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Introduction

There has been a long-standing concern amongst policymakers, economists, and trade unions over the persistent earnings gap between men and women in the Canadian labour market. Although this gap has narrowed over time, women's average hourly wages still remain about 16% lower than that earned by men.¹

The reasons for this inequality in male and female earnings are complicated and are the result of a number of diverse factors. Research has shown that much of the gender pay gap can be explained by differences between men's and women's education, age, experience, occupation, hours of work, and collective agreement coverage.

However, a significant portion of the gender inequality in earnings cannot be explained by these factors alone. In fact, while the overall male-female wage differential has narrowed over the past two decades amongst younger cohorts of workers as women have entered the labour market with more education and into better occupations, the evidence shows that the earnings gap between men and women grows as that cohort ages.²

Much of the research literature has suggested that discriminatory hiring decisions and pay structures may explain this persistent inequality in pay. Some employers, for instance, may decide not to hire or promote women because on average they experience more career interruptions and more absences for family reasons than men.

A number of studies have documented a similar persistent gender pay gap amongst

a group of the most highly educated Canadians – academic staff.³ This research has demonstrated that female university teachers on average receive lower salaries than their male colleagues, but that this difference has decreased in recent years as the Canadian academic labour market has undergone significant changes. The number of full-time female faculty has risen sharply over the past two decades. As well, academic staff unionization and collective bargaining has become commonplace.

This study examines the evolution in male-female earnings of full-time university professors in Canada between 1986 and 2006. To better understand the dynamics of gender differences in pay, we control for the two factors that we suggest most affect academic salaries: academic rank and age. The main finding is that the salary differential between men and women, when adjusted for inflation and controlled for age and academic rank, is small and has remained virtually unchanged over the past two decades. However, as with the labour market in general, we also determine that the pay gap between men and women widens as the same age cohort of men and women age. As such, we find there is a small but persistent male-female salary inequality at later stages of the academic career that cannot be explained by differences in rank or age alone. We also discover that when adjusting for major discipline taught, there still remains a small salary gap that indicates there may be discriminatory practices, overt and/or structural, that disadvantage women in the academic profession.



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Full-Time Academic Salaries by Rank and Age

Overall, the gender pay gap for academic staff in Canada narrowed significantly between 1986 and 2006. As illustrated in Table 1, in 1986 the average salary of a male professor was \$54,054, compared to a salary of \$44,464 for female academics — a gap of nearly 19 per cent. By 2006, adjusted for inflation, male salaries had risen to an average of \$60,798. Women’s salaries as a whole grew

accounted for just 16.5 per cent of all full-time academic staff in Canada and were significantly more concentrated in the lower entry-level ranks (see Table 2). Notably, just 6 per cent of the highest paid ranks of full professors were women in 1986. However, by 2006 women had doubled their overall representation in the academy and the cohort of women in 1986 had moved into higher ranks. In 2006, women made up about 36 per cent of associate professors (compared to just 16 per cent in 1986) and

TABLE 1 Average salaries of male and female academic staff, all ranks combined, Canada

	current \$		\$1996	
	Male	Female	Male	Female
1986	54,054	44,464	54,054	44,464
1996	76,158	63,352	56,198	46,748
2006	101,113	90,165	60,798	54,215
% change 86-06	87.1%	102.8%	12.5%	21.9%

Source: Calculations based on Statistics Canada, University and College Academic Staff Survey

faster over this period, rising to an average of \$54,215. As a result, the gender pay gap was just under 11 per cent in 2006.

The overall average, however, provides an incomplete and misleading picture of the real extent of salary inequality. That is because academic salaries vary significantly by rank and an unequal distribution of men and women within academic ranks can skew average salary results. In 1986, women

over 20 per cent of full-time professors. This increased representation at higher paying academic ranks had the effect of significantly raising the overall average salaries of female academics in total. In short, much of the progress made in narrowing the gender pay gap can be attributed to the increasing number of women entering the profession over the past 20 years and their progression through the academic ranks.

TABLE 2 Distribution of Full-time University Academic Staff by Rank and Gender, 1986, 1996, 2006

	1986		1996		2006	
	Men	Women	Men	Women	Men	Women
Full Professor	94.1%	5.9%	88.5%	11.5%	79.4%	20.6%
Associate Professor	83.6%	16.4%	71.9%	28.1%	64.1%	35.9%
Assistant Professor	69.1%	30.9%	56.7%	43.3%	57.5%	42.5%
Other	54.3%	46.1%	45.1%	54.4%	48.6%	51.4%
All Ranks Combined	83.5%	16.5%	75.1%	24.9%	66.9%	33.1%

Source: Calculations based on Statistics Canada, University and College Academic Staff Survey

When adjusted for rank, the pay gap between men and women is considerably smaller than the overall average, and has remained relatively stable over the past two decades (see Table 3). In 1986, the average salary for all full-time female academic staff at the full professor rank was 94.5 per cent of the average salary received by full-time male professors. This was well above the total unadjusted average of 82.3 per cent. This salary gap rose slightly between 1986 and 1996, but by 2006 had returned to roughly the same figure recorded 20 years earlier. Similarly, despite some moderate fluctuations in 1996, women at the associate, assistant and lecturer ranks experienced a pay gap in 2006 that was roughly equivalent to that recorded twenty years earlier.

Notably, the gender salary gap recorded over this period was most pronounced at the rank of full professor, with women earning

TABLE 3 Full-time Female Academic Staff Salaries as % of Full-time Male Academic Staff Salaries by rank, 1986, 1996 and 2006

	1986	1996	2006
All ranks combined	82.3%	83.2%	89.2%
Full Professor	94.5%	92.9%	94.8%
Associate Professor	95.6%	93.3%	96.9%
Assistant Professor	96.2%	96.9%	96.2%
Lecturer	96.1%	98.7%	96.5%

Source: Calculations based on Statistics Canada, University and College Academic Staff Survey

between 93 per cent to about 95 per cent of average male salaries. Given that academic salary structures also normally include annual increment increases, part of this gap may be accounted for by differences in age and seniority of male and female professors. That is, an unequal distribution of male and female academic staff by age may also skew the

Figure 1: Distribution of Full-time Canadian University Teachers by Sex and Age

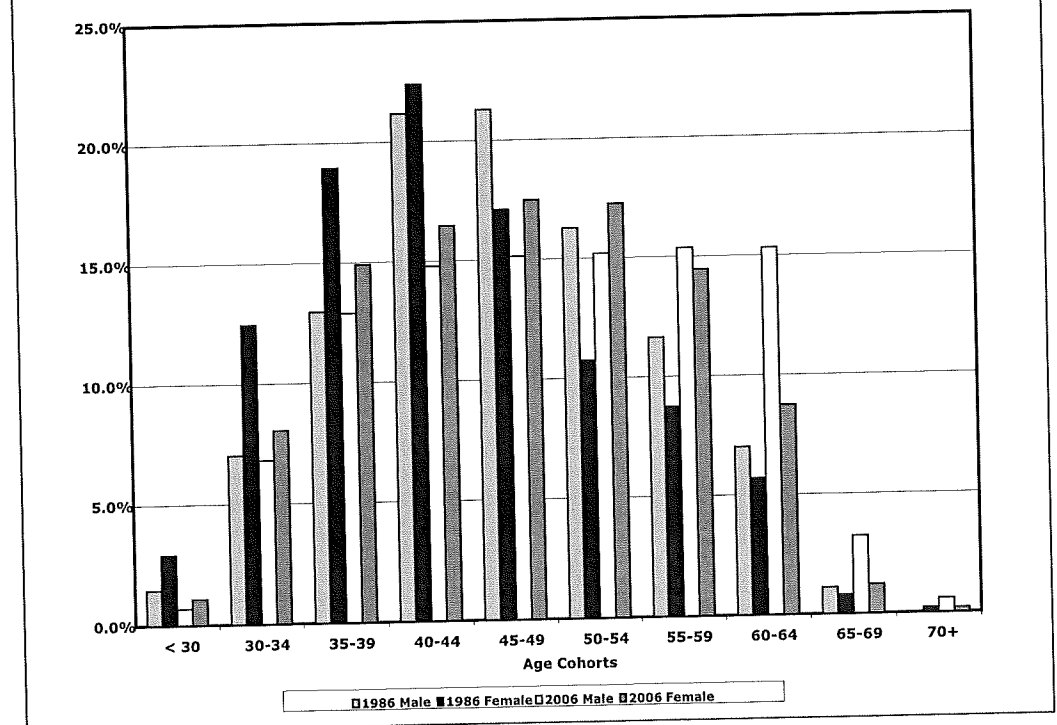


TABLE 4 Female Academic Staff Salary as % of Male Salary by rank, controlling for age

	1996		2006	
	No control	Control for age	No control	Control for age
Full Professor	92.9%	95.0%	94.8%	95.5%
Associate Professor	93.3%	95.7%	96.9%	96.9%
Assistant Professor	96.9%	97.1%	96.2%	96.1%
Lecturer	98.7%	100.8%	96.5%	99.1%

Source: Calculations based on Statistics Canada, University and College Academic Staff Survey

overall salary gap. As illustrated in Figure 1, female academic staff tend to be concentrated within younger age cohorts than men. When factoring for age, however, we find that the salary gap narrows further but only for the lowest and highest academic ranks.

As illustrated in Table 4, controlling for age (with 1986 as the base year), the salary gap between men and women virtually disappears at the rank of lecturer. At the ranks of assistant and associate professors, however, there is no significant effect. At the rank of full professor, the salary gap in 2006 narrowed slightly from 94.8 per cent to 95.5 per cent. Salary differentials have remained widest at the most senior academic rank,

indicating that there is a salary inequity between men and women above the rank of lecturer that cannot be explained by either rank or age.

Salary Differentials by Province

Amongst the provinces, there is some variation in male-female salary differentials at each academic rank. In 1986, at the rank of full professor, women's salaries as a share of male salaries ranged from a low of 88 per cent in Newfoundland and Labrador to just over 97 per cent in New Brunswick (Table 6). By 2006, that figure in Newfoundland and

TABLE 5 Salaries of Female Academic Staff as % of Male Salaries by Rank± and Province, 1986, 1996 and 2006, unadjusted for age

	Full Professor			Associate			Assistant		
	1986	1996	2006	1986	1996	2006	1986	1996	2006
Canada	94.5%	92.9%	94.8%	95.6%	93.3%	96.9%	96.2%	96.9%	96.2%
NL	88.1%	107.8%	95.8%	97.0%	98.9%	96.4%	100.2%	97.6%	99.7%
PE	*	96.9%	98.8%	101.1%	99.9%	92.3%	95.5%	94.9%	104.4%
NS	93.5%	94.8%	94.0%	95.8%	98.3%	99.8%	97.5%	98.5%	101.0%
NB	97.2%	92.8%	98.7%	99.8%	97.4%	95.7%	98.7%	98.3%	97.7%
QC	96.5%	96.5%	95.9%	94.2%	95.3%	96.7%	95.3%	97.5%	98.1%
ON	92.7%	91.4%	94.7%	95.6%	91.9%	97.0%	100.3%	98.5%	95.5%
MB	95.9%	92.4%	91.7%	97.0%	96.1%	96.0%	96.9%	94.3%	96.4%
SK	93.5%	87.9%	92.0%	100.4%	99.9%	100.1%	100.0%	102.2%	99.7%
AB	94.8%	92.3%	95.1%	96.5%	97.1%	96.0%	98.4%	95.3%	96.6%
BC	96.9%	97.7%	93.3%	96.2%	95.2%	96.4%	98.1%	96.9%	94.0%

Source: Calculations based on Statistics Canada, University and College Academic Staff Survey

± No reliable data available for rank of lecturer.

* No reliable results available due to small counts.

TABLE 6 Salaries of Female Academic Staff as % of Male Salaries by Rank± and Province, 1996 and 2006, adjusted for age

	Full Professor		Associate Professor		Assistant Professor	
	1996	2006	1996	2006	1996	2006
Canada	95.0%	95.5%	95.7%	96.9%	97.1%	96.1%
NL	96.6%	106.0%	97.9%	96.8%	96.5%	102.1%
PE	*	*	*	*	*	*
NS	93.6%	95.1%	98.7%	99.8%	99.6%	100.8%
NB	94.1%	98.2%	98.8%	95.7%	98.9%	97.7%
QC	99.1%	97.1%	96.9%	96.9%	97.4%	97.6%
ON	93.2%	95.4%	95.1%	97.0%	98.7%	95.3%
MB	89.2%	91.0%	99.3%	97.9%	93.3%	94.6%
SK	93.2%	98.4%	101.4%	101.7%	103.6%	99.6%
AB	91.5%	99.3%	97.5%	94.7%	94.9%	96.7%
BC	100.5%	92.9%	95.0%	96.4%	97.3%	93.2%

Source: Calculations based on Statistics Canada, University and College Academic Staff Survey

* No reliable results available due to small counts.

Labrador had risen to nearly 96 per cent and 99 per cent in New Brunswick. However, only five provinces – Newfoundland and Labrador, Nova Scotia, New Brunswick, Ontario and British Columbia – witnessed a decrease in male-female salary inequality at the rank of full professor between 1986 and 2006. By 2006, the largest salary gap was recorded in Manitoba where female full professors earned just under 92 per cent of that earned by men.

At the level of associate professor, changes in male-female salary differentials over the 20-year period were less pronounced within the provinces, with the lone exception of Prince Edward Island. While this data should be read with some caution given the low faculty counts in the province, it is nevertheless worth noting that the salaries of female associate professors fell from what was roughly parity in 1986 and 1996 to just over 92 per cent of men's salaries in 2006.

Similarly, there were minor provincial variations in the salary gap at the rank of assistant professor between 1986 and 2006. Advances toward greater salary equality remained largely unchanged in Newfoundland

and Labrador, Manitoba, and Saskatchewan and widened in New Brunswick, Ontario, Alberta and British Columbia.

When male-female salaries by rank are adjusted for age, the differential narrows in most provinces. For full professors, age is a particularly important factor in explaining the salary gap in Newfoundland and Labrador, the only province where female full professors on average earn more than their male counterparts when age is considered. By contrast, even when adjusting for age, female full professors in Manitoba earn on average just 91% of what men do. Only in Quebec and British Columbia does controlling results for age have the effect of widening inequalities in the salaries of full professors.

At the rank of associate professor, female university teachers in Saskatchewan on average earned slightly more than their male colleagues in 1996 and 2006 on an age-adjusted basis. Controlling for age, however, results in greater salary equality in three provinces: Nova Scotia, Ontario, and Saskatchewan. Further, age has a positive impact on reducing the salary gap at the

TABLE 7 Distribution of Full-Time Academic Staff by Gender and Major Discipline, 1986 and 2006

	1986		2006	
	% Male	% Female	% Male	% Female
Agriculture & biological sciences	85.5%	4.5%	72.3%	27.7%
Education	74.8%	25.2%	50.1%	49.9%
Engineering	98.4%	1.6%	88.0%	12.0%
Fine & Applied Arts	79.5%	20.5%	58.1%	41.9%
Health Professions	36.0%	64.0%	35.4%	64.6%
Humanities	79.5%	20.5%	58.7%	41.3%
Mathematics	94.9%	5.1%	84.8%	15.2%
Social Sciences	84.6%	15.4%	65.2%	34.8%

Source: Calculations based on Statistics Canada, University and College Academic Staff Survey

assistant professor rank in just five provinces: Newfoundland and Labrador, Nova Scotia, Quebec, Manitoba and Alberta.

Male-Female Salaries by Major Discipline

A final factor that may help explain the difference in average salaries between men and women relates to the major discipline or subject area taught. There are some salary variations between disciplines and an unequal distribution of men and women amongst subject areas will affect the overall average pay gap.

As illustrated in Table 7, in 1986 women were noticeably under-represented in the fields of engineering, and mathematics. Only in the health professions did women make up a majority of full time academic staff. By

2006, women had made significant gains, but were still a small minority in engineering and mathematics.

To assess the role that these differences between disciplinary fields may play in explaining the gender pay gap, Table 8 compares the average gap by rank with a calculation of what the differential would be if men and women were equally represented at all ranks in all disciplines. Overall, the results confirm earlier research which concluded that differences in average pay between discipline has a relatively minor impact on the total salary gap, accounting on average for no more than 1 per cent of male-female salary differentials.⁴

As illustrated in Table 8, at the rank of full professor differences in the distribution of men and women by subject area had a negligible impact in 1986, narrowing the salary

TABLE 8 Female Academic Staff Salaries as % of Male Salaries by rank, 1986 and 2006

	1986		2006	
	Unadjusted	Assuming equal representation across disciplines	Unadjusted	Assuming equal representation across disciplines
Full Professor	94.5%	94.7%	94.8%	96.0%
Associate	95.4%	96.4%	96.9%	97.9%
Assistant	96.1%	96.1%	96.2%	98.2%

Source: Calculations based on Statistics Canada, University and College Academic Staff Survey

gap by just 0.2 per cent. By 2006, however, the effect was much stronger, closing the male-female salary differential by 1.2 percentage points. This may be due to what a recent study suggests is a widening variance of academic salaries across subject areas, with disciplines in which women are under-represented witnessing a rising salary premium.⁵

At the rank of associate professor, assuming an equal representation of women across disciplines narrows the salary gap in both 1986 and 2006 by 1 percentage point. Interestingly, there is no impact on salary differentials for assistant professors in 1986, but a 2 point difference in 2006. In summary, the unequal distribution of men and women across disciplines accounts for a small difference in male-female academic staff salaries, but one that has grown in recent years.

Conclusions

The male-female salary differential amongst university teachers, when adjusted for academic rank and age, has narrowed slightly in the last twenty years. However, a persistent gap remains, one that cannot be explained by rank or age. At the rank of full professor, for instance, women on average earn about 4.5 per cent less than their male counterparts. While this is significantly less than the gap of over 11 per cent when rank and age are not considered, it nevertheless remains significant, representing in dollar terms a yearly shortfall for women of nearly \$8,000. Moreover, the salary differential rises as a cohort progresses through the ranks. The gender salary gap is less than 1 per cent at the lecturer rank but rises to 4.5 per cent at the highest rank. Our analysis has also shown that when adjusted for rank and major discipline taught, the average salary gap between men and women narrows only slightly.

How might this pay gap be explained?

Overt discrimination may play a role, but it is more likely that the remaining salary differential between men and women is a by-product of university salary structures and procedures which have the effect of disadvantaging women on average. Differences in negotiated starting salaries, though small at first, accumulate over time and generate greater gaps in later years. Most university salary structures also include market supplements and merit awards. It may be that women face discrimination in decisions taken with respect to supplements and merit pay.

Women may also be disadvantaged by the traditional academic salary grid system with the numerous progress through the ranks (PTE) steps. The steep lifetime compensation curve characteristic of such systems tends to reward those with significant occupational tenure. Since women are more likely to experience career interruptions related to childbearing, their progress through the salary grid may be slower and may result in lower earnings compared to their male colleagues.

The analysis suggests some important lessons. First, universities should provide for greater gender equity in hiring, particularly in those subject areas where women have been traditionally underrepresented.

Secondly, universities and academic staff associations must not only ensure there is greater equity in salaries at the time of hiring, but also address the fact that even if women start off in relative positions of equity the gender salary gap rises with years of experience and progress through the ranks.

Further, institutions and faculty associations will need to assess how current merit awards and salary grid systems may be contributing to the gender pay gap, particularly in later years. Ultimately, the academic community may need to explore alternative salary systems that will ensure greater parity.■

Endnotes

1. Statistics Canada, *Average hourly wages of employees by selected characteristics and profession, unadjusted data, by province*. <http://www40.statcan.ca/l01/cst01/labr69a-eng.htm>. Retrieved January 6, 2010.
2. M. Drolet (2001). *The Persistent Gap: New Evidence on the Canadian Gender Wage Gap*. Ottawa: Statistics Canada, Business and Labour Market Analysis Division. Publication no. 11F0019MPE No. 157.
3. See C. Warman, F. Wooley, and C. Worswick (2010), "The Evolution of Male-Female Wages Differentials in Canadian Universities: 1979-2001." *Canadian Journal of Economics*, 43 (1): 347-372; M. Gunderson (2006), "Male-Female Wage Differentials: How Can That Be?" *Canadian Journal of Economics*, 39(1):1-21; M. Ornstein and P. Stewart (1996), "Gender and faculty pay in Canada." *Canadian Journal of Sociology* 21: 461-481
4. M. Ornstein, P. Stewart, and J. Drackich (1998), "The Status of Women Faculty in Canadian Universities." *Education Quarterly Review* vol. 5 no. 2. Ottawa: Statistics Canada: 7-29.
5. Warman, et. al. *op. cit.* p. 370.