

Sex and salaries at a Canadian University: The song remains the same or the times they are a changin'?

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Abstract

This paper compares male and female academics' salaries at the University of Manitoba in three years, each a decade apart. Following findings of salary inequalities in 1993 and 2003, we examine whether male and female salaries equalized by 2013. We use decomposition techniques to analyze changes in the sex gap over two 10-year periods, and to identify variables that influenced those changes. Drawing on the concept of labour segregation to trace the source of the sex gap, we find that the positional variables of rank, appointment type, and faculty underwent changes that influence the salary gap between the sexes.

Introduction

The University of Manitoba (UM) has been the subject of studies on sex and salaries since 1974 when the faculty union, the University of Manitoba Faculty Association (UMFA), was certified. Gender inequalities in faculty salaries and positions were analyzed in 1974 (UMFA 1974) 1975 (University of Manitoba 1975), 1988 (Pujol and McCannell 1988), 1992 (University of Manitoba 1992), and 1993 (Haignere and Lin 1994).

The 1993 study (Haignere and Lin 1994) found a 22 percent sex gap in salaries, prompting the University to increase all women's salaries in an effort to eliminate the gap. In 2003, we obtained data to examine salaries at the 10-year anniversary of the 1993 analysis. Our analysis found a salary differential between male and female faculty that was essentially unchanged from 1993 (Brown, Troutt, and Prentice 2011).

This paper re-examines sex and salaries at the UM, using 1993, 2003, and 2013 data. It asks: Was the decade 2003-2013 different from the previous decade? Are the times finally changing? We begin by reviewing the literature on the determinants of salary gaps by sex. We then present an overview of our data. Following that, we use the Blinder-Oaxaca decomposition (BOD) to analyze the sources of differences in salaries by sex and follow this with a Wellington-Blinder-Oaxaca decomposition (WBOD) to investigate the elements that have changed between data points.

The BOD and WBOD methodologies enable a more nuanced analysis than the pre-2003 studies because BOD and WBOD reveal sources of salary differences. These sources relate to labour segregation across positional variables. In a university setting, these variables include ranks, faculties, and appointment types. WBOD in particular shows us that, in some cases, changes in the distribution of men and women among positions can greatly affect the salary gap between the sexes.

Context

Since at least the 1970s, researchers and policy makers alike have acknowledged and studied gender pay gaps in many countries and professions. In Canada, despite an

improvement in the gender pay gap, women's hourly wage remains about 83 percent of men's as of 2008 (Statistics Canada 2013).

Persistent pay gaps are echoed between male and female academics at universities throughout the industrialized countries (Catalyst 2015; Goastellec and Pekari 2013; Takahashi and Takahashi 2011). For example, Takahashi and Takahashi (2011) examined the presence and change in the salary gap in Japan, where the academic pay gap between the sexes is the largest in the world (Catalyst 2015), finding no evidence that the gap is decreasing over time. Additionally, Carlin et al. (2013) examined the gender salary gap including a number of productivity variables, using 1996-1997 data for a mid-western U.S. university. They conclude that "the comparative lack of reward for peer-rated female productivity is striking" (pp. 145-6). In their analysis, men earned a greater return than women for both research productivity and teaching awards. In Canada, studies have found salary gaps between male and female academics at a number of universities, including Memorial University (Schrank 1977, 1985), McGill University (2009; Murray 2014), the University of British Columbia (Bakker et al. 2010), McMaster University (Office of Institutional Research and Analysis 2014), the University of Calgary (2005), and the University of Winnipeg (Joint Women's Pay Equity Committee Report 1999). Based on these findings, some universities have made remedial payments to women faculty; these universities include McMaster University (McGinn 2015), the University of Winnipeg (UW 2011), McGill University (Murray 2014), the University of British Columbia (UBC 2012), and the UM.

At the University of Manitoba, gender inequities in academic salaries have been studied for several decades. A 1974 study (UM 1974) found that \$200,000 (1974 dollars) would be needed to close the existing salary gap at that time. This led to the establishment of an 'Inequities Fund' to address gender inequities in salary, which a year later became the 'Anomalies Fund' (UM 1975) whose objective shifted to repair inequities within ranks and departments, regardless of gender. The causes of the salary gap were re-examined in 1988 (Pujol & McCannel 1988) with a Human Rights complaint filed in 1989 (MACSW 1989). In 1993, Haignere and Lin (1994) conducted a salary study that estimated a 22 percent salary gap, prompting the University to pay a (partial) remedy. Despite the

remedy paid, a 2003 follow-up study (cite us?) found a 21 percent salary gap between male and female academics at the University.

The reasons for persistence in academic salary differences by gender, excluding human capital variables, focus on returns to output and occupational segregation within academia. Occupational segregation is found where there is a significant imbalance in the representation of a particular gender (or race) in a particular employment position (Jacobsen, 2007). For example, the preponderance of female secretaries and male engineers in general, or male managers in a particular firm constitute evidence of occupational segregation. In a university context, occupational segregation appears in the form of differences in the probabilities of finding men and women in particular positions that convey different monetary rewards. Between universities, women and men may be hired differentially by institution type, with institutions that are more likely to hire women paying less on average (Britton et al. 2012; Renzulli et al. 2013; "Women in Academia" 2015). Within a single institution, faculty can be hired into instructor ranks or professorial ranks, with gender segregation leading to a preponderance of women in the instructor ranks (Catalyst Canada 2015). In an academic setting, segregation can also appear in the differential hiring of women by faculty or discipline (Goastellec and Pekari 2013). Finally, it can appear in appointment type, with men more likely to obtain a tenure track position and women more likely to be found in term or contingent positions (Goastellec and Pekari 2013).

An important point on which to focus in considering the analysis below, as well as previous studies, is the absence of fault in discussions of the salary gap. Rather than place blame for female underrepresentation or unequal pay on particular agents within the organization or institution, inequities due to segregation are attributed to outcomes resulting from impersonal systemic processes and dynamics. Jacobsen (2007) shows the persistence of gender segregation across occupations throughout both industrial and agrarian societies, demonstrating that, without vigilance and intervention, humans tend to segregate. While the word discrimination is often used to represent personalistic differential treatment, systemic discrimination (Prentice 2000) represents unconscious values operationalized through institutionalized processes thought to be neutral. For this reason, systemic discrimination may be investigated through statistical analysis.

Illustrative of unconscious discrimination are the wealth of resumé or Goldberg studies that find that both men and women rank the qualifications and expertise of white men higher than those of women or people of colour (e.g., Steinpreis, Anders, and Ritzke 1999, Moss-Racusin et al. 2012). Raymond (2013 p. 33) notes that “[a] host of studies shows that people tend to rate women as less competent than men across many domains, from musical abilities to leadership, and that many individuals hold biases about competency on the basis of other irrelevant attributes, such as skin colour, body, weight, religion, sexual orientation and parental status.”

Potential unconscious bias, contributing to systemic discrimination can readily give rise to occupational segregation of men and women in a university setting, with consequent implications for the gender salary gap. Conscious work is required to overcome the unconscious biases and achieve greater equality (Raymond 2013). . In some European countries, legal requirements to report on gender representation in senior management has drastically improved women’s representation at the highest management levels and board positions in corporations (Lipman 2015).

Data

The data for this study comprise information on all full-time teaching faculty at the University who are part of UMFA. These include the professorial ranks and instructor ranks. UMFA also includes librarians, but we exclude them from the analysis because their duties differ from the duties of the teaching faculty. The analysis includes 1,215, 1,099, and 1,180 teaching staff in 1993, 2003 and 2013, respectively. The variables included in the data are full-time salary, sex, year of birth, highest degree, year of highest degree, start year at the University, faculty, department (with some missing values), rank, and appointment type.

Table 1. Teaching faculty by rank and year.

Teaching rank	Count			Percent		
	1993	2003	2013	1993	2003	2013
Full professor	523	351	361	43.0	31.9	30.7
Associate professor	367	275	335	30.2	25.0	28.5
Assistant professor	231	289	280	19.0	26.3	23.7
Lecturer	22	20	--*	1.8	1.8	
Senior Instructor	11	25	42	0.9	2.3	3.6
Instructor 2	27	54	107	2.2	4.9	9.1
Instructor 1	34	85	55		7.7	4.7
Total of faculty ranks	1,143	935	976	94.1	85.1	82.7
Total of instructor ranks	72	164	204	5.9	14.9	17.3
Total	1,215	1,099	1,180			

*Assistant professors and Lecturers are combined in 2013. There were less than 5 lecturers in 2013.

Table 1 shows the distribution of faculty by rank and year. The number of employees in faculty ranks (particularly full professors) and the number of faculty overall, dropped significantly from 1993 to 2003, and recovered slightly over the second decade. In contrast, we see the number of employees employed in the instructor ranks more than

double over the first decade and continue to grow, though more slowly, over the second decade. Looking at percentages, the proportion of UMFA members holding faculty ranks has dropped almost 12 percent over 20 years, while the proportions in the instructor ranks have increased correspondingly. The percentage of faculty who are full professors has fallen from about 43 percent in 1993 to 31 percent in 2013. Thus, over time, the University has followed a pattern seen at other universities throughout North America, substituting instructor jobs for professoriate ones to perform its functions.

Table 2 shows the distribution of faculty by sex and rank for each year. Overall, there has been progress from 1993 to 2013, with women's presence improving from 24 percent to 41 percent of UMFA teaching positions.

Despite this overall progress, changes vary by position at specific ranks or clusters of ranks. Of tenured or tenure track positions, including lecturers, women's representation increased from 20.3 percent in 1993, to 29.5 percent in 2003, to 36.3 percent in 2013. At the full professor rank, even as the number of full professors dropped over the 20 years, both the number and proportion of women full professors increased. Yet, in 2013, women still made up only a quarter of full professors. Considering full and associate professors together, 79 percent of men and 43 percent of women held one of these ranks in 1993, compared with 66 percent of men and 34 percent of women in 2003, and 68 percent of men and 46 percent of women in 2013. Despite the progress for women since 2003, men remain 50 percent more likely than women to hold one of these two top ranks. A pattern of improvement in women's representation at the assistant professor rank also held over the 20 years analyzed, with women making up almost half of assistant professors by 2013. At these rates of progress, if the University can retain its female assistant professors and continues to hire into that rank in equal proportions, women could possibly reach parity in another 20 to 30 years.

Differences in the time men and women took to attain the rank of full professor improved over the period of analysis as well. In 1993, on average, women required 2.5 extra years to reach full professor from year of hire (9.5 versus 12 years). By 2013, women took 1.2 extra years to reach full professor (9.8 versus 11.0 years). We could not obtain the data on this variable for 2003.

Like their continued underrepresentation at the professorial ranks, women's overrepresentation in the instructor ranks persists for all but senior instructors. Women remain disproportionately represented at both the instructor 1 and 2 ranks, occupying upwards of about 60 percent of those ranks across time periods. In contrast, gender parity in representation can be seen at the senior instructor rank in 2013.

Table 2. University of Manitoba teaching faculty by rank and sex: 1993, 2003, and 2013.

Rank	1993 ^a		2003		2013	
	M ^b (%)	F (%)	M (%)	F (%)	M (%)	F (%)
Full professor	486 (93%)	37 (7%)	300 (85%)	51 (15%)	272 (75%)	89 (25%)
Associate professor	271 (74%)	96 (26%)	185 (67%)	90 (33%)	203 (61%)	132 (39%)
Assistant professor	147 (64%)	84 (36%)	169 (59%)	120 (41%)	147 (52.5%)	133 (47.5%)
Lecturer	7 (32%)	15 (68%)	5 (25%)	15 (75%)	--*	--*
Senior instructor	4 (36%)	7 (64%)	8 (32%)	17 (68%)	21 (50)	21 (50)
Instructor 2	10 (37%)	17 (63%)	18 (33%)	36 (67%)	36 (34%)	71 (66%)
Instructor 1	14 (41%)	20 (59%)	33 (39%)	52 (61%)	23 (42%)	32 (58%)
Total	962 (76%)	308 (24%)	735 (64%)	417 (36%)	699 (59%)	478 (41%)

Table 3 presents human capital variables by sex. Both men's and women's average age increased from 1993 to 2013, with more marked increase in women's average age than men's. In terms of highest degree held, men are much more likely to hold a PhD than women in each period, but the proportion of women holding a PhD increased significantly between 2003 and 2013. (The proportion of men holding a PhD also increased significantly from 2003 to 2013, though by a much smaller amount). Not surprisingly, there is an opposite movement in the proportion of faculty holding an MA as their highest degree, with the proportion of women holding an MA falling sharply from 2003 to 2013.

Men and women exhibit differences in their patterns of experience prior to being employed by the University. In 1993, men and women both averaged 2.46 years of experience at hire. This means both sexes worked the same amount of time between receiving their highest degree and accepting a University position. By 2013, men had, on average, almost 5 years' experience between earning their highest degree and obtaining their University position, while women's prior experience had risen to only 3.35 years. If prior experience is a factor in hiring and starting salary decisions, this could re-introduce inequalities in wages and faculty positions between the sexes over time. As for experience at the UM, there was an increase (decrease) in women's (men's) average years of experience over the second decade only, with women's (men's) average experience increasing (decreasing) from 8.9 (16.3) years in 2003 to 10.3 (14.5) years in 2013.

Table 3: University of Manitoba faculty member characteristics across time, by sex.

	1993	1993	2003	2003	2013	2013
	M	F	M	F	M	F
Age ^{a,c}	50.52	44.92	51.01	46.31	51.79	49.22
PhD ^{a,d}	82.64	59.42	82.17	57.48	85.57	71.34
Master's ^{a,d}	12.89	30.35	12.81	31.50	9.40	22.80
Pre-Univ exp (yrs) ^{a,e}	2.46	2.46	3.49	2.93	4.94	3.35
Univ exp (yrs) ^f	17.03	9.36	16.30	8.91	14.53	10.27

Notes for Table 3:

^a Males and females test differently from each other in all 3 periods, with $p < 0.0000$ for sex proportion, mean age, PhD, Master's, and years of experience at UM (Univ exp). Males and females test different from each other on pre-UMFA experience only in 2013, with $p < 0.0000$.

^b Across time, proportions of males and females change each decade, at 0.01 level of significance.

^c Across time, females' mean age increases significantly across each decade, while males' mean age changes only across the full 20 years, all at 0.05 level of significance.

^d Across time, the probability of both males and females holding a PhD (MA) increases (decreases) from 2003 to 2013, at 0.05 level of significance. Neither changes from 1993 to 2003.

^e Across time, males' pre-UMFA experience increases across each decade, with $p < 0.0000$, and females' pre-UMFA experience increases only across the 20-year span, with $p < 0.05$.

^f Across time, females' UMFA experience increases and males' UMFA experience decreases, both only from 2003 to 2013, with $p < 0.05$ for females and $p < 0.01$ for males.

Table 4 provides male and female average salaries by rank and time period in 2013 dollars. It also shows the ratios of female to male salaries at each rank for each time period and the changes in those ratios between the decades. Overall, women earn less than men in all three time periods of our analysis. After falling slightly from under 24 percent to 21 percent from 1993 to 2003, the overall average salary gap shrank to 12 percent in 2013. This reflects both a decrease in within-rank salary gaps and progress toward more equal representation by rank.

Table 4: Mean salaries by rank and sex 1993, 2003, and 2013. (2013 dollars)

	1993			2003			2013			Change in	
									F:M		
	Male	Female	F:M	Male	Female	F:M	Male	Female	F:M	'93-'03	'13
Full prof	\$126,684	\$117,998	0.93**	\$125,977	\$115,535	0.92**	\$142,383	\$137,587	0.96*	-0.01	0.04
Assoc prof	\$95,831	\$90,535	0.94**	\$95,926	\$90,499	0.94**	\$108,681	\$107,415	0.99	0	0.05
Assis prof	\$74,782	\$69,455	0.93**	\$76,420	\$74,236	0.97	\$89,053	\$86,080	0.97*	0.04	0
Lecturer	\$58,912	\$61,314	1.04	\$65,303	\$63,572	0.97				-0.07	
Senior	\$87,443	\$79,837	0.91	\$81,417	\$79,834	0.98	\$98,139	\$99,408	1.01	0.07	0.03
Instructor 3											
Instructor 2	\$70,866	\$64,904	0.92	\$69,161	\$68,049	0.98	\$84,327	\$84,061	1	0.07	0.02
Instructor 1	\$58,037	\$55,892	0.96	\$57,026	\$53,163	0.93	\$69,813	\$71,690	1.02	0.02	0.09
Average	\$107,365	\$81,853	0.76**	\$101,057	\$79,975	0.79**	\$114,740	\$100,884	0.88**	0.03	0.03

Considering the breakdown by rank and time period, the ratio of female to male salaries is less than one for all but four cells of the table, comprising the instructor ranks in 2013 and lecturers in 1993. Of the nine ratios for the professoriate ranks in the three time periods, seven are statistically significantly less than one, indicating that, on average women continue to be paid less than their male counterparts in each professoriate rank. However, the female to male salary ratios for all three professoriate ranks increased during the 20 years that our data span. While improvement in women's pay relative to

men's at the assistant professor rank occurred during the first decade of our analysis, improvement in women's pay relative to men's at the full professor and associate professor ranks occurred during the second decade of analysis, as reflected in the two right-hand columns of the table. By 2013, in fact, female associate professors reached salary parity. Because women remain at the associate professor rank longer than men, however, what appears to be parity may be due to longevity in rank. Though by 2013, male and female academics were paid nearly equally at all ranks, indicating that within-rank sex gaps are disappearing.

None of the salary differences for the instructor ranks are statistically significant. This is due to the combination of low numbers in 1993, and movement toward salary parity over time. Segregation by professoriate versus instructor rank affects the overall salary gap as the highest paid instructor rank earns, on average, less than associate professors in all years.

Methodology

For within year analysis of determinants of the gender salary gap, we apply the Blinder-Oaxaca decomposition (BOD) to each of the three time periods. This separates the effects of endowments (variables) and coefficients in explaining the gender salary. Using coefficients and variable averages from pooled data (Jann 2008), the decomposition would look like:

$$\ln \bar{w}_m - \ln \bar{w}_f = (\bar{X}_m - \bar{X}_f)\hat{\beta}_p + (\hat{\beta}_m - \hat{\beta}_f)\bar{X}_p$$

where the left hand side is the difference between the mean male and female salaries (the wage or salary gap), m = male, f = female, p = pooled regression model, X = the vector of means of the explanatory variables (the endowments), and $\hat{\beta}$ = a vector of estimated coefficients.

On the right hand side, the first term uses a common vector of estimated coefficients and measures the effect of differences in the male and female means of endowment variables on the salary gap. The second term uses the means of the pooled endowment variables and weights these by the difference between the respective coefficients

estimated for single-sex models to measure the portion of the salary gap that is explained by differences by sex in the returns to or treatment of (coefficients on) each variable (endowment).

The interpretation of the BOD has shifted in recent literature. Traditionally, the first term on the left hand side was referred to as the 'explained component' of the salary gap, as endowments were considered to be human capital variables (see e.g. Becker and Toutkoushian 2003). Discrimination was measured using the second term or 'unexplained component,' meaning differences in treatment of persons with identical endowments. However, given debates over the potential for endowments to reflect or contain discrimination due to such factors as segregation, the interpretation of the first term has shifted (see, for example, Jann 2008). Rather than draw a conclusion concerning the presence or absence of discrimination, researchers examine the details of both components and highlight areas where differences are apparent. This directs employers and policy makers to monitor decisions closely to ensure that differences are not due to systemic discrimination. In this paper, we therefore refer to the first term as the 'endowment effect' and the second term as the 'coefficient effect' (p. 454 Jann 2008).

For example, for the variable instructor 1, the endowment effect provides the estimate of the proportion of the overall salary gap explained by the difference in the respective probabilities that a man or a woman is an instructor 1. That is, the endowment effect captures segregation, if it exists. It also captures self-selection. The coefficient effect estimates the portion of the overall gap due to the differential treatment of similar instructor 1s who differ only by sex.

To examine the change in effects on the salary gap across decades of our analysis, we apply the Wellington-Blinder-Oaxaca decomposition (WBOD) (Wellington 1993). This separates the effects of different endowments and coefficients on the change in the gap across periods. For this part of the analysis, we use information from the latest year as the base, rather than a pooled average.

The equation used for the decomposition is:

$$\begin{aligned}
& (\ln w_{m_t} - \ln w_{m_{t-10}}) - (\ln w_{f_t} - \ln w_{f_{t-10}}) \\
& = [\hat{\beta}_{m_t}(X_{m_t} - X_{m_{t-10}}) - \hat{\beta}_{f_t}(X_{f_t} - X_{f_{t-10}})] \\
& + [X_{m_{t-10}}(\hat{\beta}_{m_t} - \hat{\beta}_{m_{t-10}}) - X_{f_{t-10}}(\hat{\beta}_{f_t} - \hat{\beta}_{f_{t-10}})]
\end{aligned}$$

where notation from the BOD is retained. Wellington provides a clear explanation of the interpretation for this decomposition (1993). The first term applies male and female coefficients from the later period to changes in the means of the sexes' respective endowments over the decade. It provides the portion of the salary gap due to changes in the means of men's and women's endowments, if returns to endowments were constant at level of the later time period t . The second term provides the portion of the wage gap attributable to changes in the coefficients (i.e., treatment of the sexes) evaluated at the $t - 10$ endowment means.

This decomposition is complex to interpret. WBOD yields an endowment effect and a coefficient effect for each variable. The sign of an estimated effect is straightforward: a positive (negative) effect corresponds to a widening (narrowing) of the salary gap over time. Interpreting the source of an effect is more complicated. The endowment effect depends on the relative magnitudes of the male and female regression coefficients in combination with the relative magnitudes of changes in the male and female means of the variable. For example, if the endowment effect is positive, this could mean that the variable's female mean increased relative to the male mean across the decade if the male regression coefficient exceeds the female coefficient. Alternatively, if the male regression coefficient is less than the female regression coefficient, with both positive, then an increase in the variable's male mean must exceed the increase in the variable's female mean by enough to offset the difference in the coefficients in order to produce a positive endowment effect.

Results and Analysis

To obtain the BOD and WBOD decompositions, we perform male, female, and pooled OLS regressions for each year. The log of real salary is regressed on education

variables (PhD, MA or professional, and less than MA), experience (years in UMFA and its square, years prior to UMFA since degree), rank (full professor, associate professor, assistant professor or lecturer, senior instructor, instructor 2, and instructor 1), appointment type (tenured, probationary, term, contingent, and continuing), faculty (Arts omitted), and a binary sex variable in the pooled model. Education and experience are pure human capital variables. Rank and appointment type may capture aspects of the within-university market, but they may also reflect gender inequities in institutional processes and decision-making. Faculty effects on salaries could reflect market conditions or decisions within the university that influence salary. For the regressions, the default is a male tenured assistant professor or lecturer in the Faculty of Arts who holds a PhD and has no UMFA or pre-UMFA experience. Regression results are in Appendix 1.

BOD results

Tables 5a and 5b show the BOD results for each year, with the endowment effects in Table 5a and the coefficient effects in Table 5b. Recall that the BOD estimates the effects of endowments and regression coefficients on the size of the sex gap in log salaries. A positive (negative) estimated effect indicates that the distribution of men and women measured in that variable or the differential treatment of men and women with respect to that variable increases (decreases) the salary gap. Because the overall gap is positive in favour of males for all three years (24 percent in 1993, 21 percent in 2003 and 12 percent in 2013), a negative effect does not *necessarily* imply women are treated better than men, but that the negative treatment is smaller than average and would thus reduce the salary gap *ceteris paribus*. The endowment effects reflect relative differences in male and female experience, highest degree held, as well as the distribution of men and women by faculty, rank and appointment type.

In all three time periods we see positive endowment effects reflecting greater male experience at the University, a higher likelihood of men to be full professors, and a higher likelihood that women hold instructor positions and term or contingent appointments. The effects reflect the differences in summary statistics in Table 3.

Table 5a: Blinder-Oaxaca detailed decomposition: Endowment effects across time

Effects of differences in Endowments	1993 Coef	P-value	2003 Coef	P-value	2013 Coef	P-value
Pre-UM experience	0.0000	0.9990	0.0027	0.1820	0.0079	0.0000
UM experience	0.1402	0.0000	0.0364	0.0030	0.0452	0.0000
UM experience^2	-0.0158	0.0700	0.0239	0.0210	-0.0111	0.0350
MA or Prof'l Deg	0.0126	0.0000	0.0040	0.0590	0.0013	0.2560
Less than MA	0.0086	0.0040	0.0018	0.1050	0.0000	0.8910
Full Prof	0.1031	0.0000	0.0851	0.0000	0.0576	0.0000
Instructor 2	0.0011	0.5510	0.0061	0.0010	0.0066	0.0010
Instructor 1	0.0063	0.0060	0.0215	0.0000	0.0071	0.0120
Term Appointment	0.0096	0.0010	0.0184	0.0000	0.0025	0.0760
Contingent App.	0.0060	0.0040	0.0022	0.1170	0.0016	0.0450
Business	0.0067	0.0320	0.0081	0.0040	0.0051	0.0870
Education	-0.0010	0.3090	-0.0006	0.2150	-0.0014	0.0500
Engineering	0.0041	0.0000	0.0059	0.0000	0.0045	0.0000
Extended Ed	-0.0030	0.0310	-0.0024	0.0330	-0.0015	0.0290
Nursing	-0.0172	0.0000	-0.0107	0.0000	-0.0050	0.0010
Science	-0.0015	0.1000	0.0039	0.0010	0.0022	0.0100
Social Work	-0.0035	0.0310	-0.0014	0.0620	-0.0013	0.0140
Total	0.2510	0.0000	0.2104	0.0000	0.1250	0.0000

Table 5b: Blinder-Oaxaca detailed decomposition: Coefficients effects across time

Coefficient effect	1993 Coef	P-value	2003 Coef	P-value	2013 Coef	P-value
Pre-UMFA experience	0.0095	0.0110	0.0062	0.0960	0.0075	0.2320
MA or Professional Deg	-0.0165	0.0060	0.0068	0.1940	0.0062	0.0400
Less than MA	-0.0084	0.0300	0.0041	0.1430	0.0004	0.7820
Full prof	-0.0162	0.0220	0.0089	0.1710	-0.0114	0.1450
Assoc prof	-0.0219	0.0010	0.0001	0.9860	-0.0098	0.1590
Instructor 2	0.0047	0.0260	-0.0025	0.1990	-0.0050	0.1060
Instructor 1	0.0053	0.0340	-0.0018	0.5930	-0.0022	0.1610
School of Art	0.0004	0.6620	-0.0006	0.4090	-0.0015	0.0450
Business	-0.0023	0.1080	-0.0029	0.0070	-0.0037	0.0350
Human Ecology	-0.0039	0.0220	-0.0006	0.5190	-0.0006	0.3060
Medicine	-0.0001	0.9650	-0.0034	0.1480	-0.0061	0.0170
Music	0.0005	0.5140	-0.0003	0.7240	-0.0013	0.0500
Nursing	0.0010	0.5930	-0.0043	0.0270	0.0000	0.9910
Pharmacy	-0.0006	0.3650	-0.0014	0.0320	-0.0014	0.1320
Total	0.0205	0.0090	0.0203	0.0020	0.0017	0.7680

There is a trend toward acquiring experience between earning one's degree and being hired by the University. Men and women had equal and relatively low levels of prior experience in 1993. Both sexes' prior experience has increased since then, with men's increasing more than women's. The greatest differences in pre-UM experience in 2013 were in Kinesiology, Extended Education and Engineering, with men having more experience.

UM experience consistently contributes to the salary gap, though its influence decreases over the twenty year period, reflecting a decreasing difference in experience between men and women. Experience has a non-linear effect on the gap and is

included as a level term and a squared term. The square of experience provides information on the tail of the experience distribution. The coefficient on the square of the endowment effect switches signs. Because the endowment effect from the square of University experience is positive in 2003, the coefficient on the level effect is lower than where the endowment effect from the square is negative.

Endowment effects from highest degree held are not significant in 2003 or 2013. In 1993, a sufficiently high proportion of women relative to men held degrees lower than a PhD (82.6 percent of men held PhDs versus 59.4 percent of women) affect the sex gap in salaries. The proportion of women holding PhDs increased from just under 60 percent in 1993 to over 72 percent in 2013, while the percentage of men holding a PhD changed very little. Correspondingly, the proportion of women holding degrees lower than a Master's or equivalent fell from a little over 10 percent in 1993 and 2003, to just under 6 percent in 2013. These changes reduced the differences between men's and women's representation in the lower degree endowment levels enough to neutralize the effect of the highest degree held on the salary gap.

The endowment effects of faculty, rank, and appointment type reflect the persistent unequal positioning by sex shown in Table 2. Men continue to occupy 75 percent of full professor positions in 2013, down from 93 percent in 1993, while most instructor 2 and instructor 1 positions are held by women. As a result, the full professor endowment and instructor 1 endowments significantly increased the salary gap in all three time periods, and the instructor 2 endowment significantly increased the salary gap in 2003 and 2013. It is interesting to note that the full professor rank endowment adds to the salary gap by a decreasing amount across the time periods (endowment effect falls from 1993 onward) as women's presence at that highly rewarded rank increases. In all three time periods, women are far more likely to hold lower paying term and contingent appointments, thereby increasing the salary gap. A woman was four times more likely than a man to hold a term appointment in 1993, and is still just under three times as likely to hold a term appointment in 2013, with the number of term appointments overall increasing from 1993 to 2003 and then falling back to near 1993 levels by 2013. The university must be vigilant concerning promotion rates to full professor and hiring by appointment types if it hopes to ensure equitable salary across genders.

In considering the endowment effects of faculties, the signs of these effects are, not surprisingly, positive for Business, Engineering, and Science, and negative for Education (2013), Extended Education, Nursing, and Social Work. This does not mean that women in these faculties are paid more than the average, but that, all else equal, the distributions of women and women's salaries serve to decrease the salary gap. The sizes of the faculty effects have generally decreased since 2003, in line with the smaller overall salary gap. For Business, the endowment effect is not significant in 2013, indicating a distribution of faculty more in line with the average or less of a salary boost from being in Business compared to the average or a combination of these two factors.

We turn now to the coefficient effects, which represent differential treatment of men and women who have the same endowments. A positive (negative) effect represents differential treatment that increases (decreases) the salary gap. In 1993, there are negative effects from degrees less than PhD (-0.0165 for MA and -0.0084 for degree less than MA), showing that the penalty for having a lower degree was lower for women than for men. There are also negative effects being in the rank of full or associate professor (-0.0162 for full and -0.0219 for associate professor), reflecting the higher salary enhancement to women than men from being associate or full professor rather than an assistant professor. In contrast, men were penalized less than women for being in an instructor rank relative to assistant professor. By 2003, there is no effect on the salary gap stemming from differential treatment of men and women with respect to their experience, degree, or rank. This continued through 2013, with the exception of the MA/professional degree, where women are penalized more than men for holding a degree lower than a PhD.

The significant coefficient effects from faculties are all small and negative, indicating that the faculties in question treat women better than men with respect to salary, all else equal, relative to Arts. In 1993, only Human Ecology has significant differential treatment, but by 2013, the School of Art, Business, Medicine, and Music are all significant and negative, suggesting some change in treatment of men and women in these faculties between 1993 and 2013. Recall, this is relative to the averages for women and men in Arts.

Thus, our BOD results indicate that endowment effects changed in size over time, while most of the coefficient effects had disappeared by 2003. Overall, the salary gap did not decrease significantly from 1993 to 2003, but had decreased markedly by 2013. This motivates turning to changes in the effects of endowments and coefficients over time, using the WBOD.

WBOD results

Table 6: Wellington-Blinder-Oaxaca Decomposition (WBOD) endowment and coefficient effects

	1993 to 2003		2003 to 2013	
	Coeff.	t-stat	Coeff.	t-stat
Endowment Effect				
Pre-UMFA experience	0.0040	0.026	0.0068	6.621
UMFA experience	-0.0013	-0.006	-0.0331	-6.693
UMFA experience ²	0.0033	0.000	0.0083	3.947
Full professor	-0.0309	-17.101	-0.0249	-17.102
Associate professor	0.0101	4.072	-0.0023	-2.408
Instructor 1	0.0069	4.473	-0.0097	-6.328
Term appointment	0.0065	5.626	-0.0007	-0.295
Business	0.0022	13.592	-0.0039	-7.910
Education	0.0000	0.121	-0.0006	-2.990
Engineering	-0.0012	-9.273	0.0006	3.859
Nursing	-0.0016	-6.207	0.0018	2.932
Coefficient Effect				
Term Appointment	0.0072	0.376	-0.0214	-3.080

Table 6 lists the WBOD results. In this decomposition, the endowment (coefficient) effect shows whether the difference in the mean endowments (coefficients) by sex changed over time in such a way as to increase or decrease the overall gap. Overall,

we find no significant coefficient effects from any variable except term appointment in the second decade. With respect to endowment effects, the significant human capital variables exert opposing forces on the change in the salary gap between periods, while the ranks and appointment types reinforce the reduction in the gap from 2003 to 2013. Faculties, like the human capital variables, exert conflicting forces on the change in the size of the salary gap. We discuss the endowment effects below.

Among human capital variables, the education/highest degree endowment has no significant effect on changing the size of the salary gap over either decade of analysis.

In contrast, all three experience variables become significant in changing the size of the gap over the second decade of analysis. From 2003 to 2013, pre-UMFA experience changed so as to increase the gap, with men increasing their experience prior to hire much more than women, as reflected in Table 2. From 2003 to 2013, changes in relative mean University experience and the mean of the square of experience affect the gap in opposite directions. From 2003 to 2013, men's mean experience at the University fell from 16.3 to 14.5 years, while women's rose from 8.9 to 10.3 years. This exerted a narrowing effect on the salary gap over the second decade. Meanwhile, at the top end of the experience distribution, as the relative difference in men's and women's experience fell sufficiently to offset men's greater reward for gained experience.

The change in the square of University experience has a widening effect on the gap over the same decade. This is due to an increasing variance in experience between men and women at the top end of the experience distribution from 2003 to 2013.

Shifts in men's and women's positioning in various ranks significantly changed the magnitude of the salary gap over time. Changes in men's and women's probabilities of being a full professor had a narrowing influence on the salary gap over both decades of analysis. From 1993 to 2003, men's probability of being a full professor fell from 52 percent to 42 percent while women's remained constant at about 13 percent. From 2003 to 2013, men's probability of being a full professor declined further to 39 percent, while women's probability jumped to 19 percent (89/478). This relatively favourable change in a female faculty member's probability of being situated in the full professor

rank, combined with the positive return associated with that rank, exerted a narrowing influence on the overall salary gap over time.

The associate professor rank endowment exerted an increasing influence on the salary gap during the first decade of analysis and is not significant for the second decade. From 1993 to 2003, men's probability of being at this rank dropped from 29 percent to 26 percent and women's decreased by a greater amount from 35 percent to 24 percent. With women losing relative ground in this well-rewarded rank, this rank endowment increased the salary gap between 1993 and 2003.

Changes in the lowest rank, Instructor 1, increased the salary gap over the first decade and narrowed the gap in the second. The increase in the salary gap in the first decade of analysis was due to a jump in instructor hires from 1993 to 2003, most of which were women, as seen in Table 2. The decreasing effect of the instructor 1 rank on the salary gap in the second decade seems to be due to a reduced reliance on the instructor 1 rank by 2013, with the number of these positions occupied by women decreasing by twice as many as these occupied by men.

Term appointment is the only variable that has both significant endowment and coefficient effects. Over the first decade, changes in the numbers of men and women holding term appointments widened the gap, while over the second decade changes in the treatment of men and women holding term appointments had a decreasing effect on the salary gap.

Four faculties have changed their effects on the salary gap across decades. Between 1993 and 2003, the endowment effect of the Business faculty widened the salary gap, but the faculty had a narrowing influence in the second decade. Business shrank between 1993 and 2003, but the probability that a man was in the business faculty fell only marginally. For women, the small decrease in the number of women in the business faculty combined with the increase in female faculty in the university as a whole, led to a sharp decrease in the probability that a female faculty member in the university worked in the business faculty. In the second decade, the hiring of women in this well-paid faculty helped to reduce the salary gap. Women comprised 13 percent of the faculty in 1993 and 29 percent by 2013. Education, another relatively well-paid

faculty, also contributed to decreasing the salary gap, as the proportion of the faculty who were women increased over time, reaching almost 60 percent by 2013.

For both Engineering and Nursing, with higher average salaries than Arts, the endowment effect decreased the salary gap between 1993 and 2003, but increased it over the next decade. Women's probability of being in these faculties increased by more than men's probability did from 1993 to 2003; from 2003 to 2013, on the other hand, women's probability of being in one of these faculties decreased while men's held steady or increased.

Conclusion

There still exists a significant 12 percent salary gap between male and female salaries in 2013 at the University of Manitoba. This gap markedly decreased between 2003 and 2013, in contrast to its very small decrease from 1993 to 2003. The factors that changed in the last decade compared to the previous decade provide helpful information on the way to continue to shrink the gap in future.

Considering experience factors, men's and women's years of service at the University have started to converge but are not yet equal. By 2013, the longest serving man has been at the university only four years longer than the longest serving woman. Various factors contribute to the retirement decision, including personal factors and an individual's enjoyment of the work environment. The University can endeavour to ensure that both genders experience their workplace with equal satisfaction. Pre-University experience could lead to a re-opening of the gap. The University should be careful in its treatment of such experience, particularly if access to the opportunities providing such experience (post-doctoral fellowships, for example) is unequal.

The hiring of men and women in assistant professor positions was close to equal by 2013, which represents a great improvement over previous data points. If parity is the goal, 2013's close-to-equal ratios of men and women at this entry rank must be preserved. Toward this, the University must both continue to recruit high quality men and women as equally as possible and work to mentor and encourage the career

progress of 2013's male and female assistant professors equally. Specifically, the University should monitor and work to equalize as much as possible the retention and time-to-promotion of male and female faculty so that the near-equality achieved at the assistant professor rank in 2013 works its way up through the associate and full professor ranks. Even with equal retention and promotion rates, given the length of an academic career, the number of male full professors will likely continue to exceed the number of female full professors for the next two decades, with the consequent implications for the salary gap.

Gender segregation continues to appear in both ranks and appointment types at the University of Manitoba. Given anthropological findings of persistent segregation across cultures, this segregation, like most unconscious prejudices, requires active and conscious effort to eliminate from the University's institutional structure. The decision to hire a candidate as an instructor versus an assistant professor should be questioned when that candidate is a woman. Likewise, the decision to hire a candidate in a term or contingent position versus a probationary or tenured position should be questioned when that candidate is a woman. Such questioning should persist indefinitely, and the University should track these decisions to ensure there is equitable distribution of the sexes across entry ranks and appointment types.

The uneven distribution of men and women by faculty contributes to unequal salaries to the extent that salaries differ by faculty. Equal representation in faculties rests on many other levels of equality. However, progress is possible, as seen in the Business faculty from 2003 to 2013. From 1993 to 2003, this faculty is also a good example of how changes in overall size can affect the distribution. In the first decade of analysis, the faculty shrank, losing many more men than women. However, because the number of women in the University grew during this period, the faculty's proportion of women, in comparison to the University, fell. This demonstrates how sensitive one unit's changes are to changes beyond its boundaries. However, from 2003 to 2013, the increase in the number of women relative to men contributed significantly to the narrowing of the overall salary gap, even though women still comprise only less than 30 percent of Business in 2013. To continue to narrow the salary gap, the University should ensure that differences in salary across faculties are justified by market conditions, and where

possible, keep such differences to a minimum. The University should also encourage faculties with uneven distributions of men and women to endeavour to hire in the minority gender.

So, the times are indeed changing at the University of Manitoba, and the improvement in salary equity is significant. This improvement has been achieved in many dimensions, through more equal hiring, less segregation than in previous decades, more women in the highest ranks, and improvement in the sex distribution in some faculties. There has also been a decrease in the variance in mean salaries across faculties. Thus, overall, the University has made progress toward greater equality across genders. Threats to the improvements in the salary gap could emerge through men's and women's differential access to pre-University experience or through unanticipated means. The standard recommendations hold to preserve the important gains and to reach equity for all designated equity groups: monitor, question, persist.

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