Summary Report of the Joint Committee on Gender Pay Equity at the University of Victoria

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Executive Summary

The mandate of the Joint Committee on Gender and Pay Equity at the University of Victoria

- A joint committee on the investigation of gender pay equity at the University of Victoria, hereafter called the GET Committee, was struck in the spring of 2013.
- The mandate of this committee was to undertake a statistical investigation of the relationship between gender and pay at the University of Victoria among University Faculty and Librarians, and if such pay inequities are found to be present, to make recommendations for their correction.
- The committee began its work in September 2013.
- The committee relied on guidelines from the BC Human Rights Tribunal in formulating the investigation and in making recommendations, as well as previous studies of pay equity at other Canadian Universities.
- On March 31st, the committee submitted an initial report to the Provost and the Faculty Association President.
- Following feedback from the office of the Provost, the committee undertook further analysis and modeling of the data in order to produce this final report.

Methods

- The committee used only the data provided by the Office of Institutional Analysis at the University of Victoria in its analyses. All data reflect salary levels of faculty as of October 1, 2012 and librarians as of July 1, 2012.
- The goal of the study was to ascertain whether there were gendered salary inequities at the University of Victoria. The committee considered models that included parameters to estimate the effect of gender on salary and on the relationship between **salary** and **experience** (measured here as the larger of **number of years since hire** and the **number of years since highest degree)** at the University of Victoria.
- The committee discussed the relative merits of **multiplicative** versus **additive** models in capturing this relationship. Multiplicative models express gender effects in terms of ratios or percentages. Additive models express effects in dollar amounts.
- The committee determined that an additive model was most appropriate for this study due to the fact that the relationship between salary and experience at the University of Victoria is primarily a function of incremental dollar amounts (merit increments and career progress increments) compounded by negotiated across-the-board increases. In addition, the R-squared value for the additive model was slightly higher than the value for the multiplicative model, suggesting that the former explains more of the variation in salaries at the University of Victoria.
- To enhance the robustness of the analysis, it was conducted at the level of Faculty. However, there were two departments where annual average salaries were significantly different than the average in their home Faculty

(Economics and Child and Youth Care). These departments were treated as separate units in the analysis.

- The additive model allows different intercepts for the relationship between experience and salary by unit; however the gender slopes are the same across all units.
- The multiplicative model incorporates different intercepts for units and common gender slopes for the relationship between experience and the logarithm of salary.

Results

- The results of the statistical analyses of faculty salaries show that there is a gendered effect on the relationship between salary and experience after controlling for unit.
- The additive model shows that there is a gendered effect that favours females with less than 6.5 years of experience and favours males with more than 6.5 years of experience becoming more pronounced as the number of years of experience increase. The end result is that there is a gendered salary gap that widens with years of experience.
- More specifically, the additive model shows that at zero years of experience, male faculty members had annual salaries that were on average $2388.00 lower than the average annual salaries of female faculty members with zero years experience after adjusting for unit. However, the interaction between gender and experience was $367.00 per year, meaning that male faculty members, on average, gain $367.00 more per year of experience than female faculty members. The female advantage diminishes with each year of experience until at 6.5 years experience, when the gender effect switches to favour males. (The female advantage is $2388, $2021, $1654, $1287, $920, $553, $186 for zero to six years of experience respectively.)
- The multiplicative model also found a gendered effect favouring males that widened as years of experience increased.
- These findings suggest that gender interacts with the relationship between experience and salary but the scope of this study precludes any further comments on the cause of this interaction.
- The number of full-time librarians was too small to yield reliable estimates from a multiple regression. The committee recommends that the University Librarian and VPAC should review gender and pay equity among full-time librarians at the University on a case-by-case basis.

Recommendations

- The committee recommends that the University, following principles established in the BC Human Rights Code, should implement procedures to correct the effects of the relationship between gender and experience at the University of Victoria.
- This will entail retroactively correcting the 2012 salaries of female faculty members with more than 6.5 years of experience and male faculty members with less than 6.5 years of experience to the level that they should have been

at, were the slope between experience and salary the same for male and female faculty members.

- In addition, following Section 12 of the BC Human Rights Code, the University should implement a one-time retroactive award correcting pay discrimination between July 1, 2011 and July 1, 2012 that corresponds to the one-year difference between the pay that should have been given in 2012 and the pay that was received; and correct the effect of the 2% salary lifts given in 2012 and 2013 given the salary correction in 2012.
- The total sum of all adjustments using the additive model with the 2012 salaries is $1,287,703, and will result overall in a 1.56% increase in 2012 salary across the university.
- The committee recommends that salaries of male faculty members with less than 6.5 years experience be lifted using the procedures outlined above. The committee notes however that because the size of the salary lift decreases with years of experience there is a risk of creating salary anomalies.
- The committee recognizes that the analysis was conducted at the population-level, and as such creates population-level recommendations. It is beyond the committee's mandate to ensure that the recommendations that it makes not produce salary anomalies within units.
- Gender and pay equity among full-time librarians at the University of Victoria should be reviewed on a case-by-case basis, ideally by a committee specially tasked with this review.
- Going forward, Faculties should begin to track on an annual basis the relationship between gender and all payments related to performance, including merit increments, market supplements, and retention adjustments.
- Data on the gender breakdown of performance-based salary awards should be reported, by Faculty, to the University and the Faculty Association, annually.
- Finally, the committee recommends that this statistical exercise be repeated, using the same or equivalent methodologies and data protocols at a predetermined future date. Our recommendation is that this investigation be conducted after a minimum of 3 years, corresponding to the evaluation window of the current merit award system at the University of Victoria, and no later than 6 years.

Introduction

Several Canadian universities have undertaken investigations into the issue of gender pay equity among academic staff in recent years.[1] These investigations have mostly been prompted by the concern that systemic gender discrimination in hiring, promotion or performance awards may over time result in salary differentials. Given that academic staff is presumed to be equivalent in all attributes relevant to determining the rate of pay, *any* systemic salary differential between men and women raises concern.

The issue of pay discrimination is also one that speaks to the core mission of the University of Victoria. The University is committed to ensuring and supporting diversity within its student body and its staff. This is affirmed in the 2012 Strategic Plan, which states that "*equal rights and dignity of all persons*" is a fundamental value of the University of Victoria.

During the 2012-2014 Framework and Salary Settlement Negotiations, the University of Victoria Faculty Association Negotiating Team presented a proposal to the University to embark on a joint investigation into gender pay equity at the University of Victoria. In June 2012, the two parties signed a Letter of Agreement, outlining the purpose, scope, and aims of the investigation (Appendix A). Each party nominated three members to a joint committee that would be tasked with the investigation of gender pay equity and with making recommendations to remedy any pay inequities identified by the committee. The joint committee was first struck in the spring of 2013. Data analysis commenced in September 2013 and the committee concluded its work in March 2014. This report is the outcome of the work of the joint committee.

1. Context

1.1 Institutional Context: The mandate of the Gender Pay-Equity Task-Force at the University of Victoria

The LOA signed in June 2012 identifies the mandate of the GET committee as follows:

i. To investigate whether there are gendered salary inequities at the University of Victoria;
ii. To make recommendations to the Provost to correct such anomalies if present;

[1] Examples of Canadian universities that have recently conducted investigations into gender pay anomalies, or who have recently incorporated systems for correcting gender pay inequities into their compensation systems include: the University of British Columbia (2012); Western University (2005 and 2011); the University of Calgary (2005 and 2012).

iii. To make recommendations to the Provost for a monitoring and reporting mechanism to ensure continuing gender equity in compensation at the University of Victoria;
iv. To make recommendations regarding the information on member compensation that should be reported to the Faculty Association on an annual basis.

The committee was not tasked to investigate any other possible gender discrimination at the University of Victoria, such as workplace climate, or harassment. And, whereas gendered wage discrimination may be reflected in performance awards and/or promotion practices, it was not within the mandate of the GET committee to examine gender discrimination at these levels, except in so far as these elements of the compensation policy at the University of Victoria may be identified for further review and monitoring as one outcome of the current statistical investigation. Further to this, it is important to note that the study that is presented in this report was a population-level study, tasked with identifying whether or not gender is responsible for *group* differences in academic staff salaries at the University of Victoria.

Finally, the mandate of the GET committee extends to only those individuals within the definition of "faculty member" under the Framework Agreement, and thus excludes all academic staff belonging to other employee groups at the University.[2]

1.2 Legal Context: The BC Human Rights Code

1.2.1 Jurisprudence on pay for similar or substantially similar work

Section 11 of the *Canadian Human Rights Act* and section 12 of the British Columbia *Human Rights Code* outline the legal rights and responsibilities of employees and employers in relation to wage discrimination between men and women. As these codes are consistent with one another, and as University employment falls within provincial jurisdiction, we rely primarily on the BC *Human Rights Code* to provide the legal context for our report.

Although not generated by a human rights complaint, the working group's analysis of the salary data and recommendations are informed by the BC *Human Rights Code* provisions on pay discrimination and ways of remedying such anomalies, if present. According to section 12 of the *BC Human Rights Code,* (see Appendix B) an employer is prohibited from discriminating in the rate of pay on the basis of gender by paying one group less than their counterparts doing similar or substantially similar work.[3] Work is considered similar or substantially similar where the core duties of the job

[2] Faculty members with significant administrative responsibilities (such as Deans, and Associate Deans) were included in the analyses, but with the administrative stipend removed from their salary.
[3] While wage discrimination disproportionately affects female employees, the wording of section 12 leaves open the possibility that wage discrimination can be against employees of any gender.

of all employees require substantially similar skill, effort and responsibility. Reference to skill in this context means the education, training, experience and ability required to perform the job in question. There are both qualitative and quantitative aspects of the effort factor, and include the mental and physical exertion required to perform the job. The responsibility factor assesses the importance of assigned duties and the degree of accountability necessary for the performance of the job including supervision. (*Reid et al. v Vancouver (City) et al. (No. 5),* 2000 BCHRT 30, para. 124, reversed on other grounds, 2003 BCSC 1348, appeal allowed, 2005 BCCA 418, leave to appeal to SCC dismissed, [2005] SCCA No. 30 ["*Reid*"]).

The concept of "core duties" refers to those aspects of the employees' work "*that are central to the job, necessary to achieve the purposes for which the position was created*" and inability to perform those duties would change the nature of the position. As well, those are the duties that the employer considers compensable and constitute the basis of the job description. (*Prpich v Pacific Shores Nature Resort Ltd*., 2001 BCHRT 26, at para. 31; *Bond v Nootka Administration and others*, 2012 BCHRT 340, at para 18.) Further, the understanding of core duties must be grounded in evidence relating to the actual work assigned by the employer and performed by employees in the comparator positions regardless of titles or their job classification. (*Reid*, at para. 126; *Best Facilities Services v Canadian Union of Public Employees, Local 3338*, [2010] BCCAAA No. 36.)

Academic staff at the University of Victoria can be broadly classified into three groups: tenure-track and tenured faculty, assistant and teaching professors, and librarians. Based on the above explanations of what constitutes similar or substantially similar work, employees in each of the three categories perform similar or substantially similar duties regardless of gender (with the possible exception of individuals hired into particular positions with substantially different job descriptions). In addition, all members in each category are hired pursuant to similar job advertisements, undergo similar job application and interview processes, and are governed by the same job evaluation policies. Slight variations in individual contracts or work assignments, whether short- or long-term, do not deviate from the fact that all employees within that category and/or rank perform the same or substantially similar jobs. Special arrangements in response to individual circumstances (for example, administrative responsibilities associated with being a Chair or Director) may be considered in evaluating members' job performance, for instance, for the purposes of career progress and merit increments. However, such arrangements would not be expected to differentiate between employees doing substantially similar work or in similar work arrangements on the basis of gender. In sum, within each employee group, there is substantive similarity in terms of all attributes relevant for determining the rate of pay.

1.2.2 *Justification for pay differences based on factors such as seniority and performance*

Members of the respective employee groups under the Framework Agreement are expected to have the same or similar minimum educational qualifications and should therefore have the same or similar salary structure. However, differences in starting salaries may be justifiable based on objective evidence of experience that supports offering higher remuneration to particular employees compared to their counterparts at the same rank. As well, an employer does not contravene the duty not to discriminate in wages where subsequent wage increases are based on objective indicators of performance and productivity regardless of gender. This means that an analysis of pay inequity will need to interrogate the alleged indicators of experience and productivity to ensure one gender is not disproportionately privileged over the other. A pattern of employees of one gender persistently earning less than the other gender may give rise to a reasonable inference of a systemic bias in determining the relevant experiences and productivity that warrant higher starting salaries and/or higher performance awards, thereby resulting in a presumption of wage discrimination against employees of one gender.

Below we present the results of the statistical analyses of gender and salary among faculty and librarians at the University of Victoria. The data is presented in two separate analyses: faculty (this includes tenure-track and tenured faculty, as well as assistant and teaching professors) and librarians. We discuss further below the statistical and conceptual reasons for analyzing the data in this fashion. In general, however, this approach maintains as much homogeneity as possible within each category in terms of the attributes relevant to the rate of pay (in particular, duties and responsibilities, criteria for evaluation, and educational qualifications), while ensuring robustness of the statistical results. [4]

We begin with a methodological discussion, followed by a presentation of results. In each case we begin by presenting the protocol for the data analyses, including the variables considered for the multiple regression model, criteria for inclusion and exclusion, and statistical method, followed by the results of the regression and a brief discussion regarding the interpretation of these results.

2. Analysis and Results

2.1 Methodology

A canvas of gender pay inequity studies at other Canadian universities reveals a range of possible methodologies for investigating and addressing gendered pay discrimination. The choice of methodology reflects to some extent contextual and institution-specific concerns around the nature of gender inequity in pay and how to address them, including in particular, whether or not a *group* remedy or a *case-by-case* remedy is being sought.

[4] For this reason, limited-term positions within each of these categories were not included in the analyses, as there are substantive differences in processes around performance evaluation and other elements relevant to career progress.

Remedies focusing on individual cases are consistent with a focus on gendered *anomalies* in wages. Anomalies are cases that deviate from an expected outcome; in such situations, individuals are expected to bring their case forward for a salary review. While any difference between an individual's expected salary based on their performance, and their actual salary, is understood to be the result of a systemic bias, case-by-case analysis focuses on an individual's career, performance, and productivity. A complaint-driven approach of correcting pay discrimination is less costly to an employer than across-the-board salary corrections. However, significant drawbacks include the fact that only those individuals that bring forward a complaint would receive any redress. As well, such an approach is unlikely to provide opportunities or the desire to address any structural or systemic issues surrounding pay discrimination on a going-forward basis.

The concept of gender *inequity* in wages, on the other hand, is consistent with a focus on uncovering group differences in wages and subsequently suggesting group corrections in wages. This approach to addressing pay discrimination usually begins with a multiple regression model (Barbezat 2002; Río, Gradín and Cantó 2011). Multiple regression is an elaboration and generalization of the statistical technique known as linear regression. Simple linear regression models the relationship between an outcome variable (y) and a single predictor variable (x), whereas multiple regression models the relationship between y and several explanatory variables. Multiple regressions are particularly appropriate in the context of a study on gender differences in compensation in institutions such as universities where there is more than one attribute that is considered to be related to the rate of pay, such as years of experience, discipline, and performance. Multiple regression models thus provide estimates of group differences (in this context, between men and women) in the outcome variable of interest (salary) while controlling for the effect of other relevant variables.

Below are the results of our analyses. We begin with a discussion of the methodological protocols of the study, including the data used, data quality and operationalization of the variables. We then present results for faculty, beginning with the descriptive data, followed by an assessment of the suitability of a multiple regression model using scatterplots. We conclude this section with the regression results for faculty. We then present descriptive data for librarians and the results of the regression analysis.

The committee considered and tested a range of models, as well as ways of conceptualizing and operationalizing the relationship of interest. In the interest of brevity we present only two of the models that were tested: a linear multiple regression (or **additive** model) and a log-linear multiple regression (or **multiplicative** model). As we discuss further below, while each model has both advantages and disadvantages, it is the committee's recommendation that an additive model, both conceptually and empirically, better captures the relationship between gender and salary differentials at the University of Victoria.

2.2 Data
The committee used salary data and clarifications provided by the Office of Institutional Analysis (OIA) at the University of Victoria. For purposes of analytical consistency, all salary data were extracted for the 2012/2013 academic year (October 1, 2012 for faculty and July 1, 2012 for librarians) and thus reflect salary levels prior to the retroactive salary adjustments that were made in December 2013 and January 2014.

The dataset included **699** tenured/ tenure-track faculty, **60** Assistant Teaching Professors/Teaching Professors, and **24** librarians. Tenured, tenure-track, and assistant and teaching professors were all merged into one data set. The librarian analysis was conducted separately. Faculty members from the Division of Medical Sciences were excluded. All stipends were stripped from the salary data; the salary data for all individuals appointed at less than full-time was grossed up to estimate full salaries.

2.2.1 Variables selected
Variables selected for analyses reflected the committee's operationalization of the variables that are understood to be relevant in setting the rate of pay at the University of Victoria and which were available to us in electronic form. In particular, the committee was mindful of the importance of discipline and experience in determining faculty and librarian salaries. Our goal was to use a multiple regression to model the relationship between **experience** and **salary** and the influence (if any) that **gender** had on this relationship, while controlling for market-based differences between the disciplines. To this end, the committee had to determine how best to capture "experience" and "discipline" in the statistical model. We discuss below in more detail how we operationalized these variables.

2.2.1.1Measuring experience:
Experience and seniority can be measured through: rank (i.e. Assistant, Associate or Full Professor, in the case of tenured and tenure-track faculty), years in rank, years since hire, or years since highest degree. The committee discussed the merits and drawbacks of each of these. An important goal was to arrive at a measurement of experience that had the least correlation with other variables of interest, but in particular, gender.

Rank: While rank does measure seniority and experience it may also, simultaneously be a reflection of gender discrimination (if, for instance, more men than women are promoted, or if women spend more time at lower ranks, than men). Secondly, rank is a categorical variable, which limits interpretation of the data, but also masks the significant variability in the number of years of experience within each of the ranks of Associate Professor, Professor and Assistant Teaching Professor.

Years in Rank: Measuring the number of years in rank allows us to account for the diversity of experience within each rank; at the same time it introduces the same risks of co-dependence as "rank" in terms of possible gender discrimination. In addition, there is lack of comparability across the ranks, as Assistant Professors are required to apply for tenure and promotion within six years, while Assistant Teaching Professors, and Associate Professors have no such requirement and may thus stay at that rank for the duration of their career.

Years since Hire/Years since Degree: "Years since highest degree" is currently one of the main metrics used to establish starting salaries at the University of Victoria**.** Years since highest degree is a continuous variable, which allows for a more nuanced and targeted set of recommendations, than "rank." Highest degree for most academic staff is the PhD; for librarians, the advanced degree in Library Sciences was treated as the terminal degree.

However, there are some disadvantages to using this indicator as a proxy for experience. In particular, while for many Faculties, the PhD is the terminal degree, this is not the case for all Faculties. Furthermore, in some of those faculties where the PhD is not a terminal degree, having a PhD does not automatically confer a salary advantage.

Solution: Upon consideration of the advantages and disadvantages of this measure, the committee elected to capture **experience** as the larger value of the **number of years since hire** and the **number of years since highest degree.**

2.2.1.2 Accounting for market-based salary differences between disciplines
There are significant differences among departments and schools in terms of the average salary for faculty at the University of Victoria. While some of this variation is at the Faculty level (e.g. between the Faculty of Humanities and the Faculty of Science) there are also some significant differences within Faculties. The committee discussed the merits of using a "department" indicator versus a "Faculty" indicator in order to capture these differences.

Department/School: Using a department /school indicator may offer the most nuanced approach to understanding the disciplinary differences in rates of pay. However, some of the departments have very small numbers, which is a challenge for a robust regression analysis.

Faculty: There are statistical and conceptual advantages to using "Faculty" as the indicator for capturing disciplinary differences in salary. Statistically, the numbers within each Faculty are larger, which lends robustness to a regression analysis. Conceptually, in practice rates of pay are determined by the Faculty Dean in consultation with the Provost, who has to agree to initial salaries and presumably makes these decisions within the context of Faculty-wide salary grid. One disadvantage is that there are some departments that are outliers in terms of

salaries within their home Faculty. This means that the "Faculty" variable may contain some categories that are highly heterogeneous.

Solution: The committee decided that it was best to adopt a hybrid approach that drew on the conceptual and statistical strengths of both indicators above. Through a statistical analysis, two departments that were outliers in terms of average salaries within their home Faculties, were pulled out of their Faculties and given separate indicators: Economics from the Faculty of Social Sciences, and Child and Youth Care from the Faculty of Human and Social Development. We created a new 'Unit' variable, which for Social Sciences includes all departments except Economics; for HSD, it includes all departments except Child and Youth Care; Economics and Child and Youth Care are two separate units; and it includes all of the other Faculties each as a whole. **Table 1** shows the resultant categories, with the number of faculty members (Ns) within the Units.

It is important to note here that this model *retains* market-based salary differences between disciplines in that it groups together departments and schools that are homogeneous in terms of median salaries.

For librarians, there does not appear to be the same variation across departments in terms of salary. While job descriptions vary considerably among librarians, the committee was not aware of any systematic differences between the different job descriptions in terms of the variables that set the rate of pay (years of experience, degree required) that warranted treating these variables as indicators in the analysis.

Table 1: Faculty Variable Categories and their Number of Faculty Members, N

Category	N	Category	N
Business	35	**Social Sciences**	113
Humanities	141		
Science	128	**HSD**	74
Engineering	81	**Education**	66
Law	25	**Child and Youth Care**	15
Fine Arts	59	**Economics**	22
Total: 759			

2.3 Results: Faculty
2.3.1 Descriptive Statistics

Table 2 provides demographic statistics about Assistant, Associate, Full, Assistant Teaching and Teaching Professors as of October 1, 2012. **Table 3** reports the mean

and median salaries of male and female tenure-track and tenured faculty members employed at the University of Victoria as of October 1, 2012 in the three professorial ranks. **Table 4** further shows that while women represent 42% of all faculty members, only 28% at the Full Professor rank are women. Women represent 48% of faculty members at the ranks of Associate and Assistant Professor and 62% of Assistant and Teaching Professor.

Table 2: Average Characteristics: Faculty

Gender	Rank	Numbers	Age	Hire Years	Years in rank	Experience
Men	All	441	51.7	15.5	8.4	20.6
Women	All	318	51.1	13.4	6.4	17.2
Men	Full	200	58.1	20.8	11.5	27.8
Women	Full	77	57.4	18.0	6.6	24.1
Men	Associate	144	47.7	12.9	5.9	15.9
Women	Associate	135	50.8	13.7	6.5	16.8
Men	Assistant	74	41.9	6.3	5.0	9.8
Women	Assistant	69	43.9	7.6	5.2	10.3
Men	Teaching	23	51.9	16.2	7.6	20.6
Women	Teaching	37	52.6	13.4	7.6	17.2

Table 3: Average and Median Salaries by Gender and Rank

Gender	Rank	Average Salary	Female/Male Salary Ratio	Median Salary	Ratio2
Men	All	113400	0.902	110300	0.904
Women	All	102300		99690	
Men	Full	134300	0.936	133600	0.912
Women	Full	125600		121900	
Men	Associate	102400	0.992	101000	0.987
Women	Associate	101600		99730	
Men	Assistant	85760	0.998	84580	0.994
Women	Assistant	85570		84040	
Men	Teaching	89140	0.987	88330	0.992
Women	Teaching	88010		87630	

Table 4: Distribution of men and women across the Faculty Ranks

Gender	Rank	Numbers	% of all	% of Women
Men	All	441	100	
Women	All	318	100	41.9
Men	Full	200	45.4	
Women	Full	77	24.2	27.8
Men	Associate	144	32.7	
Women	Associate	135	42.5	48.4
Men	Assistant	74	16.8	
Women	Assistant	69	21.7	48.3
Men	Teaching	23	5.2	
Women	Teaching	37	11.6	61.7

The figures in **Table 3** indicate that the overall average female/male salary gap among all faculty members is: $113400-$102300= **$11,100**. The within-rank average salary gaps are: **$8700, $800**, $**190** and **$1130** at the Full Professor, Associate Professor, Assistant and Teaching Professor ranks respectively. Also reported in **Table 3** are the female/male salary ratios, which indicate that overall the female/male salary ratio is around 90%. The raw differences in salaries between males and females are largest for the Full Professor rank. Some of the differences may be explained by the data reported in **Table 2**; for example, years in rank and years since last degree. The extent to which these differences in salary are due to gender, and not to other relevant variables, such as years of experience, is what we explore through the multiple regression model presented later in this report.

2.3.2 Assessing the fit for a multiple regression model using scatter-plots and residual analysis

Below we use multiple regression to examine the relationship between gender and salary among faculty and librarians at the University of Victoria. As a first step, the committee examined the adequacy of the regression model in terms of its fit with the assumptions of regression. We began by generating scatterplots. We found that while there is a roughly linear relationship between the variables of interest, there were also some significant outliers. We next discuss strategies to minimize the effect of outliers.

2.3.3 Outliers and multiple regression models

Regression outliers pose a serious problem to a standard least-squares regression analysis. Large outliers risk skewing the results in one or the other direction; put another way, if the goal of a regression analysis is to estimate a slope that will predict mean values of an outcome variable on the basis of the predictor value, outliers on either of those variables may have an undue influence on the resulting estimate of the slope.

In the case of our dataset, there are significant outliers - high experience with low salaries, and low experience with high salaries. Two standard solutions exist to mitigate the outlier problem: i) identify and remove unusual observations or ii) robust regression.

Outliers may be identified through techniques such as residual analysis. Residuals are the differences between an actual salary and the salary predicted by the regression model; for example, once a residual reaches more than a predetermined number of standard deviations from the mean (for instance three or four) the observation is determined to be an outlier and removed from the analysis.

Robust regression, however, aims to keep all observations within the dataset by generating weights that reduce the effect of outliers on the regression model (Koller and Stahel 2011; Maronna, Martin and Yohai 2006; Rousseeuw and Leroy 1987; Yohai 1987). The advantage of a robust regression model is that it retains all observations in the dataset but reduces the leverage of outliers in predicting the regression line. Robust analyses were performed for the models considered in this report using the R package 'robustbase' (Rousseeuw, et al. 2014).

2.3.4 Robust Regression Models

2.3.4.1: Linear Regression – the Additive Model

We present first the results of a robust linear regression model for faculty members. In this model, outlying observations were automatically assigned weights by the regression model to limit any undue influence that they might have on the slope of the relationship between experience and salary.

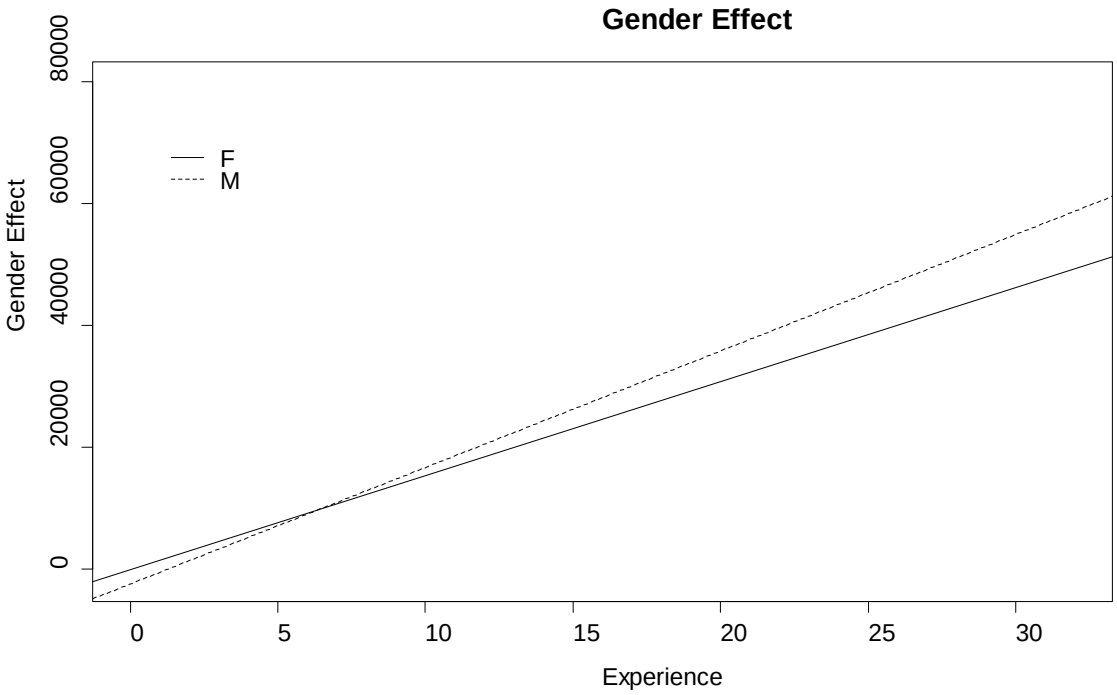
Table 5 shows the results of the robust regression for the salaries of all faculty members. The model used the following independent variables: **Unit + Gender + Experience + (Interaction of Gender and Experience)**. The model thus examines salary as a function of gender by experience and by Unit as defined in **Table 1**. The *interaction term* estimates the effect of gender on the slope of the relationship between experience and salary. Each estimate* shows the estimated mean salary for women, with zero years experience in the specified Unit. The results are shown with their standard errors.

Figure 1 displays the modeled mean relationship between experience and salary by gender ignoring the Unit amount: the dotted line shows the relationship for men (as a group) while the solid line shows that for women (as a group). Ignoring the Unit amount, the equation for mean salary for females is $1543.1*Years Experience, whereas the equation for males is $-2388. 3 + ($367.3 + $1543.1)* Years Experience. Put simply, this means, that as a group, male faculty members with 0 years experience have lower salaries than female faculty members with 0 years experience, but are rewarded at a higher rate ($367.3) for each year of experience. The cross-over point at which the gender effect starts to impact female salaries is at **6.5** years of experience.

Table 5: Robust linear regression results by Unit, Gender and Experience

	Estimate	Std. Error
SOCIAL SCIENCES *	74627.5	1841.8
BUSINESS*	98614.1	2670.7
Child & Youth Care*	70746.1	3866.3
Economics*	89005.2	3340.5
EDUCATION*	69361.9	2469.0
ENGINEERING*	88116.9	2158.9
FINE ARTS*	62387.6	2733.1
HUMAN & SOCIAL DEVELOPMENT*	77409.6	2283.4
HUMANITIES*	70303.3	1813.7
LAW*	87432.4	3478.8
SCIENCE*	73718.4	2034.7
Gender Male	-2388.3	1896.5
Experience	1543.1	120.4
Gender Male Experience	367.3	133.5

Figure 1: Gender Effect



Significance tests were not conducted, as the data that we are using are population-level, as opposed to sample statistics. The R-squared value is 0.6966 with an adjusted R-squared value of 0.6913 indicating that the model explains a reasonable proportion of the variation in salaries among faculty at the University of Victoria.

2.3.4.2: Adjustments suggested by the additive model

The additive model suggests that correcting the intercept for males (-$2388) and slope by the interaction term ($367.3) would eliminate the gender effect on salary. We show below the results of the adjustment[5] of the salaries of female faculty members with 6.5 years or more of experience and male faculty with 6.5 years or less experience. **Table 6** compares the mean and median salaries of male and female faculty before and after the salary adjustment. **Table 7** shows the new results of a linear multiple regression after the salary adjustment. This table shows that after adjustment, the interaction between gender and years of experience has been eliminated. **Figure 2** graphs the relationship between the value of the adjustment and years of experience.

[5] Very large female salaries noted in the residual plot, were not adjusted.

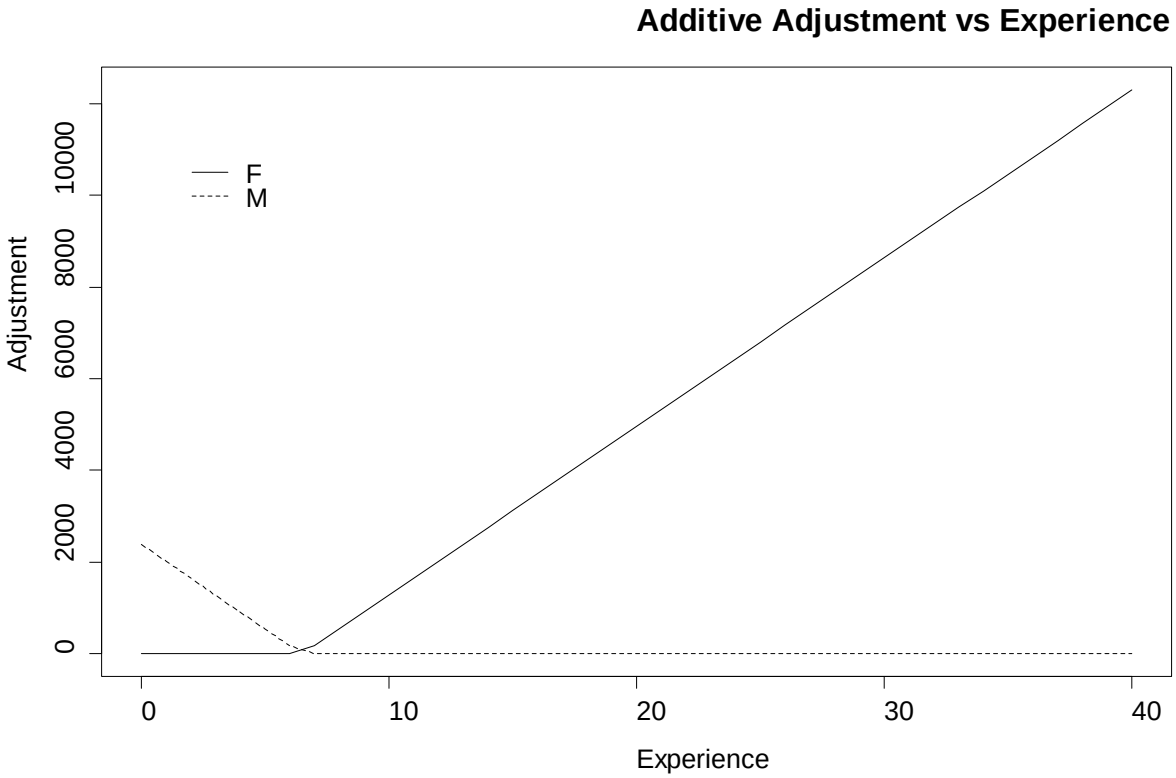
Table 6: Mean and Median Salaries of Faculty, Before and After Adjustment

Rank	Gender	Mean	Adjusted	Median	Adjusted
Assistant	**F**	**85571**	**87139**	**84036**	**84950**
	M	85755	86035	84584	84584
Associate	F	101559	105344	99729	104488
	M	102355	102356	100991	100991
Full	F	125633	132015	121914	129117
	M	134277	134277	133552	133552
Teaching	F	88010	92146	87628	91502
	M	89136	89276	88327	88327
All	F	102343	106316	99693	104119
	M	113357	113412	110253	110253

Table 7: Robust regression results after adjustments

SOCIAL SCIENCES *	72517.4	1834.5
BUSINESS*	96756.5	2680.9
Child & Youth Care*	68517.4	3863.9
Economics*	86733.5	3333.2
EDUCATION*	67132.3	2463.3
ENGINEERING*	85872.1	2153.2
FINE ARTS*	60184.2	2733.6
HUMAN & SOCIAL DEVELOPMENT*	75224.9	2290.4
HUMANITIES*	68104.2	1810.4
LAW*	85257.2	3465.5
SCIENCE*	71482.6	2031.7
Gender Male	88.8	1898.5
Experience	1900.5	120.0
Gender Male Experience	-1.4	133.3

Figure 2: Value of the Adjustment in the Additive Model



As shown in Figure 2, the value of the adjustment increases linearly with years of experience, after 6.5 years of experience for females and decreases linearly with years of experience for males. The formula for the adjustment for females with 6.5 or more years of experience is: -2388.3 + 367.3*Years Experience and the formula for males with less than 6.5 years experience is 2388.3 - 367.3*Years Experience. The total sum of all adjustments using this model is $1,287,703, and will result overall in a 1.56% increase in salary across the university. We note that this adjustment has the significant disadvantage of creating anomalies in salary among male faculty with few years of experience because their adjustments decrease with years of experience.

2.3.4.3: Log- Linear Regression – the Multiplicative Model

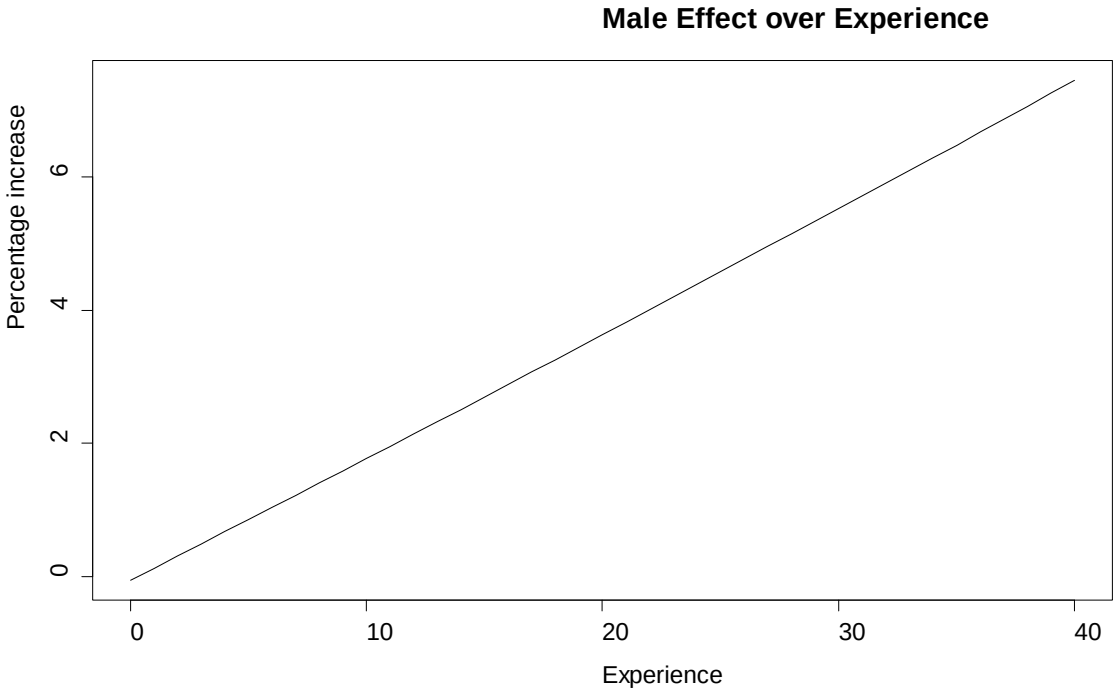
As above, outlying observations in the robust log-linear regression, were automatically assigned weights by the regression model to limit any undue influence that they might have on the slope of the relationship between experience and salary.

Table 8 shows the results of the robust linear regression for the log of salaries of all faculty members. The model uses the following independent variables: **Unit + Gender + Experience + (Interaction of Gender and Experience)**. Male salaries are on average exp (-.0005224+.0018092* Years Experience) times salaries for females in the same Unit. The value of this expression is greater than 1 for Years Experience greater than .3 years and therefore these males have higher salaries than females with the same experience and in the same unit. Note that the model estimates that males with less than .3 years of experience have salaries that are negligibly smaller than females with the same experience and in the same Unit. The R-squared for this model is 0.6876, with an adjusted R-squared of 0.6821 which is slightly less than the Additive model.

Table 8: Robust linear regression results for log of salary

	Estimate	Std. Error
SOCIAL SCIENCES *	11.246	0.0180
BUSINESS*	11.481	0.0247
Child & Youth Care*	11.214	0.0367
Economics*	11.383	0.0276
EDUCATION*	11.197	0.0239
ENGINEERING*	11.369	0.0199
FINE ARTS*	11.124	0.0284
HUMAN & SOCIAL DEVELOPMENT*	11.274	0.0207
HUMANITIES*	11.204	0.0172
LAW*	11.359	0.0312
SCIENCE*	11.243	0.0191
Gender Male	-0.0005	0.0184
Experience	0.0155	0.0010
Gender Male Experience	0.0018	0.0011

Figure 3: Experience and percentage increase in salary, men



2.3.4.4: Adjustments suggested by the multiplicative model

The multiplicative model parameterizes adjustments in terms of ratios or percentages of salary rather than flat dollar amounts. The adjustments suggested by the multiplicative model conform to the percentage increase that is termed "male effect" in Figure 3. The formula for the adjustment as a percentage is: 100% * (exp(-.0005224+.0018092* Years Experience) -1) for females with .3 or more years of experience. The mean salary adjustment, using this model is 1.3%, with a maximum of 8.7%. The overall cost of the adjustment, according to this model is $1,065,843.

2.3.4.5 Comparing the two models

Both the linear and log-linear models show that gender appears to have a cumulative effect on salary, in that the male faculty members appear to gain more salary per year of experience than female faculty members. There are some differences between the two models though, in particular:

1) The additive model has a slightly higher R-squared value, suggesting that a linear model of the relationship between salary and experience explains slightly more of the variation in salary.

2) The cumulative impact of the adjustments using the additive model is higher (with an overall value of $1,287,703, that will result in an overall lift of 1.56% versus $1,065,843.00 with a mean value of 1.3% for the multiplicative model).

The committee determined that an additive model was most appropriate for this study due to the fact that the relationship between salary and experience at the University of Victoria is primarily a function of incremental dollar amounts (merit increments and career progress increments) compounded by negotiated across-the-board increases. The resulting model allows different intercepts for the relationship between experience and salary by unit; however the slope is the same across all units. However, the committee recognizes that the recommendations that flow from the additive model have some potential of creating anomalies, particularly among male faculty members with fewer than 6.5 years of experience.

2.4 Results: Librarians

2.4.1 Demographic statistics

Table 9 shows demographic characteristics of all librarians at the University of Victoria and by rank at the time of the data extraction (July 2012). Librarian rank reflects a combination of performance and years of service. As shown in **Table 9**, women librarians have, on average, higher years in rank than men, as well as more years experience. **Table 10** shows that on average, male librarian salaries are slightly lower, with the exception of Librarian IIIs. The overall ratio between median salaries of men and women librarians is 1.10. As shown in **Table 9**, there are currently no Librarians I at the University of Victoria. In addition, currently all of those in the Librarians II rank are women.

Table 9: Average Characteristics by Gender and Rank, Librarians

Gender	Rank	Number	Age	Hire Years	Experience	Years in Rank
Men	All	8	50.6	9.3	18.5	3.5
Women	All	16	50.3	15.4	20.9	5.8
Men	IV	2	57	14.0	26.0	4.0
Women	IV	10	55.8	18.6	25.3	7.4
Men	III	6	48.5	7.7	16.0	3.3
Women	III	4	40.5	13.8	15.0	2.3
Men	II	0	NA	NA	NA	NA
Women	II	2	42.5	2.5	10.5	4.5

Table 10: Average and Median Salaries by Gender and Rank

Gender	Rank	N	Average	Ratio	Median	Ratio2
Men	All	8	83780	1.06	82310	1.10
Women	All	16	89220		90620	
Men	IV	2	95480	1.02	95480	1.02
Women	IV	10	98050		97790	
Men	III	6	79880	0.97	79010	0.98
Women	III	4	77210		77120	
Men	II	0	NA	NA	NA	NA
Women	II	2	69100		69100	

2.4.2 Assessing the fit using residual analysis

The scatterplot showed that while the relationship appeared to be roughly linear, there were also a number of outliers. A residual analysis revealed that of the 24 full-time librarians, at least six, or 25%, have salaries that are significantly higher or lower (by more than 5000 dollars) than the estimated mean salary.

2*.4.3 Robust regression results*

The residual analysis suggests that there are some unusual observations. However the R-squared for this model is 0.8869 and the adjusted R-squared is 0.8700 suggesting that a large portion of the variation in salaries is explained by the model.

Table 11: Robust regression results, librarians

Coefficient	Estimate	Std error
Intercept	54727	3750
Gender-Male	14704	3297
Experience	1682	201
Gender Male: Experience	-1004	189

Table 11 shows the regression results for librarians. The intercepts show that while men with zero years experience have salaries that are $14,704 higher than women with zero years experience, the salary slope for women is steeper by $1,004. Note that there are no men with zero years of experience, and the minimum experience years observed in the data set is 9 years.

Interpretation: The committee is unable to draw firm conclusions regarding pay inequities and gender in the case of librarian salaries because the number of

librarians is too small to lend confidence in the estimated gender effects in the multiple regression. Although the regression model fits reasonably well, it is not known whether indicators for department or job description could explain the gender differences displayed here. These indicators cannot be included in the model because of the very small numbers of librarians in each department and job description.

3. Recommendations for Pay Adjustments

3.1 Remedying discrimination in wages: BC Human Rights Code, sections 12(5); 37(2)

As already stated, the GET committee decided its work will be informed by the BC *Human Rights Code* provisions on pay discrimination and ways of remedying such anomalies. Section 12(5) provides that an employee who alleges discrimination in wages is entitled to bring an action against the employer to recover the difference between the amount paid and what they should have been paid had the employer not discriminated in its compensation system. The claim is limited to remuneration for the 12 months period immediately before the date of the employee's termination or commencement of the action for wage discrimination, whichever comes first. For our purposes, this means a claim for discrimination in wages can only be made in relation to salary paid to faculty members and librarians during the 12 months preceding the commissioning of the working group to investigate potential gendered salary anomalies.

Section 12(5) does not specifically state what remedy the employee is entitled to upon a finding of discrimination in wages. Section 37(2) provides a range of remedies that the Tribunal Member or Panel hearing the complaint may consider:

- The Member or Panel must order the employer determined to be in contravention of the relevant Code provision (for our purposes section 12 (discrimination in wages)), to stop the contravention and not to commit the same or similar contravention: section 37(2)(a).
- In addition, the Member or Panel may order the employer to take particular steps "*to ameliorate the effects of the discriminatory practice*" and/or "*adopt and implement an employment equity program or other special program to ameliorate the conditions of disadvantaged individuals or groups*" as evidenced by the finding of discriminatory pattern or practice: section 37(2)(c)(ii).
- The Member or Panel has discretion to order an employer determined to be discriminating in wages to pay the affected employees all or part of the salary differential due to the pattern or practice of discriminatory remuneration within the past 12 months as determined under sections 12(5)(b) and section 37(2)(d)(ii).

The GET Committee's analyses and recommendations reflect the procedure and remedies in the BC *Human Rights Code*. Among other things, it interprets the Code's provision to suggest that a finding of gendered pay discrimination will lead to recommendations that the University take measures to redress wage discrimination on the basis of gender. Specifically:

- The University should adopt a compensation system that recognizes equal pay for faculty members and librarians doing the same or substantially similar work, institute a system of regular or periodic audits to monitor compensation patterns and practices to avoid potential discrimination in future, and to remedy any discrimination in wages.

- As well, given the discretion in determining appropriate ways to redress wage discrimination, the committee considered the parameters of its recommendations for retroactive salary adjustments, the relevant period for that adjustment and method(s) for determining the appropriate amount.
- In terms of determining retroactive salary adjustments, the GET committee took the timing of the signing of the LOA in June 2012 as equivalent to the "*commencement of the action against wage discrimination*" as specified in section 12 (5).
- This means that any salary award or correction that we recommend be implemented as follows: (i) a one-time retroactive award correcting pay discrimination between July 1 2011 and July 1 2012 that corresponds to the one-year difference between the pay that should have been given in 2012 and the pay that was received; (ii) a correction of the base salary as of July 1 2012; and (iii) recalculation of the 2% salary lifts given in 2012 and 2013 given the salary correction in 2012.

3. 2 Remedies Available to Address Pay Discrimination

As already noted, the concept of gender *inequity* in wages is consistent with focusing on uncovering group differences in wages, if any, and suggesting group corrections in wages. Across similar types of investigations, three different types of remedies have been proposed:

- **"*Below-the-line*" corrections:** The regression analysis is used to graph differences between predicted salaries (on the basis of seniority, performance and/or rank or some modifications of those predictors) and actual salaries. Only those individuals whose actual salaries fall below their predicted salaries receive a correction, "*to-the-line*". For instance, "*below-the-line*" corrections were implemented following gender pay equity analysis at Western University in 2005 and in 2009 (UWO Committee on Gender-Based Anomalies 2009).

- **Group awards:** The regression analysis is used to determine the gender intercept as an estimate of group differences in pay between men and women employees. All employees in the disadvantaged group would then receive the same monetary award, regardless of whether they are high or low paid (or fall below or above the regression line). This is the approach used most recently at the University of B.C., where, following an investigation into gender inequity in salary, all female faculty received a 2% lift in their base pay. (UBC Final Recommendation Report, 2012)

- **Modified group awards:** This approach is similar to the group award approach except that it attempts to discriminate between different categories of employees and to generate remedies that are more targeted at specific areas of inequity. This approach uses the regression analysis to determine

the gender intercept within particular categories of employees, such as by rank, or area of service.

3.3 A modified group award based on a robust linear regression analysis

The analysis conducted by the GET Committee leaves open a fourth possible way to formulate a correction of gender pay inequities in salary: a modified group award using the regression-line as its model. In this approach, two regression lines are modeled: one for male faculty members and one for female faculty members. Those female faculty members with years of experience above the point at which the salary slope for men and women intersect will receive a pay correction, as will those male faculty members with years of experience below the intersection point. This correction will have the result of evening out the difference between the two regression lines that are shown in **Figure 3**. It is a group award, however, rather than an individual award, because every female faculty member with the same number of years since highest degree will receive the same monetary correction.

The committee recognizes that the analysis was conducted at the population-level, and as such creates population-level, or group-level recommendations. It is beyond the committee's mandate to ensure that the recommendations that it makes not produce salary anomalies within units.

As per the discussion on pay remedies for gender discrimination outlined in *3.1.1* should entail the following components: (i) a one-time corrective payment representing the difference between the pay received and the pay that should have been received between July 1 2011 and July 1 2012; (ii) a correction of base salary as of July 1 2012; a reassessment of the effects of the 2% lifts in 2013 and 2014 on the basis of the new base salary of 2012.

4. Recommendations for Monitoring and Preventing Future Pay Inequities

The recommendations contained in this report reflect the results of the first institution-wide study of gender and pay equity conducted at the University of Victoria. The results of the study show that there are gendered differences in pay among faculty at the University of Victoria; these differences are small for small number of years since last degree, but get larger for faculty who are more senior in their career. In other words, our data shows that there is a "*seniority*" effect on gender differences in salaries.

There are at least three competing hypotheses that would explain this effect:

- The "*seniority*" effect is likely an artifact of historical discrimination in hiring practices, in which female faculty members were historically offered lower starting salaries than male faculty members. The large salary differences among senior members reflect this discrimination, while the small differences among more junior faculty reflect a growing awareness of gender equity in starting salaries.
- The "*seniority*" effect likely reflects gendered patterns of discrimination in performance awards; the small differences among junior faculty and the large differences among more senior faculty reflect the cumulative impact of performance discrimination over time.
- The "*seniority*" effect is likely a result of *both* historical discriminations in starting salaries and gendered discrimination in performance awards.

As the data that the GET committee used is cross-sectional, its findings do not allow us to discriminate between any of these three explanations. In other words, any further examination of the causes of the "*seniority*" effect would require longitudinal data that tracks salary and career progression over time among male and female faculty members. What the committee is able to do, however, is offer recommendation in terms of monitoring the salary recommendation process and the timing of future pay equity investigations, that taken together, will be able to contribute a fuller picture of the origins and nature of possible gender pay inequity at the University of Victoria going forward.

Our recommendations are thus as follows:

- That the relationship between gender and performance awards (including merit increments, market supplements, and retention adjustments) be monitored annually at the Faculty level;
- That reports on the gender breakdown of performance awards be presented to the Provost's office as well as to the Faculty Association at regular intervals, ideally no less frequently than once every three years;
- That the statistical exercise presented in this report be repeated, using the same or equivalent methodologies and data protocols, at a predetermined future date. Our recommendation is that this investigation be conducted at minimum after one 3-year interval corresponding to the evaluation window

of the current merit award system at the University of Victoria, and no later than 6 years. The investigation should include an assessment of the relationship between gender and merit increments, market supplements, and retention adjustments to the extent possible.

- The University Librarian should review gender and pay equity among full-time librarians at the University on a case-by-case basis. Our recommendation is that the timing of this review should coincide, if possible, with the salary corrections of faculty members.

APPENDIX A: Letter of Agreement between the University and the Faculty Association

CONFIDENTIAL
University of Victoria and UVic Faculty Association
2012 Framework Agreement Negotiations

FINAL APPROVED WORDING
June 29, 2012

Re: Gendered inequities in salaries at the University of Victoria

Faculty Association June 26th, 2012

Proposed Letter of Agreement

The Administration and the Faculty Association agree to jointly form a task force, including a representative from the Academic Women's Caucus, to investigate and address gendered salary inequities at the University of Victoria. This task force will:

a. investigate whether there are gendered salary inequities at the University of Victoria;

b. make recommendations to the Provost to correct such anomalies with a report by January 31st and an implementation deadline by June 30th 2013;

c. make recommendations to the Provost for a monitoring and reporting mechanism to ensure continuing gender equity in compensation at the University of Victoria; and

d. make recommendations regarding the information on member compensation that should be reported to the Faculty Association on an annual basis.

Dated: June 29, 2012

Kim Hart Wensley
Chief Negotiator
University of Victoria

Doug Baer
Chief Negotiator
University of Victoria Faculty Association

APPENDIX B

British Columbia *Human Rights Code,* RSBC 1996, c 210

Discrimination in wages

12 (1) An employer must not discriminate between employees by employing an employee of one sex for work at a rate of pay that is less than the rate of pay at which an employee of the other sex is employed by that employer for similar or substantially similar work.

(2) For the purposes of subsection (1), the concept of skill, effort and responsibility must, subject to factors in respect of pay rates such as seniority systems, merit systems and systems that measure earnings by quantity or quality of production, be used to determine what is similar or substantially similar work.

(3) A difference in the rate of pay between employees of different sexes based on a factor other than sex does not constitute a failure to comply with this section if the factor on which the difference is based would reasonably justify the difference.

(4) An employer must not reduce the rate of pay of an employee in order to comply with this section.

(5) If an employee is paid less than the rate of pay to which the employee is entitled under this section, the employee is entitled to recover from the employer, by action, the difference between the amount paid and the amount to which the employee is entitled, together with the costs, but

(a) the action must be commenced no later than 12 months from the termination of the employee's services, and

(b) the action applies only to wages of an employee during the 12 month period immediately before the earlier of the date of the employee's termination or the commencement of the action.

Index of Tables and Figures

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