2	8	6	3	9
	Strategy	5	1	6	6	2	8
	Total	47	10	57	52	15	67
By Ethnicity							
	African American	0	0	0	0	2	2
	Hispanic and Native American	2	0	2	2	0	2
	Underrepresented Minority Total	2	0	2	2	2	4
	Asian	12	4	16	12	6	18
	White, Other	33	6	39	38	7	45
	Total	47	10	57	52	15	67
Additional Role Titles		Director/Other Addl Roles			Any Addl Role with Stipend		
	Director	6		6	10		10
	Associate Dean	1		1	1		1
	Total Additional Roles with Stipend	7	0	7	11	0	11

Comparison for **Olin Business School**: 2008-09 vs. 2011-12

	Dependent variable		Adj. R^2	Std error	Mean female residual	Mean male residual	Difference female minus male residuals	z-score for female	z-score for male
Model D1	log	2008-2009	0.91	2.27%	-2.48%	0.53%	-3.00%	-1.09	0.23
		2011-2012	0.88	2.10%	0.32%	-0.09%	0.41%	0.15	-0.04
	dollar	2008-2009	0.90	5,174	-5,566	1,184	-6,751	-1.08	0.23
		2011-2012	0.86	5,091	-684	197	-881	-0.13	0.04
	Dependent variable		Adj. R^2	Std error	n.a.	n.a.	Difference as female coeff.	Female coefficient divided by std error	
Model D2	log	2008-2009	0.91	2.98%			-3.67%	-1.23	
		2011-2012	0.88	2.86%			0.49%	0.17	
	dollar	2008-2009	0.90	6,801			-8,257	-1.21	
		2011-2012	0.86	7,275			-1,056	-0.15	
Model D3	log	2008-2009	0.84	4.24%			-5.69%	-1.34	
		2011-2012	0.82	3.53%			0.78%	0.22	
	dollar	2008-2009	0.80	10,151			-12,878	-1.27	
		2011-2012	0.76	9,346			-223	-0.02	

School of Law

Of the 43 faculty members in the school of Law included in the analysis, 22 (51%) are women. Women represent roughly half of the faculty at every academic rank at the law school. There are three more faculty members with additional roles in AY12 than in AY09. Of the 13 faculty with additional roles in AY12, 6 are women.

The findings for the Law School were mixed. Three of the six models for the Law School indicated the gender gap has narrowed and three indicated that it has increased. There are two caveats regarding the Law School results: (1) the population size is small (45 faculty in AY09 and 43 in AY12) so that a few departures and hires can have a large impact on the results and (2) the values of adjusted R^2 for the regression model are much lower for the Law School than the other schools in the study. This means that the regression analysis for Law is less robust and does not do a very good job of explaining the variance in Law salaries.

Law School Tenured and Tenure Track Faculty Included in the Analysis

	2008-09			2011-12		
	Men	Women	Total	Men	Women	Total
By Rank						
Associate Professors (not tenured)	3	2	5	3	2	5
Full Professors	11	10	21	11	11	22
Full Professors with Endowed Chairs	11	8	19	7	9	16
Total	25	20	45	21	22	43
By Ethnicity						
African American	1	2	3	0	3	3
Hispanic and Native American	0	0	0	0	0	0
Underrepresented Minority Total	1	2	3	0	3	3
Asian	1	1	2	3	1	4
White, Other	23	17	40	18	18	36
Total	25	20	45	21	22	43
Additional Role Titles	Director/Other Addl Roles			Addl Roles with Explicit Addl Pay		
Associate Dean		2	2	1	2	3
Director	3	3	6	4	4	8
Faculty Liaison for Alumni Relations	1		1	1		1
Vice Dean	1		1	1		1
Total Additional Roles with Stipend	5	5	10	7	6	13

Comparison of differences by gender for **Law School**: 2008-09 vs. 2011-12

	Dependent variable		Adj. R^2	Std error	Mean female residual	Mean male residual	Difference female minus male residuals	z-score for female	z-score for male
Model D1	log	2008-2009	0.45	4.28%	-1.44%	1.16%	-2.60%	-0.34	0.27
		2011-2012	0.43	4.64%	-1.21%	1.27%	-2.48%	-0.26	0.27
	dollar	2008-2009	0.37	9,246	-3,080	2,464	-5,544	-0.33	0.27
		2011-2012	0.33	10,517	-2,093	2,192	-4,285	-0.20	0.21
	Dependent variable		Adj. R^2	Std error	n.a.	n.a.	Difference as female coeff.	Female coefficient divided by std error	
Model D2	log	2008-2009	0.44	5.19%			-3.04%	-0.59	
		2011-2012	0.41	5.80%			-3.12%	-0.54	
	dollar	2008-2009	0.35	11,246			-$6,484	-0.58	
		2011-2012	0.32	13,159			-$5,381	-0.41	
Model D3	log	2008-2009	0.47	4.80%			-2.89%	-0.60	
		2011-2012	0.38	5.56%			-3.68%	-0.66	
	dollar	2008-2009	0.39	10,351			-$5,810	-0.56	
		2011-2012	0.29	12,574			-$6,396	-0.51	