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A New View of the Male/Female Pay Gap

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Abstract

We construct a new time series on the Canadian female/male pay ratio. The new series is based on wage data rather than the earnings data that has been used in the past. Wages more closely correspond to the price of labour, which is the focus of most theories of labour market discrimination and public policies in this area. Earnings based estimates combine gender differences in wages with gender differences in decisions of how much to work (i.e., hours). Our results reveal significant differences between the wage and earnings based series. Most importantly the wage series reveals that women have continued to make progress in the last fifteen years. In 2006 the wage based ratio is 0.85 while the earnings based ratio is only 0.72. We also find that as the gender wage ratio has risen, the remaining gap in wages is increasingly unexplained in the sense that it cannot be accounted for by gender differences in characteristics that the labour market values.

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Executive Summary

Most discussion of differences in male and female compensation in Canada is framed by Statistics Canada's annual release of *Income Trends in Canada*. Based on data from the *Survey of Consumer Finances* and *Survey of Labor and Income Dynamics* this publication provides annual observations on the ratio of females' earnings to males' earnings for full year full time workers (the "gender earnings ratio"). Recent news from this publication is not good: the female/male earnings ratio for full year full time workers shows modest improvement in the late 1980s but has been in a holding pattern around 0.70 since 1992.

From a policy perspective the lack of movement in the ratio is puzzling. Canadian governments at various levels have been active with legislation intended to right inequities in compensation by gender.

In this paper, we investigate the possibility that the gender **earnings** ratio does not provide an informative gauge of the relative status of women. We offer estimates of the female/male **wage** ratio as an alternative. Wages more closely correspond to the price of labour that is the focus of economic models of discrimination. Earnings combine prices and quantities so an earnings gap might arise simply because Full-Year, Full-Time (FYFT) females work less than FYFT males. Gender employment gaps are an interesting but distinct issue.

Piecing together wage data from various surveys starting in 1981, we construct a consistent time series on the gender wage ratio in Canada. The wage based series is different from the earnings ratio in both level and trend. It is consistently higher than the earnings based ratio by 10 to 15 percentage points. In 2006 the wage based ratio for full time workers stood at 0.85, while the earnings based ratio for full year full time workers stood at 0.72. It also changes differently over time. Of particular note the wage based ratio displays steady if modest progress over the last 15 years while the earnings based ratio remains stalled.

Both the males and females in the sample have become older and more educated over time and females have gained more labour market experience. We investigate how the gender wage ratio changes as we control for gender differences in productive characteristics. In many dimensions females increasingly hold an edge on males in this regard. As a result if females commanded the same returns to these characteristics as males we would expect them to be receive higher—not lower—wages than males. The most significant exception to this conclusion is the industrial distribution of employment in which males hold a significant advantage.

From a policy perspective this research raises important issues. First, a gender compensation ratio of 0.80+ clearly raises different issues than one that is 0.70. Second, the wage based ratio shows women have made steady if modest progress through the 1990s and 2000s while the earnings based ratio does not.

The *Labour Force Survey* now provides timely, consistent evidence on the wages of male and female workers in the Canadian economy. There is a strong case for moving the annual report of the gender pay ratio and the policy debate that surrounds it to a wage basis.

Introduction

Most discussion of differences in male and female compensation in Canada is framed by Statistics Canada's annual release of *Income Trends in Canada*.¹ Based on data from the *Survey of Consumer Finances* (SCF) and *Survey of Labor and Income Dynamics* (SLID) this publication provides annual observations on the gender ratio of earnings for full year full time (FYFT) workers. The news from this publication is not good, as figure 1 makes clear.² While showing modest improvement in the late 1980s the female/male earnings ratio for full year full time workers has been in a holding pattern around 0.70 since 1992.

From a policy perspective the lack of movement in the ratio is puzzling. Canadian governments at various levels have been active with legislation intended to right inequities in compensation by gender. For example, pay equity laws now cover federal workers, public sector workers in many provinces, and private sector workers in Ontario and Quebec. While we can't rule out the possibility that things would be worse in the absence of these initiatives, it does seem surprising that there has been so little demonstrable progress.

Research provides some clues to this puzzle. For example, Baker and Fortin (2001) show that low wages in female jobs were not a particular problem in Canada in the period preceding the introduction of many of these laws. Their 2004 paper suggests the application of pay equity laws to the private sector can face substantial hurdles.

An intriguing implication of Drolet's (2002a, 2002b) recent studies of the female/male wage gap is that we may be using the wrong metric to monitor progress. When these studies were released they garnered considerable attention by showing that the female/male wage ratio, adjusting for male/female differences in observable characteristics, might be as high as 0.90.

¹ These same statistics are also available through CANSIM.

² The earnings ratios in this figure are for full year full time workers.

Passing almost unnoticed was evidence that circa 2000 the unadjusted female/male wage ratio was 0.80. This is substantially different than the ratio of 0.70 (or 0.61 for all workers) from the SLID.

The key difference here appears to be that the SCF and SLID statistics compare the annual earnings of FYFT workers while Drolet's evidence is based on (mostly) direct observations on hourly wages. Wages more closely correspond to the price of labour that is the focus of economic models of discrimination. Earnings combine prices and quantities so an earnings gap might arise simply because FYFT females work less than FYFT males. Gender employment gaps are an interesting but distinct issue.

What is currently unknown is whether the difference between the wage and earnings based ratios is only present in the years that Drolet examined or pervasive across the entire time series. Previous studies provide a hint. Baker et al. (1995) and Gunderson (1998) report that the unadjusted female/male earnings ratio for FYFT workers in the early 1980s was 0.64-0.67, consistent with the information in figure 1. In contrast Doiron and Riddell (1994) report that the female/male wage ratio was 0.76-0.77 in this same period.

From a policy perspective this is an important issue. First, a gender compensation ratio of 0.80 plus clearly raises different issues than one that is less than 0.70. Second, it is not currently known if movements in a wage based ratio follow the time series in figure 1. Any differences would change the historical record but also potentially change our evaluation of past policies in this area. For example, in the figure the most dramatic movement in the earnings based ratio is over the economic expansion of the late 1980s. This might suggest that economic growth is of particular importance to the relative economic status of females.

In this paper we offer a new time series on the gender compensation gap based on wage data. Piecing together wage data from various surveys starting in 1981, we construct a consistent time series on the gender wage gap in Canada. The wage based series is different from its earnings based counterpart in both level and trend. The wage based ratio reveals that women's relative compensation has increased over the last 15 years, a message that sharply contrasts with the story told by the earnings based ratio. In 2006 the wage based ratio for full time workers aged 25-54 was 0.85, while the earnings based ratio for full year full time workers of this age was just 0.72.

Both the males and females in the sample have become older and more educated over time and females have gained more labour market experience. Accounting for the gender log wage differential using the familiar Blinder-Oaxaca decomposition we find that as the gap has decreased it is increasingly "unexplained". In many dimensions females hold an advantage in productive characteristics, such that we would expect them to be paid more than males if they commanded the same return to those characteristics in the labour market.

Previous Research

The majority of previous studies of the male/female compensation gap use annual earnings as a measure of compensation. The "raw data" for this analysis are presented in figure 1. There are two periods of relative stability. Between 1980 and 1988 the ratio rose very modestly from 0.64 to just shy of 0.66. Starting in 1992 and continuing to the present the ratio has fluctuated around 0.70. The period 1988-1993 then is the time of change as the ratio rises from below 0.66 to above 0.70. While some earnings based studies use data other than the SCF and SLID data used for this graph, there is general agreement with the times series in figure 1.

Baker et al. (1995) and Gunderson (1998) are examples of the earnings approach that provide evidence for multiple points in time.³ Baker et al. document the male/female earnings gap in 1970, 1980, 1985 and 1990 using data from the Canadian census (1971, 1981 and 1986) and SCF (1986 and 1991). They report unadjusted female/male earnings ratios for these years in line with the evidence in figure 1. Adjusting for any differences between males and females in observable productive characteristics, the “adjusted” ratios are between 4 (1990) to 9 (1970) percentage points higher. The results from their most complete specification, which controls for gender differences in occupation, indicate that the adjusted gender earnings ratio hovered around 0.70 throughout the entire period.

Gunderson (1998) provides a comparable set of estimates using the 1971, 1981 and 1991 Canadian censuses. His estimates of the unadjusted ratio are again in line with figure 1 with the exception that he reports a ratio of 0.72 for 1990, which predates the achievement of the 0.70 ratio in the data from *Income Trends in Canada*. Gunderson’s most complete specification of the earnings function includes several controls that are not typical in other studies: possession of vocational training, language (French, English, both, neither) hours per week and industry. The result is much higher adjusted gender earnings ratios that show steady improvement throughout the period. In table 1 we summarize the results of these two studies as a point of reference for our wage based results.

There are only a few previous studies that have used a wage based measure of compensation rather than earnings. Doiron and Riddell (1994) provide estimates for the 1980s using Survey of Work History (SWH), Survey of Union Membership (SUM) and Labour Market Activity Survey (LMAS) data. Their estimates of the unadjusted gender wage ratio range

³ See also Gunderson (1979), Holmes (1976), Maki and Ng (1990), Miller (1987), Robb (1978), Shapiro and Stelcner (1987) and Wannell (1990).

between 0.76 and 0.77 for the years 1981, 1984 and 1988.⁴ Estimates of an adjusted ratio for each of these years are 0.83.

Drolet (2002a and 2002b) provides corresponding estimates for 1997 and 1999. Her estimates of the unadjusted gender wage ratio for these years are 0.80. Once she controls for a host of productive characteristics, including some only available in her Survey of Labour and Income Dynamics (SLID) and Worker Employer Survey (WES) data, the ratio ranges from 0.89 to 0.92.

Finally, Fortin and Schirle (2006) present estimates of the median gender pay gap based on estimates of hourly wages constructed from the Survey of Consumer Finances data, as annual earnings divided by the product of annual weeks and usual weekly hours. The results for individuals with at least one year of tenure show an unadjusted ratio rising from just under 0.7 to just over 0.7 through the 1980s. Starting in 1990 the ratio rises from 0.7 to roughly 0.77 by 1997.

Earnings or Wages?

Differences between wage and earnings based estimates of the gender compensation gap suggest a deficiency in the earnings based measures. Wages more accurately capture the price of labour. Gender differences in the price of labour commonly define gender based labour market discrimination. There are also at the centre of economic theories of discrimination.

Focusing on wages also neatly delineates any gender gaps in labour supply that necessarily are part of the gender earnings gap. Although many earnings based studies focus on the weekly earnings of full year full time workers, any gender differences in weekly hours of

⁴ Christofides and Swidinsky (1994) provide wage based estimates for 1989 using LMAS data. The estimate of the “white female/white male” gap for this year is roughly 0.76. Kidd and Shannon (1997) report gender wage ratios for 1981 and 1989 of 0.773 and 0.778 respectively.

work among these workers will remain part of the resulting gender earnings gap. While part of the gender gap in hours or weeks worked may arise from discrimination, it is also thought that corresponding gender differences in preferences play a role. For example, family responsibilities are known to have a greater association with females' labour supply than with males'.

Earnings do have an advantage of conveying individuals' command over good and services and therefore can be viewed as providing an index of economic welfare. However, it is well known that earnings (or income) based indices of welfare are better measured at the family or household level, and that individual based indices can provide a misleading picture of the standard of living an individual actually attains.

Finally, wages rather than earnings are typically the focus of public policy in this area. For example, pay equity legislation mandates equal wages for work of equal value.

Data

Because there is no single, on going source of wage data for an extended period of time, we use data from a variety of surveys conducted over the last 30 years. The oldest source of wage data that we are aware of is the *Survey of Work History* (SWH) for 1981. The next observation is for 1984 from the *Survey of Union Membership* (SUM). We obtain data for the period 1986-1990 from the *Labour Market Activity Survey* (LMAS) and for 1993-1996 from the SLID. Finally from 1997-2008 the wage data come from the *Labour Force Survey* (LFS). The base population of interest is all paid employees in their main job.⁵

The particular strengths of the data should be highlighted. These data cover a long period of time, are nationally representative and use the LFS sample design or are supplements to the

⁵ With the exception of the SUM, the wages are for the job held in May. The SUM uses the main job in December.

LFS. The variables used have been harmonized in such a manner as to provide a consistent concept over the survey years.

There are naturally some inconsistencies in data taken from so many sources. Most importantly, the definition of wages (taken as the *usual* wages or salaries *before* taxes and other deductions) varies across surveys, as tips and commissions and overtime are not treated consistently. Appendix Table 1 describes the wage and hours concept used in each survey. Also, each survey uses different imputation methods for missing data.⁶ The LFS revised its concept of educational attainment in 1990 from a measure based on the number of years of schooling to the highest level of education attained. The LFS has changed industry coding from the Standardized Industry Codes (SIC) - used up until 1998 - to the North American Industrial Coding System (NAICS) and has changed occupation coding from the Standardized Occupation Coding (SOC) to the National Occupation Coding (NOC).

In some instances we can directly address these problems. Our methods for creating consistent industry and occupation codes across the different data sets are reported in the appendix. We can report gender wage gaps based on medians to address changes in topcoding. In other cases we can merely document the problems.

The Gender Pay Gap

A comparison with the Earnings based ratio

We begin our analysis by comparing our wage based estimates of the gender pay gap to the more well known, and widely available earnings based measures. The earnings based estimates are available annually, by some limited demographic characteristics. In figure 2 we

⁶ The LMAS uses hot deck imputation method while the LFS uses donor imputation methods. Donor imputation is a method by which missing data is imputed using a ‘donor’ record that has all the same characteristics as the ‘missing’ record. Hot deck imputation is a method by which only selected information between the ‘donor’ and the ‘missing’ record are compared.

graph both the wage and earnings based series for workers 17 to 64.⁷ One comparison is the earnings and wage based series for “all workers”. The most striking feature of this comparison is the horizontal distance between the two series. The earnings based ratios ranges from 0.53 to almost 0.65, while the wage based ratios ranges from just under 0.74 to over 0.84. In many years the difference is almost 20 percentage points. There are also some differences in the time variation of the two series, most notably in the early 1980s when the wage based ratios fall while the earnings based ratio rise. Also notable is the late 1990s and 2000s when the earnings ratio loses and regains ground while the wage based ratio shows steady if modest improvement.

It is the gender earnings ratio for FYFT workers that is more commonly cited in the media and by commentators. In figure 2 we also graph this series and the wage based estimates for full time workers as a point of comparison. Note this comparison is not completely consistent as the earnings estimates exclude part year full time workers. There is a significant difference in the level of the earnings series relative to its “all workers” counterpart. In contrast the move from all workers to full time workers makes less of a difference for the wage series—effectively no difference in the early 1980s. The wage based ratios are again consistently higher—now by about 10 to 15 percentage points—and the two series again display different trends in the early 1980s. What’s new here is that the earnings based series shows the well known result of a relatively constant ratio starting 1992, while the wage based ratio increases by over 5 percentage points over this period. Starting from the mid 1980s the earnings based ratio improves by just over 6 points while the wage based ration improves by just less than 12 points—a dramatic difference.

⁷ Our earnings based series for workers aged 17-64 are almost identical to the earnings based series available through CANSIM for workers of all ages shown in figure 1.

To more formally evaluate the difference between the two series we run a simple regression of the difference on a time trend and the prime age male unemployment rate.⁸ The results are reported in table 2. For the series based on all workers there is some evidence of a cyclical relationship but little evidence of a trend. A rise in the unemployment lowers the difference between the wage and earnings based series perhaps because the gender difference in hours falls in recessions so that earnings comparisons more closely match the wage comparison. For full time workers there is both a cyclical and trend component. Consistent with the evidence in figure 2, over the period the two series diverge. Controlling for economic conditions, the linear trend specification result indicates a relative increase in the wage based series of almost 4½ percentage points over the period.

To complete the analysis of this section, we conclude with evidence on the gender ratio for part time workers. Part time work is a heterogeneous category spanning casual jobs through effectively full time jobs parceled out over several workers in part time blocks. The series for part time wages and the earnings of full year part time employees are in figure 3. Either series conveys much more equitable outcomes than the series for full time workers. The wage series is consistently greater than 1.0 since the mid 1990s and peaks at over 1.2. The earnings based series is more variable but also rises above 1.0 on occasion.

The gender ratio for full time prime age workers

While the preceding evidence for full time workers is a good basis for point in time analysis, over longer periods it is important to consider economic and social trends that may change the composition of the sample. There are three that stand out for the period under study.

⁸ We also considered real GDP as a regressor. In the sample years the variable simply trends upwards and therefore is not well distinguished from the time trend. Note that we do not have observations on the wage series for either the 1982 or 1991 recessions.

First is the changing educational investment of young adults. For example, Neill (2006) reports a steady increase in the full time university enrollment of the 18-24 year old population between 1979 and 2003.⁹ In some provinces the enrollment rate rose from under 10 percent to over 25 percent in this period. This means the types of young adults we observe working full time over the period could be systematically changing, which could in turn affect the gender wage ratio for this group. At the other end of the age distribution is changing retirement patterns, as an increasing number of Canadians leave the labour market in their early 60s or even their late 50s. For example, Milligan and Schirle (2008) document significant decreases in the employment rates of 55-59 year old and 60-65 year old males between 1976 and the mid 1990s with a rebound for both groups in the 2000s. For females in these age groups the employment rates are mostly flat until the 1990s when they also start to trend upwards. Again the resulting changes in the sample of adults working full time in these age groups could affect estimates of the gender wage ratio.

We address both of these developments by selecting a sample of full time workers between the ages of 25 and 54. By age 25 most individuals have completed their schooling while the trend towards early retirement is not significant before age 55.

The third trend is the rising employment rates for females of all ages over the period. In figure 4 we graph the full time employment rate of females (and males) aged 25-54. Although there are some significant upward deviations in the 1980s, the male rate is roughly 0.80 throughout much of the period. The female rate shows two periods of substantial increase. Between 1981 and 1990 it rises from 0.44 to 0.54, and then from 1996 through 2007 it rises from 0.54 to 0.63. Therefore over the sample period the rate rises by almost 20 percentage points.

⁹ The increase is from less than 10 percent to over 25 percent (on some provinces) between 1979 and 2003.

We clearly cannot address this development by tailoring our sample. In fact some authors have attributed the changes in the gender wage gap for the prime age population to these changes in the employment of females (Mulligan and Rubinstein 2008). While the source of any changes in the gender wage gap is not our primary purpose here, it is important to keep the changing labour market participation of females in mind as we review the evidence.

We begin in figure 5 with evidence for the full 25-54 age group. The series show good agreement with the evidence for the broader population in figure 2. The ratios for 25-54 year olds are perhaps a shade lower, but there is still a steady 10 percentage point increase in the ratio over the 20 years starting in 1986. The numbers underlying this graph are reported in table A1 of the Appendix.

We also graph the ratio based on medians to provide a view of the relative skewness of the male and female wage distributions and as way of addressing the topcoding of wages in a few of the surveys. Save for the late 1990s the ratios based on the medians and averages tell a very similar story.

One of the reasons for focusing on wages is that earnings ratios combine information on wages and the number of hours worked and females tend to work less than males. This is certainly true for our sample of 25-54 year old full time workers as can be seen in figure 6 where we graph total usual hours on the main job per week. There is substantial male/female gap in hours throughout the period starting at over 4 hours and ending at just short of 3½. The message from the graph of actual hours per week on the main job (not reported) is slightly different, as the ratio of female to male hours rises modestly and then declines over the period.

In the next figures we provide information on the gender wage ratio by some important demographic characteristics. Figure 7 shows the series by ten year age groups. While all ages

see an increase in the wage ratio over the period the most dramatic improvement is for the 45-54 year olds: upwards of 15 percentage points. The timing of the improvement differs by age group. For the youngest women almost all the increase is in the 1980s, while for older women the increase continues throughout the 1990s. This delay for the older age groups suggests the cohort effects may play some role. There is also a well defined age profile of the wage gap in each year, ranging as high as 20 points in the early part of the period and falling to under 10 points by the end.

A different perspective on this finding is provided in figure 8 where we graph the age profile of the wage gap experienced by cohorts of males and female who enter the labour market at different points of our sample period. Here the story is quite different. The age profile of the gap is flat for the cohorts entering the labour market in the late 1970s and early 1980s. For later cohorts there is a downward sloping profile but the decline is relatively small compared to the cross section profiles in the previous figure. This suggests much of the cross section age profile in the gender wage gap is the result of cohort effects.

In figure 9 are the results by marital status.¹⁰ Married or common law females make steady progress throughout the period matching the results for all workers. Singles experience a significant improvement between the mid 1980s and mid 1990s, but lose some ground in the latter part of the period. It is important to note that the proportions in these different categories change significantly over the period. For example, the proportion of males reporting being married or common law ranges from a high of 83 percent in 1981 to a low of 69 percent in 2008.

¹⁰ We code married and common law together in the LMAS, SLID and LFS data. Common law relationships are not separately identified in the SWH or SUM data, but the proportion of the sample reporting being married suggest those in common law relationships used this category.

In figure 10 are the results by education. Splits by education are difficult to construct because Statistics Canada changed the coding of education in 1989, and the post secondary educational sector has changed quite significantly over the period. The three categories that appear to be coded consistently over the period are 1) a university degree, 2) a post secondary certificate or diploma and 3) up to high school completion. Note there is some erratic movement in the university ratio in the late 1980s. Over the entire period there is notable convergence across the education categories with lower educated females catching up with their counterparts in the other groups. The university ratio holds steady or declines modestly over the period.

The gender wage ratios by province are presented in figure 11. Females in most provinces enjoyed the progress over the period evident in figure 5. That said, there is considerable variation in the ratio across provinces over time. For example, by the end of the period there is over a 19 percentage point difference between the ratio in Alberta and the ratio in PEI. To make the relative standing of women in different provinces clearer, in table 3 we present averages of the ratios by province for selected sub periods. Presented this way the data suggest a few points. First women in PEI consistently fare better than their counterparts in other provinces. Second, females in Alberta, British Columbia and Newfoundland consistently face among the largest ratios in the country. Finally the ranking of Quebec in the distribution is quite steady at roughly third.

Olivetta and Petrongolo (2008) argue that differences in the gender pay gap across countries can be partly explained by corresponding differences in female employment. If female employment exhibits positive selection, then those countries with lower female employment rates will have relatively higher wage women in the labour market and as a result a lower gender wage gap. At first blush this is not a promising explanation of the provincial differences in

gender wage gaps we observe. The Pearson correlation coefficient for this sample between gender wage ratios and female full time employment rates across provinces is as often positive as it is negative and averages 0.083 over the period.

In the next figure we investigate differences in the gender wage ratio by job tenure. Although females' lifetime work experience still lags males' (Drolet 2002), it has risen in relative terms throughout the period that is thought to have played role in changing gender pay ratios (Blau and Kahn 2006). Our data does not contain a measure of lifetime work experience. We do have a measure of current job tenure, however, which under certain assumptions should move with changes in lifetime experience.¹¹ The figure reveals changes in the gender wage ratio within tenure class that, with some exceptions, match the aggregate story. There is a degree of compression of the ratio across classes in the middle of the period, but by the last years the ratios spread out as they were at the beginning of the period.

As noted above, there have been significant changes in the observable characteristics of our sample over the period. Relative to the 1980s, both males and females are now older on average, females have greater labour market experience relative to males, both groups are more educated and household relationships have changed. A very simple way of attempting to understand the impact of these changes on the gender pay gap is to ask what would the female - male ratio look like if the composition of the sample had remained the same throughout the period. To do this we construct a simulated gender wage ratios series keeping the distribution of a given characteristic at the 1981 levels but allowing the wages (prices) that a given characteristic commands to change over time.

¹¹ For example, if females' shorter experience results from fertility related job interruptions, and the expansion of maternity leave mandates promotes both their return to the labour market post birth and their job continuity across the birth event. See Baker and Milligan (2008).

In figure 13 we investigate the effects of age. The average age of both males and females rose similarly in our sample over the period. The 25-34 age group represented roughly 45 percent of the sample in 1981 falling to one-third of the sample by 2008. Because the gender wage ratio tends to larger at older ages (figure 6) we might expect this change to have some impact on the overall ratio. As we can see the aging made little difference. This is because as the sample aged the difference in the gender wage ratio by age narrowed (figure 6).

The results by tenure are in figure 14. The actual and simulated series track each other quite closely through the 1980s but a gap opens up in the 1990s. By the end of the period there is 2½ percentage point gap between the two ratios. Based on this admittedly simplistic analysis about 24 percent of the increase in the gender wage ratio between the mid 1980s and the end of the period is due to the relative increase in females' job tenure.

Regression Adjusted Estimates

We next turn to regression adjusted estimates of the gender wage gap that can help us understand how differences in observable characteristics across males and females can account for any corresponding differences in wages. We begin very simply, by pooling the male and female samples and estimating the equation

$$(1) \quad \ln w_i = X_i\beta + F_i\lambda + \varepsilon_i.$$

Individual i 's log wages are modeled as a function of explanatory variables X_i , a dummy variable F_i for females and an error term. In this specification both males' and females' attributes are valued at an average of the males and female "prices". While this is clearly restrictive, this specification has the advantage of allowing us to make some simple points about the conditional (adjusted) wage gap easily. We present estimates from the more traditional specification that allows separate parameters for males and females below.

We estimate four specifications of the explanatory variables. The first serves as a baseline and includes only the female dummy but no other explanatory variables (called Specification 1). For the second we add controls for age, education, and province (Specification 2). The third add controls for marital status, union status and tenure (Specification 3). Finally the fourth adds controls for industry and occupation (Specification 4). The definition of these variables is provided in the Appendix.

Because the objective of this part of the analysis to provide an overview of trends over the period, we present estimates of the λ graphically by year. All the estimates presented this way are statistically significant at least at the 5 percent level.

The results are presented in figure 15. In the early years of the time series the results line up across specifications as might be expected. The largest gap is in specification 1 (implied wage ratio of 0.76) and the smallest in richest (implied wage ratio 0.81). Also as expected is the explanatory variables do not make a huge difference. Even when controls for industry and occupation are added to the regression we can account for about 5 cents of the gender wage gap.

In later years of the period there are two perhaps surprising developments. First the difference in the implied wage gaps from the baseline and richer specifications converge. By the last years all the estimates are clustered together. Second the estimate from the baseline specification actually implies the smallest wage ratio. For example, in 2008 the implied ratio from the baseline specification is 0.85, while the ratio from the richest specification is 0.84 (even lower for some of the leaner specifications). Typically, and in earlier years here, we expect that accounting for observable characteristics will close some of the gender gap in pay. By the last years of our sample, however, accounting for observable characteristics makes the gender gap larger. This twist in the ordering of the estimates across specifications suggests that females'

observable characteristics have changed to levels that we would expect them to be paid more than males. Of course in this specification we may be “overvaluing” female characteristics by not allowing separate parameters on the X_i by gender.

Another issue we can explore with this specification is the differences in the gender wage ratios by province. To do this we add a full set of interactions between the female dummy variable and the dummy variables for province. We use the same specifications. Again we present the results graphically for selected years and only report interactions that are statistically significant at the five percent level.

The results are reported in figures 16 and 17. We report the provincial interactions as deviations from the gender wage gap in Ontario (the omitted province). Therefore a negative number indicates that the gender log wage differential is larger in the indicated province than in Ontario. Because our interest is to discover how provincial differences in the gender wage gap can be mitigated by differences in the characteristics of their workers we focus on two of our richer specifications, specifications 3 and 4. Only estimates statistically significant at least at the 5 percent level are reported.

The first thing to notice is that in that many of the provincial interactions are not individually statistically significant. Therefore, many of the provincial differences identified in table 3 are not statistically distinguishable in our sample once we account for differences in industry, occupation and the other explanatory variables across provinces. Next, in either specification there is a tendency for the gender wage differential to be larger in the western provinces and this persists through the sample period. Finally, a recent development is a smaller gender gap in Quebec.

We next turn to the more traditional Blinder-Oaxaca decompositions of the gender wage gap that are common in the literature. This is accomplished by dropping the dummy variable for females from equation (1) and estimating the equation separately for the male and female samples. Then we can express the difference in mean log wages between males and females as

$$(2) \quad \overline{\ln w_M} - \overline{\ln w_F} = \hat{\beta}_M (\bar{X}_M - \bar{X}_F) + \bar{X}_F (\hat{\beta}_M - \hat{\beta}_F).$$

The first component of this decomposition is usually interpreted to “explain” some portion of the log wage gap as due to differences in the average values of the explanatory variables across males and females. The second component is usually referred to as the “unexplained” portion of the gap, resulting from gender differences in the returns the different explanatory variables command in the labour market.

There is some debate over which explanatory variables can be legitimately included in this regression. Occupation provides a nice demonstration of the issues. Some people believe that differences in occupation across the genders are the result of differences in preferences between males and females and so there is little reason not to include them in the decomposition. Other people believe that women are forced into certain occupations and/or denied access to others so that gender differences in occupation are in fact a measure of the discrimination females face in the educational system and in hiring. In this case including occupation in the regression runs the risk of explaining discrimination with discrimination.

Rather than taking a strong stand on this issue we offer decompositions of the log wage gap using both specifications 2 and 4. The specification 2 includes only age, education and province. Specification 4 includes all the available explanatory variables including industry and occupation.

The results for specification 2 are reported in table 4. At the beginning of the period the decompositions are in line with similar analyses of this time, in that the explained part of the gap is very small. For example in 1981 nearly 98 percent of the gap is unexplained. This is due to the strong similarities in average age, province and education across the genders. In later years differences in the explanatory variables begin to gain some traction but perhaps not in the way we would expect. These differences increasingly explain a negative proportion of the gap: -11 percent by the end of the period. What this means is that based on gender differences in age, education and province we would expect females to be paid more than males. This result is driven by gender differences in education. At the beginning of the period a higher proportion of males had a university degree. By the end of the period females in the sample, by a substantial margin, are more likely to be university educated. As a result the unexplained component of the log wage gap grows to 114 percent by 2008.

The decomposition using specification 4 is reported in table 5. Here again the period begins with the expected result. Now a greater proportion of the gap is explained, but it is still fairly modest—just over one-third in the mid 1980s. In later years the explained component gets smaller although it never becomes negative. It is again gender differences in education doing some of the work, accounting for just over -5 percent of the gap by 2008. However, relative to specification 2 the contribution of education is roughly halved. The contribution of gender differences in occupation initially alternate positive and negative, but by the end of the period it is solidly negative at about -10 percent. What keeps the overall explained component positive is the significant positive contribution of gender differences in industry throughout the period. The health industry appears to play the dominant role in most years. The proportion of females in this industry far exceeds the proportion of males, and the estimated parameter on the health

industry dummy in the male wage equation is typically large and negative. The overall result of all these developments is that the unexplained component of the log wage differential rises throughout the period from below 70 percent to over 80 percent.

An alternative perspective on changes in the gender wage gap over time is provided by a dynamic Blinder-Oaxaca decomposition. A straightforward extension of equation (2) leads to the following decomposition of the change in the gender wage gap between time t and $(t-j)$:

$$(3) \quad (\overline{\ln w}_{Mt} - \overline{\ln w}_{Mt-j}) - (\overline{\ln w}_{Ft} - \overline{\ln w}_{Ft-j}) = [\hat{\beta}_{Mt} (\overline{X}_{Mt} - \overline{X}_{Mt-j}) - \hat{\beta}_{Ft} (\overline{X}_{Ft} - \overline{X}_{Ft-j})] + [\overline{X}_{Mt-j} (\hat{\beta}_{Mt} - \hat{\beta}_{Mt-j}) - \overline{X}_{Ft-j} (\hat{\beta}_{Ft} - \hat{\beta}_{Ft-j})].$$

The first component on the right hand side of the equation captures the impact of relative changes in the productive characteristics of males and female in the labour market. The second term captures the corresponding impact of changes in the relative prices these characteristics command. In table 6 we provide this decomposition for the entire sample period as well as selected years that are at roughly the same point of the business cycle.

Over the entire time period almost 60 percent of the reduction in the log wage gap can be accounted for by changes in characteristics. While no one characteristic dominates, significant increases in the proportion of females with university degrees and in the managerial and social science/education/government occupations play important roles.

The message of this analysis is that in many dimensions females possess characteristics that would lead us to expect they would be paid more than males; at least if they commanded the same returns to these characteristics that males do. The exception is their industrial distribution, particularly their presence in the health industry. In this dimension males hold an advantage and so industry accounts for a significant proportion of the wage gap. Nevertheless, as the gender wage gap has declined it is increasingly accounted for by gender differences in the returns males

and females command for their characteristics in the labour market; what is traditionally called the unexplained component of the gender pay gap. Furthermore, the decline in the gap has been furthered by the improving educational and occupational attainment of women.

Discussion and Interpretation

Our analysis indicates that the gender pay ratio based on wages is significantly different from the corresponding ratio based on earnings. Is this true in other countries? O'Neill (2003) provides a view of both the gender gap in full time year round earnings and hourly wages for the US over much of the period we study. First, as is the case for Canada the ratio based on wages is consistently higher than the earnings ratio, typically by a margin of 5 to 12 percentage points. Second, the two series follow different paths in some periods, notably over the 1990s the wage series stalls while the earnings based series continues to rise. Third over the 1990s the wage based ratio is roughly 0.80, comparable to what we report for Canada. Olivetta and Petrongolo (2008) report gender log wage gaps for the US and a selection of European countries in 1999. The calculation of the hourly wage is slightly different; the ratio of annual or weekly earnings divided by the number of hours over this period.¹² The gender wage ratios implied by these gaps vary widely from a low of 0.72 in the U.S. to 0.95 in Greece. Our estimate of Canada's ratio at this time is 0.8-0.82, and Finland and Ireland are reported to have ratios at this level.

One issue Olivetta and Petrongolo (2008) stress is that it is important to account for the labour market participation of women when comparing results across jurisdictions or over time. While the annual publication of the gender pay gap does not consider this issue—or others such as gender differences in observable characteristics—it is clearly an important topic for future research.

¹² As noted above Fortin and Schirle (2006) use a similar methodology for Canada and report gender pay ratios that are somewhat lower than the ones we report for the same period.

While our evidence comes with these sorts of qualifications, perhaps the strongest implication of our results is that there is a strong case to start reporting the gender pay gap in terms of wages rather than earnings. The LFS now provides a timely and consistent report of wages over time, and the wage gap is the primary interest of theories of gender discrimination and public policy in this area.

Conclusions

We present new evidence of the gender pay gap in Canada. Our new series of the gender pay ratio is based on wage data rather than the earnings data that is more commonly reported and the subject of policy debate in Canada. Bringing together data from multiple data sets, we demonstrate how the wage based ratio differs from its earnings based counterpart and how it varies by geography, education and other demographic characteristics.

The wage based series is different in both level and trend. It is consistently higher than the earnings based ratio by 10 to 15 percentage points. In 2006 the wage based ratio for full time workers stood at 0.85, while the earnings based ratio for full year full time workers stood at 0.72. It also changes differently over time. Of particular note the wage based ratio displays steady if modest progress over the last 15 years while the earnings based ratio remains stalled.

We also investigate how the wage based gender gap changes as we control for gender differences in productive characteristics. In many dimensions females increasingly hold an edge on males in this regard. As a result if females commanded the same returns to these characteristics as males we would expect them to be receive higher—not lower—wages than males. The most significant exception to this conclusion is the industrial distribution of employment in which males hold a significant advantage. Over time as the gender wage gap has

fallen, the proportion of it that is unexplained—due to gender differences in the returns to characteristics in the labour market—has neared 100 percent.

We note that the earnings/wage distinction has proved important in other gender based comparisons. For example, Caponi and Plesca (forthcoming) find the male/female difference in the returns to university disappear once wages are the measure of compensation instead of earnings.

The LFS now provides timely, consistent evidence on the wages of male and female workers in the Canadian economy. There is a strong case for moving the annual report of the gender pay ratio and the policy debate that surrounds it to a wage basis.

Appendix

Variable Definitions

Age:	10 year age groups. Quadratic in age in Tables 4 and 5 (midpoint of 10 year age intervals used in 1981 and 1984).
Province:	10
Education:	high school, post secondary, university
Union:	0/1
Married:	Married or common law (see footnote 10)
Tenure:	0-6, 7-12, 13-60, 61-120, 121-240, 240+ months

Industry and Occupation

Standardized classification systems provide a systematic classification structure that categorizes the entire range of economic activity in Canada. The industry in which a person works is determined by the *main economic activity of the employer* while occupation reflects *the kind of work performed*. Often there is a strong relationship between occupation and industry since certain occupations are predominant in some industries. However, several of occupations may be found in any given industry.

The industrial classification systems are hierarchical in nature – composed of sectors (at the highest level) to industries (as the most detailed level). Industries within sectors are grouped according to their similarity of input structures, labour skills or production processes used. Occupational classification are identified and grouped primarily according to the work usually performed, as determined by the tasks, duties and responsibilities of the occupation. It is customary to revise these classifications to reflect the changing nature of the economy. As such, comparability over time is an issue.

The industry data used in this paper is based on Standardized Industrial Codes SIC (1980) and the North American Industrial Classifications System (NAICS) 2002. The SIC classification differs from the NAICS classification in a number of important ways making comparability over time difficult. First, NAICS classifies industries on the basis of common inputs and process while the basis of the SIC was on outputs. Second, major changes included in the NAICS include classifications for new and emerging industries, service industries and industries engaged in the production of advanced technologies. Since many of the industries are being recognized for the first time, no SIC equivalent exists. Third, some industries used in the 1980 SIC classifications, were split or combined, or recombined into new NAIC industries. For example, Construction in SIC 1980 includes inspection services and excludes some repairs whereas while NAICS excludes inspection and includes some repairs.

The following table based on the publication *Labour Force Update* (Statistics Canada, Cat no. 71-005-XPB) shows how the distribution of sector employment by each classification corresponds to that of the other system That is, it shows the proportion of a sector's employment according to (first) classification that would also be classified to the same sector using the

(second) classification. For example, 97.3% of the Agriculture sector in NAICS would be classified as the Agriculture using the SIC. Likewise, 92.6% of the Agriculture sector in SIC would be classified as the Agriculture using the NAICS.

Distribution of employment

Code	SIC 80-NAICS97	NAICS97- SIC 80
1 Agriculture Fishing, Trapping, Forestry,	92.6	97.3
2 Mining	94.1	88.4
3 Utilities	82.0	96.3
4 Construction	91.9	92.5
Manufacturing	92.2	96.8
5 Mfg-Durables		
6 Mfg-Non-durables		
Trade	87.0	96.6
7 Wholesale		
8 Retail		
9 Transport-Warehousing	71.7	95.0
10 FIRE	95.4	89.0
11 Business services	(1)	
Professional		(2)
Business support services		(2)
12 Education	94.8	97.0
13 Health	91.5	91.9
14 Information		(4)
15 Accommodation, Food	97.9	98.4
16 Other services	37.7 (3)	53.8 (5)
17 Public Administration	92.1	92.7
99 Unclassified		

There is no industry sector that is consistently defined in both systems. Although the majority of units would fall into the correct classification regardless of which system is adopted, (no less than 80% of total employment in 1998 would have consistent industry codes). Partial relationships exist for the following:

(1) Employment in SIC Business services sector found in NAICS Professional Sector (73.7%) and found in Business Support services (17.7%).

(2) 92.8% of employment in NAICS Professional sector and 40.5% of employment in Business Support sector found in SIC Business services.

(3) Employment in SIC other services found in NAICS Information sector (24.1%), Business support sector (20.5%) and in other services (37.7%).

(4) Employment in NAICS Information sector found in SIC manufacturing (13.4%); transportation, storage and communications (34.1%); and other services (39.2%).

(5) Employment in NAICS other services found in SIC trade (28.2%) and in health (12.9%).

To further aggravate the problem, the industry data in SUM-SWH-LMAS is at an aggregated level. That is, there are 52 industry groupings corresponding to SIC 1980. The LFS uses 4-digit NAICS codes. Every attempt was made to harmonize the classification systems over time in order to minimize the impact of partial relationships between systems and to maximize the usefulness of the data. Concordance tables were used to derive the following industry breakdown.

INDUSTRY	NAIC 2002 LFS SLID	Aggregated SIC SUM-SWH-LMAS 52 groupings	2-digit SIC1980
1 Agriculture	Subsector 111-112 Industry group 1151-2	1	01-02
2 Forestry, Fishing, Mining, Oil and Gas	Subsector 113-4 Industry group 1153 Sector 21	2-8	03-09
3 Utilities	Sector 22	34	49
4 Construction	Sector 23	29-30, 52	40-44
Manufacturing	Sector 31-33	9-28	10-39
5 Durables	3211-3219, 3271-3279, 3311-3399	11, 16, 17, 20-24, 28	10-12, 25, 26, 29-35, 39
6 Non-durables	3111-3169, 3221-3262	9-10, 12-15, 18, 19, 25-27	15-19, 24, 27, 36, 37
Trade	Sector 41-45	35-36	50-69
7 Wholesale trade	Sector 41	35	50-59
8 Retail trade	Sector 44-45	36	60-69
9 Transportation and Warehousing	Sector 48-49	31-32	45
10 Finance, Insurance, Real Estate and Leasing	Sector 52-53	37-39	70-76
11 Business Services		44	77
Professional services	Sector 54		
Business and building support	Sector 55-56		
12 Educational Services	Sector 61	40	85
13 Health Care and Social Assistance	Sector 62	41	86
14 Information, Culture and Recreation	Sectors 51 and 71	19, 33, 43	28, 48, 96
15 Accommodation and Food Services	Sector 72	46	91
16 Other services	Sector 81	48-51	81-84

Using the 4-digit LFS NAIC codes, it is possible to classify industries that have changed sectors into a harmonized concept. The following adjustments were made to further harmonize the industry classification.

Description	NAICS	SIC Equivalent	Harmonized	Notes
Animal aquaculture	Animal production 1125	Major Group 03 Fishing	2	NAIC code fully corresponds to SIC equivalent
Retail trade	4413, 4431-4442, 4461, 4532		8	NAIC retail codes include both SIC retail and wholesale codes. SIC cannot be disaggregated.
Printing, Publishing and Allied Industries	Information and Culture Publishing Industries 5111, 5112	Major Group 28 Manufacturing Printing, Publishing and Allied Industries	14	SIC code includes commercial printing, platemaking, typesetting and bindery industries as well as publishing industries.
Postal / courier service	Transportation Postal service 4911, 4912	Major group 48 Communications	14	SIC code 48 includes telecommunication and broadcasting industries. Include postal service in Information sector.
Business services	5413, 5417, 5419	Major group 77	11	Partial relationships in NAICS codes
Utilities	5621, 5622, 5629	Other utilities	3	Waste management
Other services	Personal services Household repair Advocacy groups	Major group 97- 99	17	
Recreation	Education Other schools 6116	Major group 99 Other services	14	Includes athletic instruction
Retail	Repair and	Major group 63	8	

	Maintenance Automotive 8111	Retail		
Wholesale	Repair and Maintenance Electronics 8112 8113	Major group 57	7	SIC includes a wholesale not personal service

The following table shows the distribution of employment by industry classification system using data from the LFS. The first two columns – SIC1980 and NAICS 1997, are based on estimates from the *Labour Force Update* while the last two columns are based on workers aged 17-64 in May 1998 excluding those with unknown wages. For the most part, the distributions look similar and that the harmonized industry coding system will not introduce any systematic bias into our results.

Distribution of employment by industry classification, 1998

Code	Industry	SIC 1980	NAICS 1997	NAICS 2002	Harmonized SIC 1980- NAICS 2002
1	Agriculture	3.1	2.9	1.1	1.1
2	Fishing, Trapping, Forestry, Mining	1.9	2.1	2.1	2.3
3	Utilities	1.0	0.8	1.0	1.1
4	Construction	5.4	5.3	4.2	4.2
	Manufacturing	15.7	15.0	17.2	
5	Mfg-Durables				9.7
6	Mfg-Non-durables				7.5
	Trade	16.9	15.2	15.3	
7	Wholesale				3.6
8	Retail				12.8
9	Transport-Warehousing	6.5	4.9	5.1	4.1
10	FIRE	5.5	5.9	6.2	5.8
11	Business services	7.9			6.0
	Professional		6.6	4.4	
	Business support services		3.4	3.1	
12	Education	6.7	6.6	7.8	7.6
13	Health	10.3	10.2	10.4	10.5
14	Information		4.4	4.4	5.7
15	Accommodation, Food	6.4	6.4	6.6	6.6
16	Other services	7.2	5.0	4.0	4.3
17	Public Administration	5.5	5.5	6.9	6.9
99	Unclassified				0.4

The occupation data used in this paper is based on the Standardized Occupation Codes 1980 (SOC-1980) and the National Occupation Code (NOC 2001). The SOC classification differs from the NOC classification in a number of ways. First, SOC 1980 corresponds to economy of the 1970s and 1980s. Occupations in decline tend to be overrepresented in the SOC 1980 while there are too few in rapidly expanding service sectors. Second, groups are better defined according to skill level in NOCs. Third, technical occupations are separated from professional occupations in NOCs.

A similar strategy used in the preceding analysis on harmonizing industry codes was used to harmonize occupation codes. There are 50 occupation groupings corresponding to SOC 1980. The LFS uses 4-digit NOC codes. Every attempt was made to harmonize the classification systems over time in order to minimize the impact of partial relationships between systems and to maximize the usefulness of the data. Concordance tables are not available for SOC 1980 and NOC 2001. Tables using SOC 1980- SOC 1991; SOC 1991 – NOC 1997; and NOC 1997 – NOC 2001 were used to derive the following occupation breakdown.

Main differences between the SOC and NOC classification systems include:

- Greater detail in managerial, natural and applied science and services such as travel and tourism
- Technical occupations have been separated from professional occupations
- Supervisors are allocated to a separate group in sales and service occupations.

The following table provides a very broad look at the relationship between the NOC and the SOC aggregates. However, there are significant

Occupation Codes	4 digit NOC LFS-SLID	SOC Aggregate SUM-SWH-LMAS
Management*	A	1-3
Business Finance and Administrative	B	17-22
Natural and applied sciences	C	4-7
Health	D	13-15
Social science, Education, Government and Religion	E	8-12
Art, Culture, Recreation and Sport	F	16
Sales and Services	G	23-28
Trade, Transport, Equipment Operators and related	H	42-49
Unique to primary industry	I	29-33
Unique to Processing, Manufacturing and Utilities	J	34-41
Unclassified		

Using the 4 digit NOCs codes in the LFS, the following adjustments were made to harmonize the occupation classification.

NOC Description	NOC Code	SOC Equivalent	Harmonized
Supervisors: Sales, Services	A211, A221-2	Sales and Service	Sales and service
Protective services	A351-3	Protective services 25	Sales and service
Other service managers	A361	Sales and services	Sales and service
Residential home builders, renovators	A372	Other construction trades	Trade
Securities agents Other financial officers	B013 B014	Sales agents and traders	Sales and service
Assessors and brokers	B115-6	Other sales and services	Sales and service
Insurance Underwriter	B114	Management & administrative	Management
Dispatchers Transportation Route and Crew	B575 B576	Other transportation operators	Equipment operators
Bookkeepers, loans, claims Secretaries Clerical Supervisors Clerical Occupations	B111-3 B2 B4 B5 (excl. B575- 6)	Bookkeepers Secretaries and stenographers Other clerical	Clerical
Administrative and regulatory occupations	B3	Management	Management
Professional occupations in business and finance	B0 (excl B013- 4)	Management	Management
Electrical service technicians	C142-4, C162	Repairing services	Processing
Technical and regulatory inspectors	C162-3	Inspectors	Management
Transport operators and controllers	C17	Other transport	Transport
Industrial designer	C152	Product and interior designer	Art, recreation
Program officers unique to government	E037	Government officials	Management
Broadcast / Audio / Video technicians	F124-5, F127	Electronic equipment operator	Trans
Artisans and craft	F144-5		Processing
Grain elevators	G134	Management	Management
Cashiers	G311	Cashiers and Tellers	Clerical
Occupations in travel and accommodation	G711-5	Travel clerks	Clerical

Tour and travel guides recreation	G721 G722, G731	Sales Recreation	Sales & Service Recreation
Early childhood educators	G812	Elementary educator	Education
Elemental Medical and Hospital Assistants	G951	Nursing, therapy and related	Health
Commercial divers	H522	Other services	Sales & Service
Pest control and fumigators	H534	Other services	Sales & Service

The following table shows the distribution of employment by occupation classification system using data from the LFS. For the most part, the distributions look similar and that the harmonized industry coding system will not introduce any systematic bias into our results. Note that Business occupations in NOCS have been classified as clerical or management based on the SOC equivalent.

Distribution of employment

	SOC 1988	NOC 1998	Harmonized 1998
Management	12.5	8.3	10.9
Business Finance and Administrative*		19.9	
Clerical	18.5		17.4
Natural and applied sciences	3.9	6.6	5.4
Health	5.0	5.5	5.5
Social science, Education, Government and Religion	7.3	7.8	8.4
Art, Culture, Recreation and Sport	1.6	2.0	2.0
Sales and Services	20.3	24.1	23.3
Trade, Transport, Equipment Operators and related	16.5	15.0	15.5
Unique to primary industry	2.8	2.4	3.2
Unique to Processing, Manufacturing and Utilities	11.7	8.5	8.5

Table A1: The Gender Wage Ratio for Full Time Workers in Selected Years

Year	Age 17-64	Age 25-54
1981	0.771	0.770
1984	0.738	0.742
1986	0.738	0.746
1987	0.752	0.759
1988	0.758	0.760
1989	0.764	0.766
1990	0.774	0.776
1993	0.800	0.795
1994	0.822	0.821
1995	0.810	0.811
1996	0.827	0.822
1997	0.828	0.826
1998	0.828	0.826
1999	0.823	0.821
2000	0.823	0.823
2001	0.821	0.818
2002	0.833	0.834
2003	0.841	0.843
2004	0.847	0.845
2005	0.853	0.859
2006	0.852	0.847
2007	0.859	0.856
2008	0.852	0.847

Appendix Table 2. Surveys, Sample Sizes, and Wage/Hours Definitions Full Time Workers Age 25-54

Year	Survey	Sample Size		Wages	Hours
		Males	Females		
1981	SWH	13,602	7,302	Usual wage or salary before taxes and other deductions. Includes tips, no reference made commissions, bonuses and overtime. No topcoding.	Usual days per week + usual hours per day. No reference to overtime.
1984	SUM				
		11,719	7,321	Usual wage or salary before taxes and other deductions. Includes tips, no reference made commissions, bonuses and overtime. No topcoding.	Weeks worked in 1984 + usual hours per day. No reference to overtime.
1986	LMAS	14,010	8,823		
1987		16,366	10,877	Usual wage or salary before taxes and other deductions includes tips, commissions, bonuses and paid overtime (includes items all together). Some topcoding.	Usual paid days per week + usual hours per day. No reference to overtime.
1988		13,733	9,143		
1989		13,532	9,435		
1990		13,307	9,505		
1993	SLID	5,494	4,056		
1994		5,807	4,222	Wage or salary before taxes and other deductions includes tips, commissions, and bonuses but explicitly excludes paid overtime.	Usual paid hours per week. No reference to overtime
1995		5,629	4,198		
1996		11,739	8,852	Wage or salary before taxes and other deductions includes tips, commissions, and bonuses but explicitly excludes paid overtime. No topcoding.	Usual paid hours per week explicitly excluding overtime.
1997	LFS	17,654	13,507		
1998		17,964	13,899		
1999		18,115	14,023		
2000		18,124	14,144		
2001		18,291	14,729		
2002		17,543	14,623		
2003		17,697	14,725		
2004		16,855	14,506		
2005		17,253	14,526		
2006		17,764	15,208		
2007		17,760	15,381		
2008		17,685	15,375		

References

- Baker, M, Benjamin, D., Desaulniers, A., and M. Grant. "The Distribution of the Male/Female Earnings Differential: 1970-1990", *Canadian Journal of Economics*, 28, August 1995, 479-501.
- Baker, M. and N. Fortin, "Occupational Gender Composition and Wages in Canada: 1987-1988", *Canadian Journal of Economics*, 34, May 2001, 345-376.
- Baker, M. and N. Fortin, "Comparable Worth in a Decentralized Labour Market: The Case of Ontario", *Canadian Journal of Economics*, 37, November 2004 850-878.
- Baker M. and K. Milligan, "How does job-protected maternity leave affect mothers' employment?", *Journal of Labor Economics*, 26, October 2008, 655-692.
- Blau, F. and L.M. Kahn, "The US Gender Pay Gap in the 1990s: Slowing Convergence", Working Paper 508, IRS, Princeton University, March 2006.
- Caponi, V. and M. Plesca "Post-Secondary Education in Canada: Can Ability Bias Explain the Earnings Gap Between College and University Graduates?", *Canadian Journal of Economics*, forthcoming.
- Christofides, L.N., and R. Swidinsky, "Wage Determination by Gender and Visible Minority Status: Evidence from the 1989 LMAS", *Canadian Public Policy*, 20, 1994, 34-51.
- Doiron, D. and W.C. Riddell, "The Impact of Unionization on Male-Female Earnings Differences in Canada", *Journal of Human Resources*, 1994, 29, 505-534.
- Drolet, M., "New Evidence on Gender Pay Differentials: Does Measurement Matter?", *Canadian Public Policy*, 28, 2002a, 1-16
- Drolet, M., "Can the Workplace Explain Canadian Gender Pay Differentials", *Canadian Public Policy*, 28, 2002b, S41-S63.
- Fortin, N. and T. Schirle. "Gender Dimensions of Changes in Earnings Inequality in Canada" with Nicole Fortin, in *Dimensions of Inequality in Canada*, ed. David A. Green and Jonathan R. Kesselman. Vancouver: UBC Press. 2006.
- Gunderson, M., "Decomposition of the Male/Female Earnings Differential: Canada 1970", *Canadian Journal of Economics*, 12, 1979, 46-72.
- Gunderson, M., *Women and the Canadian Labour Market: Transition Towards the Future*, Statistics Canada: Census Monograph Series, 96-321, 1998.
- Holmes, R., "Male-Female Earnings Differentials in Canada", *Journal of Human Resources*, 11, 1976, 109-17.

Kidd, M.P. and M. Shannon, "The Gender Wage Gap in Canada over the 1980s", in M. Abbott, C. Beach and R Chaykowski (eds.) *Transition and Structural Change in the North American Labor Market*, Kingston ON: IRC Press, 1997, 126-154.

Maki, D. and I. Ng., "Effects of Trade Unions on the Earnings Differential between Males and Females: Canadian Evidence", *Canadian Journal of Economics*, 23, 1990, 305-11.

Miller, P.W., "Gender Differences in observed and Offered Wages in Canada: 1980", *Canadian Journal of Economics*, 20, 1987, 225-45.

Milligan K. and T. Schirle, "Working while receiving a pension: Will double dipping change the elderly labour market?", Mimeo, University of British Columbia, April 2008.

Mulligan C.B., and Y. Rubinstein, "Selection, Investment and Women's Relative Wages Over Time", *Quarterly Journal of Economics*, 123, August 2008, 1061-1110.

Neill, C., "Tuition Fees and the Demand for University Places", Wilfred Laurier University, 2006.

Ollivetti, C and B. Petrongolo, "Unequal Pay or Unequal Employment? A Cross Country Analysis of Gender Gaps", *Journal of Labor Economics*, 26, 2008, 621-654.

O'Neill, J. "The Gender Gap in Wages Circa 2000", *American Economic Review*, 93(2), 2003, 309-314.

Robb, R., "Earnings Differential between Males and Females in Ontario", *Canadian Journal of Economics*, 11, 1978, 350-59.

Shapiro, D.M. and M. Stelcner, "The Persistence of the Male-Female gap in Canada: The Impact of Equal Pay Laws and Language Policies", *Canadian Public Policy*, 13, 1987, 462-76.

Statistics Canada, *Income Trends in Canada 1980-2005*, Ottawa: Statistics Canada, (13F0022XCB).

Wannel, T., "Male-Female Earnings Gap Among Recent University Graduate", *Perspectives on Labour and Income*, Cat. No. 75-001E, Summer 1990, Ottawa: Statistics Canada.

Table 1: Some Estimates of the Female/Male Earnings Ratio in Canada

Source	Year Data Source	Unadjusted Ratio	Adjusted Ratio
Baker et al. (1995)	1970 Census	0.60	0.69
	1980 Census	0.64	0.73
	1985 Census	0.66	0.73
	1985 SCF	0.64	0.71
	1990 SCF	0.67	0.71
Gunderson (1998)	1970 Census	0.63	0.74
	1980 Census	0.67	0.76
	1990 Census	0.72	0.79

Adjusted Ratio: The productive characteristics included are: (Baker et al. 1995) years of education and years of potential experience, region, marital status, children and occupation; (Gunderson 1998) age, vocational training, education attainment, marital status, language, immigrant status, province, hours worked, occupation and industry.

Table 2: Cyclical and Trend Differences Between Wage Based and Earnings Based Estimates of the Gender Pay Ratio

	All Workers		Full Time	
Unemployment Rate	-0.007 (0.002)	-0.005 (0.003)	-0.006 (0.002)	-0.005 (0.003)
Trend	0.0002 (0.0004)	-0.003 (0.002)	0.0017 (0.0004)	-0.0006 (0.0021)
Trend Squared		0.0001 (0.0001)		0.00009 (0.00007)
p-value H ₀ : t=0 t ² =0		0.3011		0.002
Durbin Watson	0.522	0.572	1.467	1.609

Notes: The reported estimates are the result of a regression of the gender wage ratio, 1981-2008, on the indicated explanatory variables. Standard errors in parentheses.

Table 3: The Average Gender Wage Ratio by Province for Selected Periods

	1981	1987-1989	1996-98	2006-2008
NF	0.75 (9)	0.73 (9)	0.79 (9)	0.83 (8)
PEI	0.83 (1)	0.81 (1)	0.88 (1)	1.00 (1)
NS	0.76 (6)	0.79 (2)	0.83 (3)	0.89 (3)
NB	0.82 (2)	0.74 (8)	0.81 (7)	0.87 (6)
QU	0.81 (3)	0.77 (4)	0.83 (3)	0.89 (3)
ON	0.76 (6)	0.77 (4)	0.84 (2)	0.85 (7)
MB	0.77 (5)	0.78 (3)	0.83 (3)	0.90 (2)
SA	0.81 (3)	0.75 (6)	0.80 (8)	0.88 (5)
AB	0.71 (10)	0.75 (6)	0.78 (10)	0.78 (10)
BC	0.76 (6)	0.72 (10)	0.82 (6)	0.83 (8)

Notes: Provincial rank in parentheses.

Table 4: Binder-Oaxaca Decompositions of the Gender Log Wage Gap Specification 2

Year	Log Wage Gap	Explained Component	Contribution of Differences in Education	Unexplained Component
1981	0.268	0.006	0.004	0.262
1984	0.312	0.005	0.001	0.307
1986	0.295	0.007	-0.002	0.287
1987	0.287	0.006	-0.001	0.281
1988	0.287	0.0007	-0.006	0.286
1989	0.273	0.003	-0.003	0.270
1990	0.266	-0.002	-0.005	0.268
1993	0.237	-0.006	-0.003	0.243
1994	0.202	-0.013	-0.005	0.215
1995	0.215	-0.010	-0.005	0.225
1996	0.197	-0.009	-0.007	0.206
1997	0.194	-0.006	-0.006	0.200
1998	0.194	-0.005	-0.005	0.200
1999	0.196	-0.009	-0.008	0.205
2000	0.196	-0.012	-0.012	0.208
2001	0.206	-0.010	-0.010	0.216
2002	0.184	-0.011	-0.011	0.196
2003	0.171	-0.015	-0.015	0.185
2004	0.169	-0.012	-0.013	0.181
2005	0.157	-0.016	-0.016	0.173
2006	0.169	-0.013	-0.014	0.182
2007	0.157	-0.018	-0.020	0.175
2008	0.166	-0.018	-0.018	0.185

Notes: The reported statistics are the result of decompositions of the gender wage gap in the indicated year. The explanatory variables are age, education and province. The decomposition is made using the male parameters and female means as weights. The explained and unexplained components are as defined in the text. The two components may not add exactly to the overall log wage gap in some years due to rounding. The contribution of difference in education is to the explained component.

Table 5: Binder-Oaxaca Decompositions of the Gender Log Wage Gap Specification 4

Year	Log Wage Gap	Explained Component	Contribution of differences in			Unexplained Component
			Education	Occupation	Industry	
1981	0.268	0.105	0.003	0.026	0.058	0.163
1984	0.312	0.130	0.001	0.022	0.079	0.182
1986	0.295	0.095	-0.002	-0.005	0.077	0.199
1987	0.287	0.108	-0.001	-0.003	0.087	0.179
1988	0.287	0.086	-0.005	-0.002	0.068	0.200
1989	0.273	0.107	-0.003	0.023	0.065	0.166
1990	0.266	0.114	-0.004	0.008	0.088	0.152
1993	0.237	0.070	-0.003	0.020	0.046	0.167
1994	0.202	0.040	-0.004	0.009	0.038	0.162
1995	0.215	0.042	-0.003	-0.004	0.045	0.173
1996	0.197	0.050	-0.005	0.001	0.046	0.147
1997	0.194	0.029	-0.004	-0.009	0.040	0.165
1998	0.194	0.026	-0.003	-0.002	0.032	0.168
1999	0.196	0.045	-0.005	-0.003	0.055	0.152
2000	0.196	0.045	-0.008	-0.004	0.055	0.151
2001	0.206	0.043	-0.005	-0.005	0.053	0.162
2002	0.184	0.033	-0.006	-0.006	0.047	0.151
2003	0.171	0.020	-0.008	-0.016	0.047	0.151
2004	0.169	0.027	-0.007	-0.012	0.049	0.143
2005	0.157	0.019	-0.008	-0.008	0.042	0.138
2006	0.169	0.026	-0.007	-0.010	0.046	0.143
2007	0.157	0.013	-0.010	-0.015	0.041	0.144
2008	0.166	0.026	-0.009	-0.023	0.065	0.141

Notes: The reported statistics are the result of decompositions of the gender wage gap in the indicated year. The explanatory variables are age, education and province, union status marital status tenure, occupation and industry. The decomposition is made using the male parameters and female means as weights. The explained and unexplained components are as defined in the text. The two components may not add exactly to the overall log wage gap in some years due to rounding. The contribution of differences in education, occupation and industry are to the explained component.

Table 6: Dynamic Binder-Oaxaca Decompositions of the Gender Log Wage Gap Specification 4

Period	Change in Log Wage Gap	Explained	Unexplained
1981-2008	-0.102	-0.059	-0.042
1984-1994	-0.110	-0.056	-0.054
1990-1998	-0.072	-0.034	-0.038

Notes: The reported statistics are the result of decompositions of the change in gender log wage gap between the indicated years. The explanatory variables are age, education and province, union status marital status tenure, occupation and industry. The explained and unexplained components are as defined in the text. The two components may not add exactly to the overall log wage gap in some years due to rounding.

Figure 1: Female - Male Earnings Ratio for Full Year Full Time Workers, All Ages

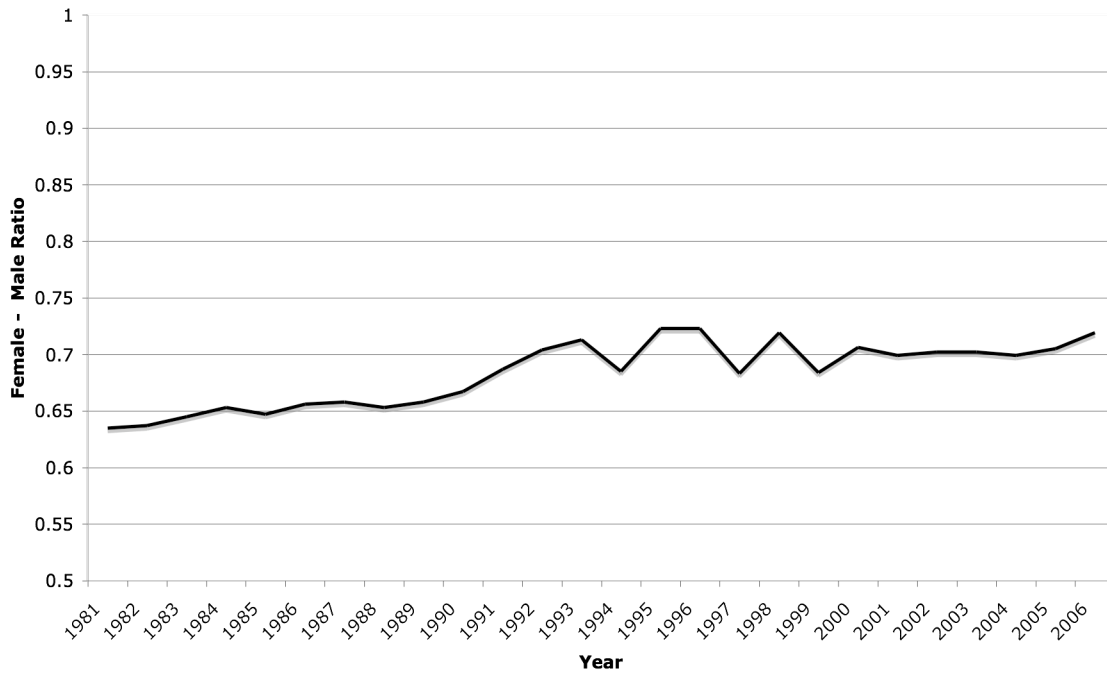


Figure 2: Female - Male Pay Ratios, Workers Age 17-64

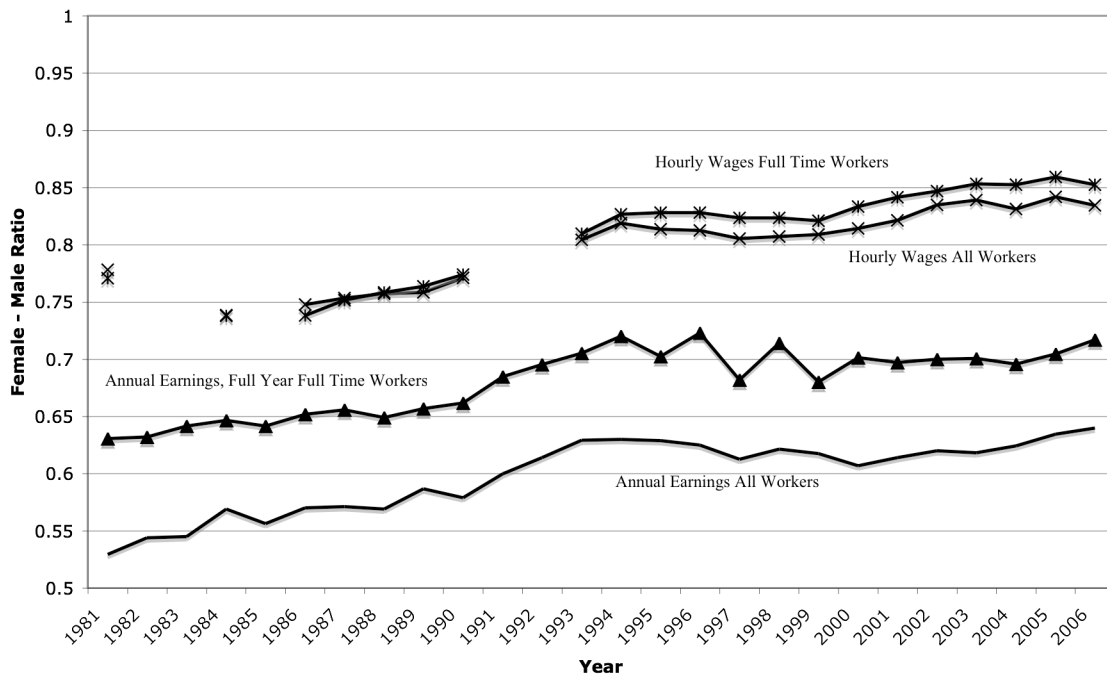


Figure 3: Female - Male Pay Ratios, Part Time Workers Age 17-64



Figure 4: The Full Time Employment Rate of males and Female Age 25-54.

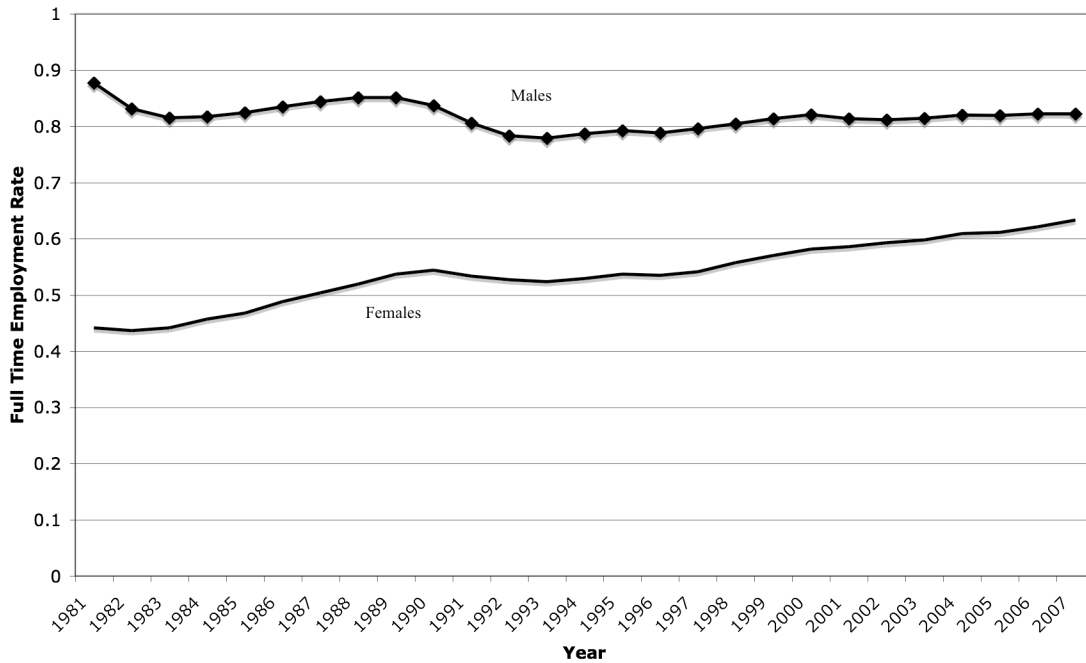


Figure 5: Female - Male Wage Ratios Full Time Workers Age 25-54

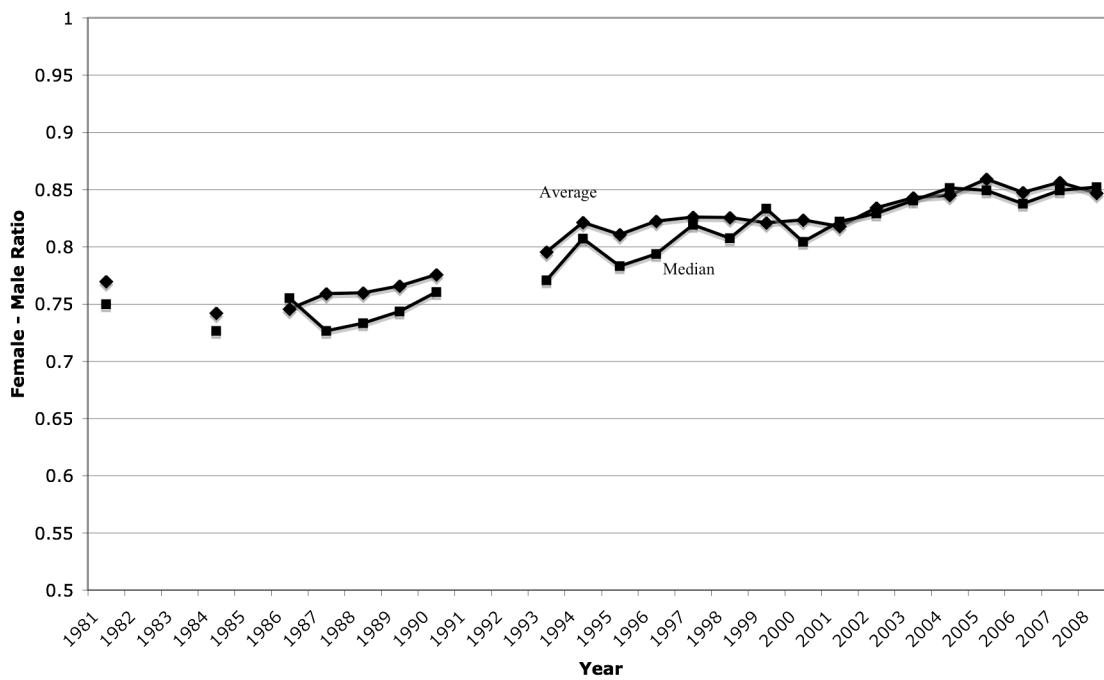


Figure 6: Usual Weekly Hours, Main Job, Full Time Workers Age 25-54

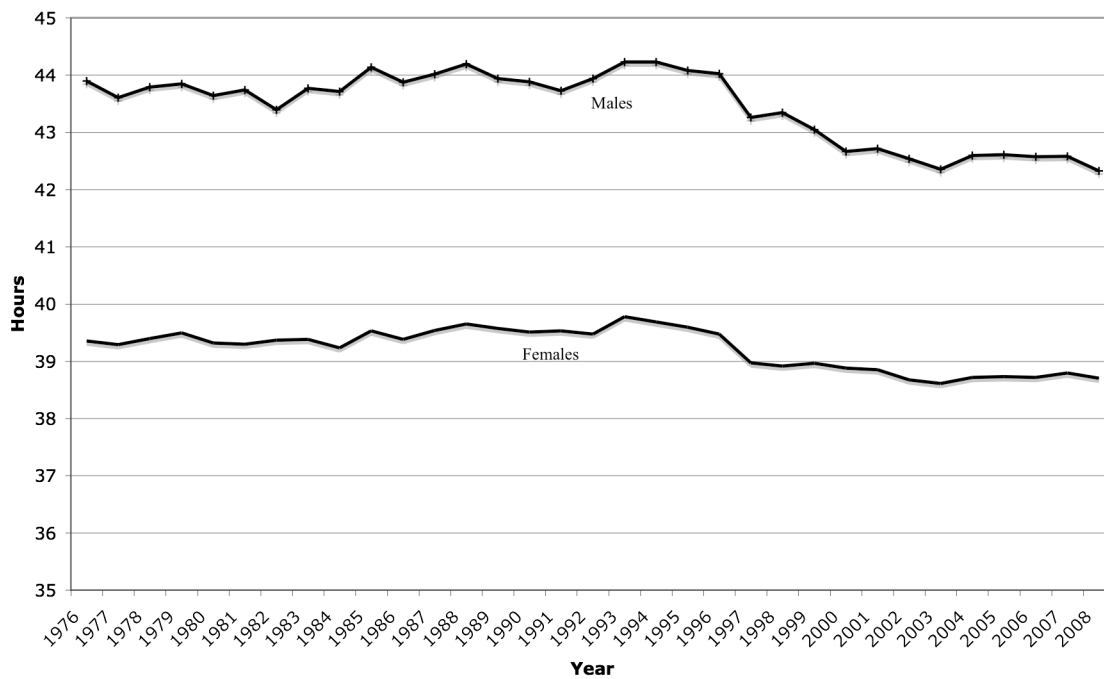


Figure 7: Female - Male Wage Ratios, Full Time Workers, by Age

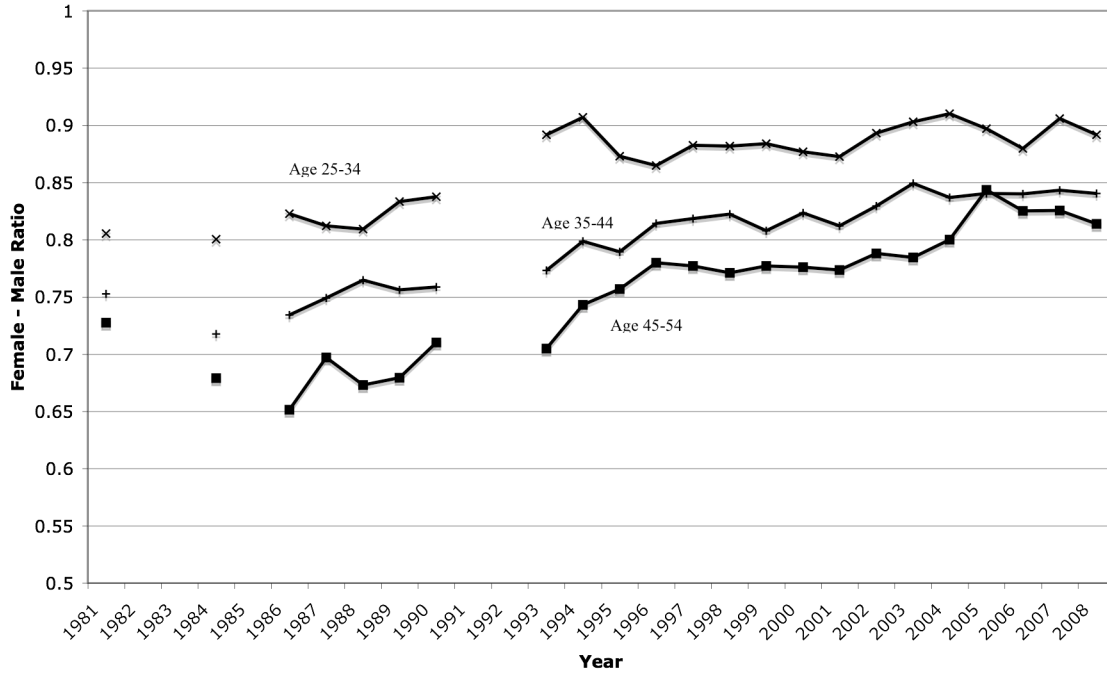


Figure 8: Female - Male Wage Ratios by Cohort of Entry to the Labour Market

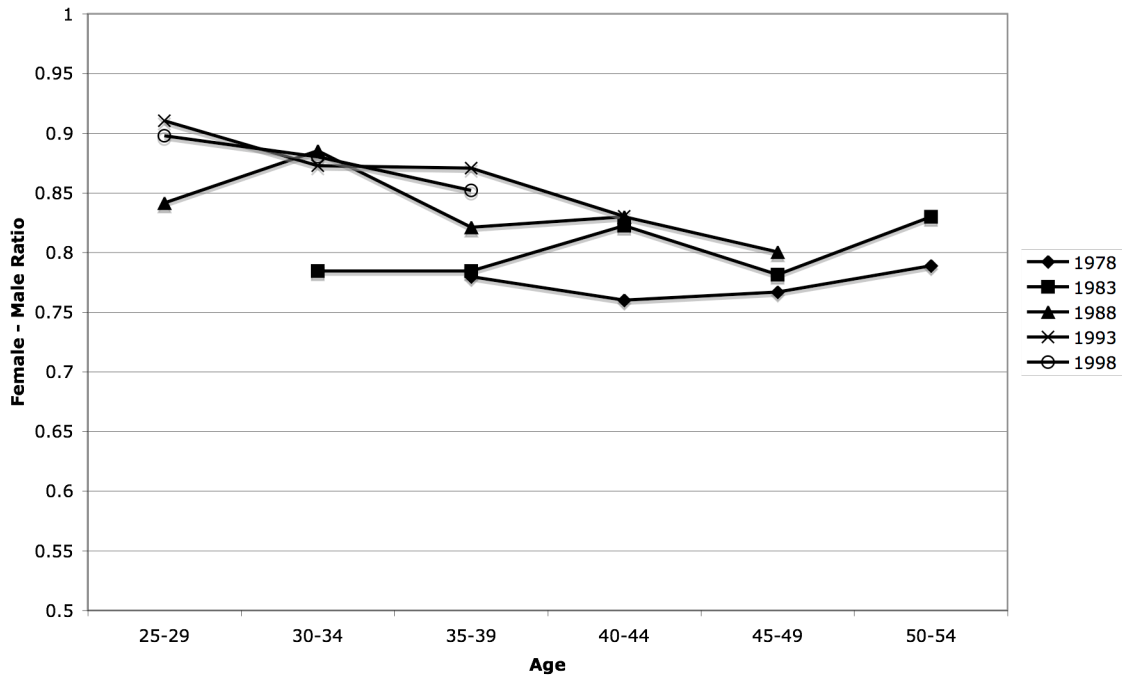


Figure 9: Female - Male Wage Ratios Full Time Workers Age 25-54, By Marital Status

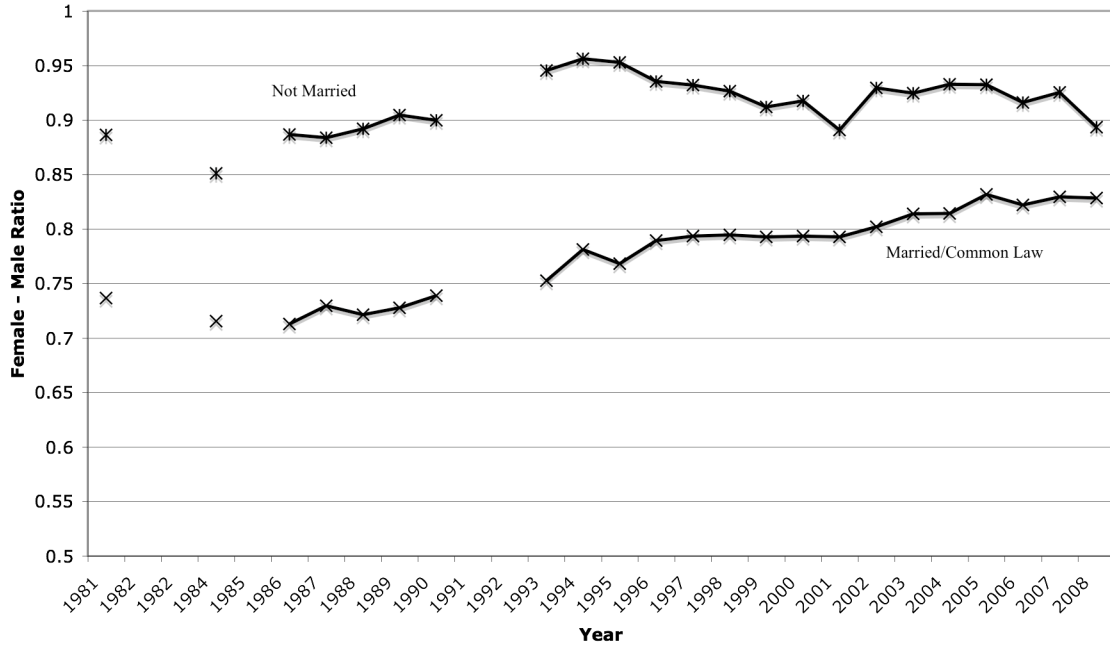


Figure 10: Female - Male Wage Ratios Full Time Workers Age 25-54, by Education

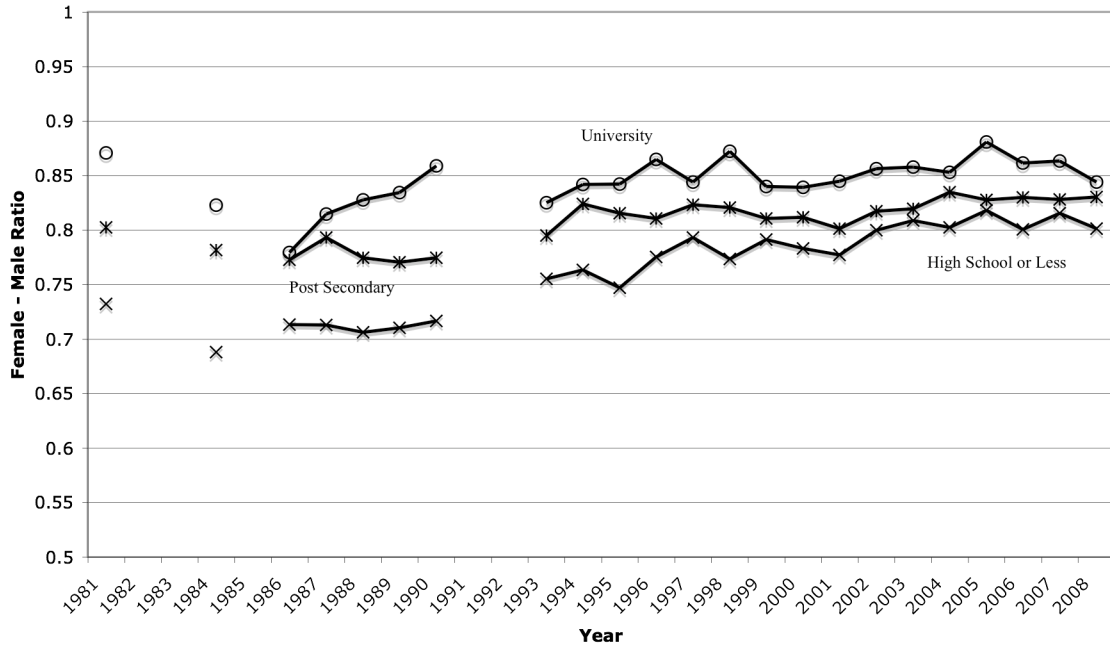


Figure 11: Female - Male Wage Ratios Full Time Workers Age 25-54, By Province

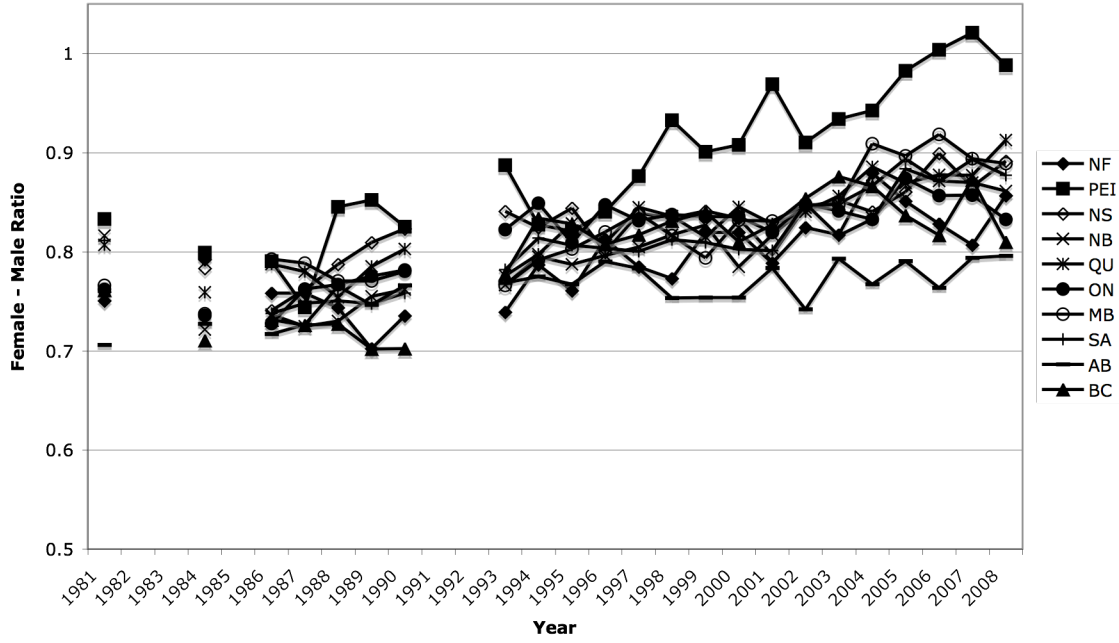


Figure 12: Female - Male Wage Ratios, Full Time Workers Age 25-54 by Tenure on Current Job

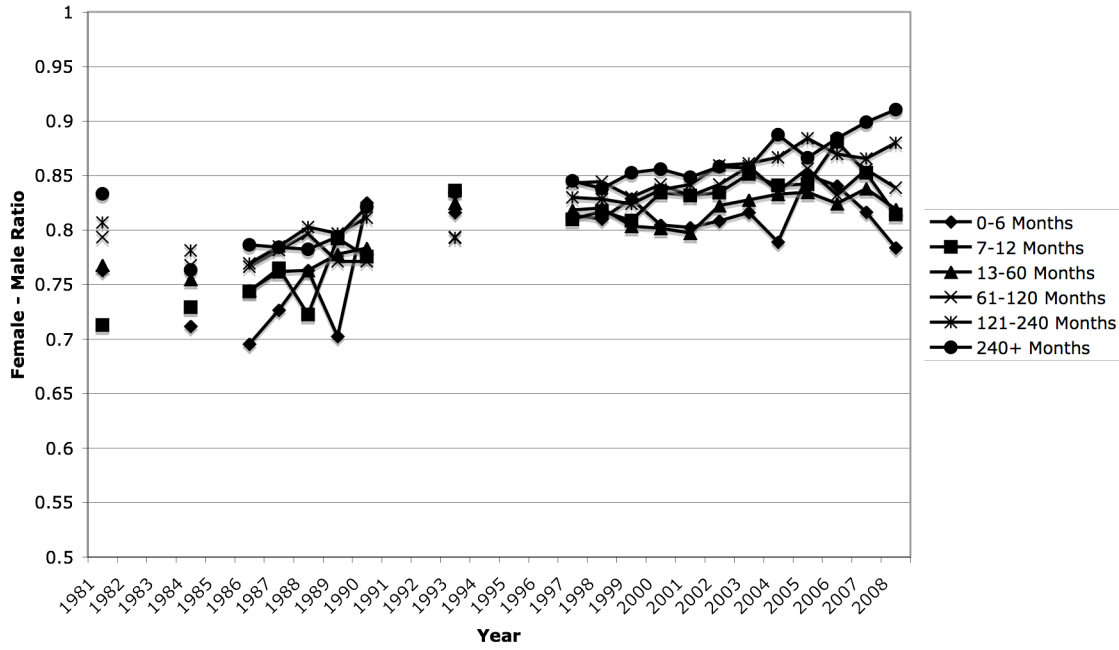


Figure 13: Female - Male Wage Ratio, Full Time Workers Age 25-54. The Effects of Age.

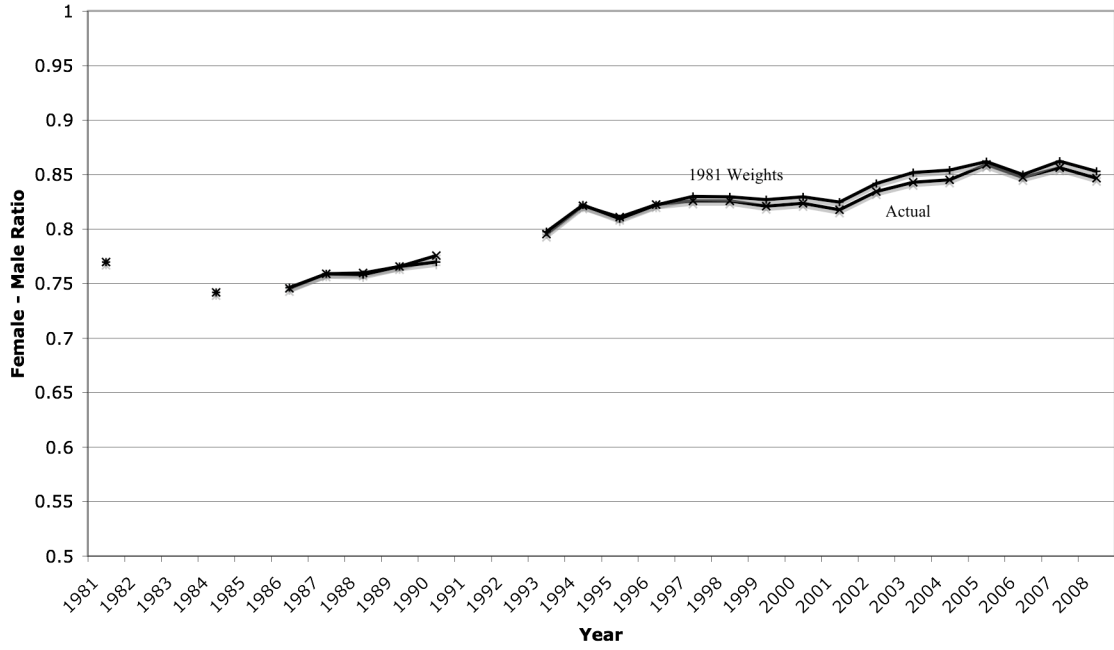


Figure 14: Female - Male Wage Ratio Full Time Workers Age 25-54. The Effects of Tenure

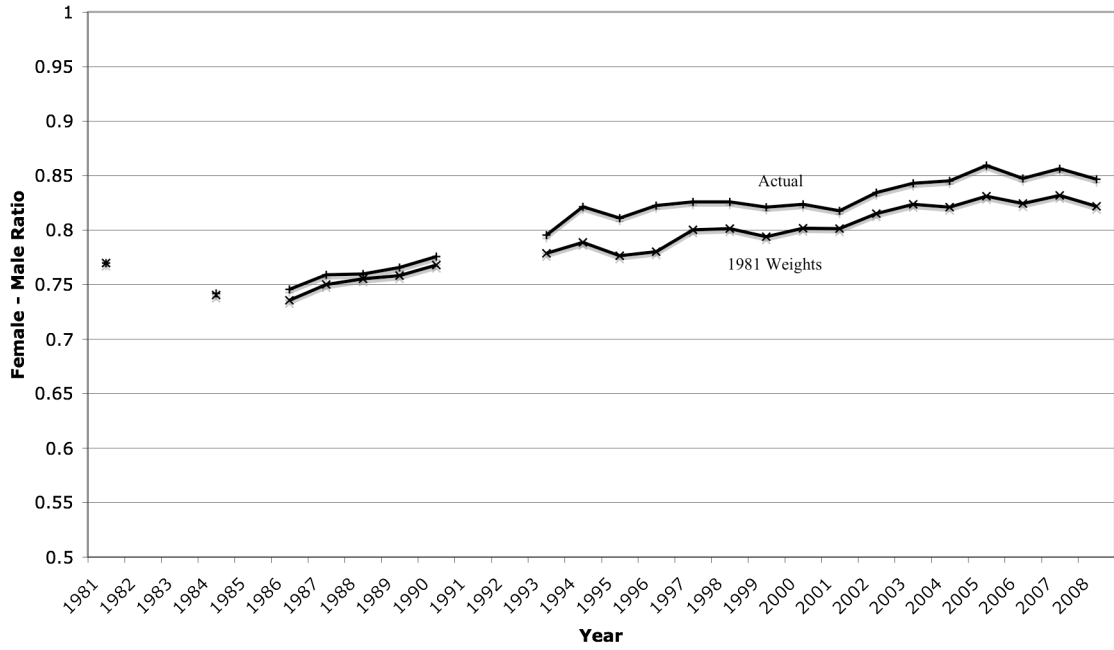


Figure 15: Conditional Gender Log Wage Differentials, Full Time Workers Age 25-54

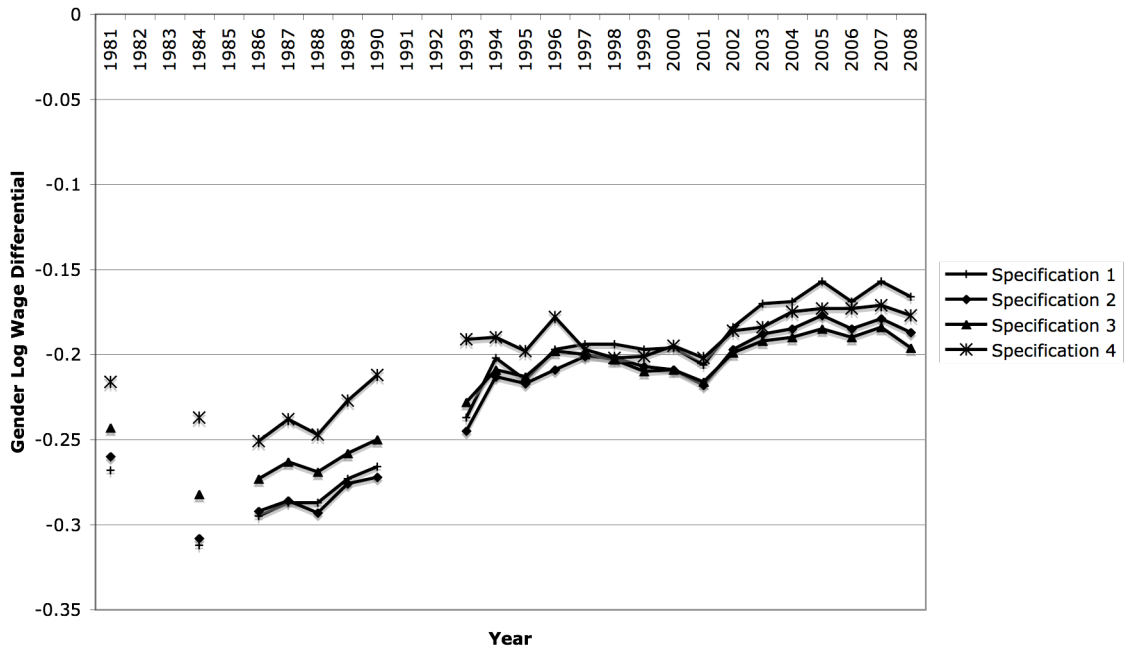


Figure 16: Gender Log Wage Gaps by Province, Specification 3, Full Time Workers Age 25-54

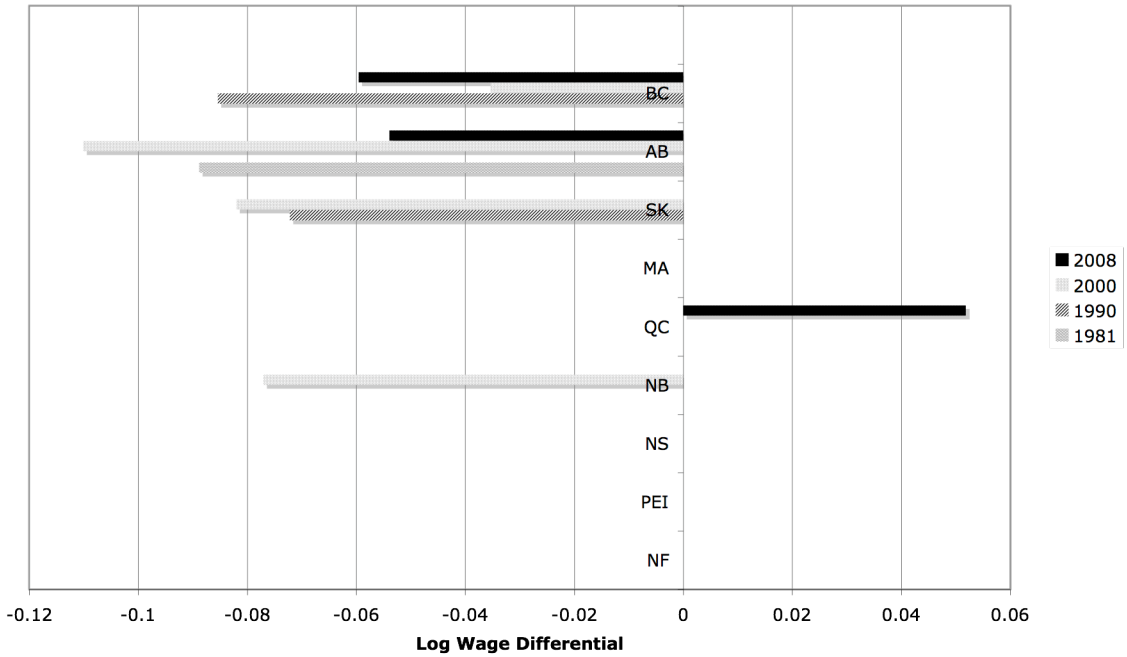


Figure 17: Gender Log Wage Gaps by Province, Specification 4, Full Time Workers Age 25-54

