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# Measuring and Analyzing the Gender Pay Gap: A Conceptual and Methodological Overview

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# Measuring and Analyzing the Gender Pay Gap: A Conceptual and Methodological Overview

by **Melissa Moyser**, PhD

## 1. Introduction

Pay inequality between women and men is a persistent phenomenon in Canada and around the world.<sup>1,2</sup> Focusing on Canada, female labour force participation has risen dramatically since the 1960s, driven simultaneously by an increase in the proportion of employed women at any given time, and a decrease in the propensity of employed women to withdraw from the workforce upon marriage or motherhood.<sup>3,4,5</sup> Women are now better educated, on average, than their male counterparts, having made substantial gains in educational attainment over the past three decades by increasingly acquiring university degrees at the bachelor level or above, and doing so at a faster pace than men.<sup>6,7,8</sup> At post-secondary institutions, women have diversified their fields of study, making inroads in lucrative science, technology, engineering, and mathematics (STEM) specialties.<sup>9,10</sup> Recent cohorts of women also seem to have stronger attachments to the labour market than their predecessors, as they are more likely to return to employment after a work interruption (e.g., maternity/parental leave), and to be employed when they have young children.<sup>11,12</sup> Although women remain the minority, their representation in leadership positions (i.e., senior management) and in the top 1% of income earners has grown since the 1980s.<sup>13,14</sup> Finally, social-policy support for women's employment, in the form of job-protected maternity/parental leave and partial income replacement for that leave, has expanded, along with legislation addressing unfair treatment in the labour market.<sup>15,16,17,18</sup>

While these trends are associated with a reduction in gender differences in pay in Canada, women aged 15/16 years and older earned from \$0.69 to \$0.89 for every dollar earned by men in 2017, depending on how the gender pay gap is measured. Pay inequality between women and men is an important social, economic, and political issue for at

1. Blau, Francine D. and Lawrence M. Kahn. 2003. "Understanding international differences in the gender pay gap." *Journal of Labor Economics* 21(1): 106-144.
2. Organization for Economic Co-operation and Development (OECD). 2019. *Gender wage gap indicator*. Available at: <https://data.oecd.org/earnwage/gender-wage-gap.htm>
3. According to the Labour Force Survey, 70.2% of women in Canada aged 15 years and older (9.3 million) participated in the labour market in 2017. This compares with 23.2% of women (1.1 million) in 1950. Although women continue to be somewhat less likely than men to participate in the labour force, this disparity narrowed considerably over the years, from 60.8 percentage points in 1950 to 8.7 percentage points in 2017.
4. Alon, Sigal, Debra Donahoe, and Marta Tienda. 2001. "The effects of early work experience on young women's labor force attachment." *Social Forces* 79(3): 1005-1034.
5. Goldin, Claudia. 2014. "A grand gender convergence: Its last chapter." *American Economic Review* 104(4): 1091-1119.
6. Statistics Canada, 2016 Census of Population, Education Highlight Tables: "Highest level of educational attainment (detailed) by selected age groups 15 years and over, male, % distribution 2016, Canada, provinces and territories, 2016 Census – 25% Sample data."
7. Based on data from the Census of Population, the proportion of women in Canada aged 25 to 34 who had at least a bachelor's degree rose by 25 percentage points between 1986 and 2016, from 15.7% to 40.7%. At the same time, the proportion of men who had at least a bachelor's degree grew to a lesser extent (13.4 percentage points), such that women were more likely than men to have at least a bachelor's degree in 2016 (40.7% vs. 29.1%).
8. Ferguson, Sarah Jane. 2016. "Women and education: Qualifications, skills and education." *Women in Canada: A Gender-based Statistical Report*. Ottawa: Statistics Canada.
9. Based on data from the 2016 Census, the fields of study at post-secondary institutions that experience the largest growth between the 1952-1961 birth cohort and 1982-1991 birth cohort were "science and science technology" (+13.3%), "trades, services, natural resources, and conservation" (+9.2%), and "engineering and engineering technology" (+8.3%).
10. Frenette, Marc and Kristyn Frank. 2016. "Earnings of postsecondary graduates by detailed field of study." *Economic Insights*, catalogue no. 11-626-X (no. 056). Ottawa: Statistics Canada.
11. Moyser, Melissa. 2017. "Women and paid work." *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.
12. Pacaut, Philippe, Céline Le Bourdais, and Benoît Laplante. 2011. "The changing impact of conjugal status and motherhood on employment across generations of Canadian women." *Canadian Studies in Population* 38(3-4): 105-132.
13. Statistics Canada, Labour Force Survey, table no. 14-10-0297-01.
14. Lemieux, Thomas and W. Craig Riddell. 2016. "Who are Canada's top 1 percent?" Pp. 103-155 in *Income Inequality: The Canadian Story*, edited by David A. Green, W. Craig Riddell, and France St-Hilaire. Montreal, QC: Institute for Public Policy Research.
15. Job-protected maternity/parental leave came into effect in the federal jurisdiction (i.e., industries regulated by the federal government) and the provinces at different points in time during the 1960s, 1970s, and early 1980s, and the duration of this leave increased significantly in the federal jurisdiction in 1985 (from 15 to 41 weeks) and the provinces in the early 1990s (from 17 or 18 to 30-70 weeks). These changes took place in the presence of partial income replacement for maternity/parental leave through the federal Unemployment Insurance program, renamed the Employment Insurance program in 1996.
16. Canada's legislative and policy responses to systematic discrimination in the workplace are the federal *Employment Equity Act* (1986) and the Federal Contractors Program (1986), along with sections of the *Canadian Human Rights Act* (1978) and the *Charter of Rights and Freedoms of the Constitution Act* (1982). Quebec introduced employment equity legislation for its public sector in 1987. While Ontario followed in 1994, the legislation was repealed the next year. Complementing employment equity legislation is pay equity legislation, which addresses discrimination in the form of devaluation of work traditionally performed by women. In addition to the *Canadian Human Rights Act*, pay equity provisions pertaining to federally-regulated industries are found in the *Equal Wage Guidelines* (1986). *Ontario's Equal Pay Act* (1987) pertains to all public-sector employers (regardless of the number of employees) and private-sector employers with more than 10 employees.
17. Agcos, Carol. 2002. "Canada's employment equity legislation and policy, 1987-2000: The gap between policy and practice." *International Journal of Manpower* 23(3): 256-276.
18. Baker, Michael and Kevin Milligan. 2008. "How does job-protected maternity leave affect mothers' employment?" *Journal of Labor Economics* 26(4): 655-691.

least four reasons. First, earnings are the main determinant of economic well-being for employed individuals, and of potential gains to employment for those who are not currently in the workforce.<sup>19</sup> In this way, earnings serve as a significant input into a variety of decisions, from labour supply to family formation, as well as a factor affecting bargaining power and relative status within the household.<sup>20</sup>

Second, there have been dramatic changes in the structure of families in Canada: dual-earner families now outnumber single-male-earner families; single-female-earner families and lone-parent families (usually headed by mothers) have become increasingly common; and relationship dissolution is prevalent.<sup>21,22,23,24</sup> While women's contribution to household income has grown, gender differences in earnings make it harder for them to financially support themselves and their families.<sup>25</sup> Further, a lifetime of pay inequality between women and men means that women are disproportionately retiring into financial insufficiency and even poverty.<sup>26</sup>

Third, the gender pay gap is symbolic of gender-based discrimination and injustice. Women spend more time than men on unpaid housework, childrearing, and caregiving (i.e., domestic labour), and they often reduce their labour force participation accordingly, putting them at a disadvantage in the labour market and making them vulnerable to low income, particularly in the event of union dissolution and during old age.<sup>27,28</sup> Women's disproportionate responsibility for domestic labour enables men to prioritize paid work and spend more time doing it than women. Although both paid work and domestic labour are integral to "social reproduction"—that is, the interdependent processes by which societies organize themselves to produce and reproduce material life on a daily and intergenerational basis—only production for the market is economically rewarded.<sup>29</sup> It follows that the unpaid work performed disproportionately by women creates broad social benefits, yet they pay the price for doing that work in the form of lower earnings, relative to men.

There is also a connection between the work that women do at home and their paid work, in that women's employment is concentrated in occupations and industries that parallel their traditional gender roles.<sup>30,31</sup> Female-dominated jobs tend to be underpaid, even when they involve the same level of skill as male-dominated jobs.<sup>32,33</sup>

Fourth, pay inequality between women and men perpetuates the gender division of labour. When women earn less than their male counterparts, even when they work the same amount of time, it is economically disadvantageous for individual families to move toward greater sharing of paid and unpaid work.

For these reasons, reducing pay inequality between women and men is a key priority, both nationally and internationally, for achieving gender equality. In Budget 2018, the Government of Canada introduced the Gender Results Framework, which includes the gender pay gap as a measure of progress toward the strategic goal of women's equal and full participation in the economy. Internationally, the principle of equal pay for work of equal value is included in the 2030 Sustainable Development Agenda under Goal 8, "decent work and economic growth."

Documenting gender inequality in pay and tracking progress in this regard for policy purposes requires at least one indicator. The gender pay gap—the difference between the employment earnings of women and men, expressed either as a proportion of men's earnings (i.e., the "gender pay ratio") or one minus the gender pay ratio—typically serves this purpose. At present, there are no internationally-recognized standards for measuring the gender pay

19. Blau, Francine D. and Lawrence M. Kahn. 1999. "Analyzing the gender pay gap." *Quarterly Review of Economics and Finance* 39(5): 625-646.

20. Ibid.

21. Statistics Canada, 2016 Census of Population, catalogue no. 98-400-X2016388: "Age of Child (13), Census Family Structure (7B) and Sex (3) for Children in Census Families in Private Households of Canada, Provinces and Territories, Census Metropolitan Areas and Census Agglomerations, 2016 and 2011 Censuses - 100% Data."

22. Milan, Anne. 2015. "Families and living arrangements." *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

23. Milan, Anne. 2013. "Marital status: Overview, 2011." *Report on the Demographic Situation in Canada*, catalogue no. 91-209-X. Ottawa: Statistics Canada.

24. Vanier Institute of the Family. 2010. "Families count: Profiling Canada's families." Ottawa: Vanier Institute of the Family.

25. Fox, Dan and Melissa Moysier. 2018. "The economic well-being of women in Canada." *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

26. Ibid.

27. According to data from the 2015 General Social Survey (GSS) on Time Use, women age 15 years and older spent an average of 3.6 hours per day on domestic labour—1.2 hours more than men (2.4 hours). (Statistics Canada, table no. 45-10-0014-02).

28. Beaujot, Roderic, and Zenaida R. Ravenera. 2009. "Family Models for Earning and Caring: Implications for Child Care and Family Policy." *Canadian Studies in Population* 36(1-2):145-166.

29. Laslett, Barbara and Johanna Brenner. 1989. "Gender and social reproduction: Historical perspectives." *Annual Review of Sociology* 15: 381-404.

30. Cohen, Philip N. 2004. "The gender division of labor: 'Keeping house' and occupational segregation in the United States." *Gender and Society* 18(2): 239-252.

31. Moysier, Melissa. 2017. "Women and paid work." *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

32. Levanon, Asaf, Paula England, and Paul Allison. 2009. "Occupational feminization and pay: Assessing causal dynamics using 1950-2000 U.S. Census data." *Social Forces* 88(2): 865-891.

33. Moysier, Melissa. 2017. "Women and paid work." *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

gap, leaving considerable scope for political choice.<sup>34</sup> The purpose of this paper, then, is to inform the development of international standards for measuring the gender pay gap by explaining the assumptions underlying, and the implications following from, various methods.

This paper has two additional purposes: One is to increase literacy about the meaning and interpretation of different estimates of the gender pay gap. Understanding the distinction between the unadjusted and adjusted gender pay gap is particularly important, as confusion in this regard contributes to debate as to the very existence of the gender pay gap. The other purpose is to bring together various explanations for the gender pay gap, and highlight the importance of taking context into account.

This paper is organized as follows: in Section 2, measurement of the gender pay gap in terms of who estimates are based upon, what type of earnings are counted, and how “typical” earnings are calculated are discussed. Section 3 addresses analysis of the gender pay gap, focusing on prevailing explanations for earnings inequality between women and men; the statistical technique used to determine the relative importance of different explanations (i.e., Oaxaca-Blinder decomposition); and considerations when studying trends in the gender pay gap. Section 4 concludes, providing an overview of key points.

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34. The United Nations’ Minimum Set of Gender Indicators—a collection of 52 quantitative indicators and 11 qualitative indicators addressing issues related to gender equality and/or women’s empowerment—includes the gender pay gap among tier III indicators, for which no international standards or methodology have been established.

**Box 1****Sex, gender, gender identity, and gender expression**

The complexity of sex and gender has become increasingly evident in the past decade, as growing numbers of people challenge binary and mutually-exclusive conceptualizations of female and male, feminine and masculine. For this reason, it is important to define these terms from the outset.

Sex is assigned to an individual at birth, typically based on his/her biology: anatomy, hormones, and physiology.<sup>35</sup> In contrast, gender is a social category, entailing roles, behaviours, activities, and attributes that a society deems to be appropriate for a given sex.<sup>36</sup> Gender refers to the social construction of female and male as oppositional categories with distinct characteristics and unequal social value and power.<sup>37</sup> Individuals develop gendered selves by internalizing, through socialization beginning in childhood, social norms and cultural expectations regarding appropriate roles, behaviours, activities, and appearances for their sex.<sup>38</sup> In their social interactions, individuals perform sex-appropriate gender roles (i.e., they “do gender”), thereby creating and sustaining the prevailing gender order.

There are also gender identity and gender expression. Gender identity refers to personal identification of one’s gender according to an internal awareness that can fall anywhere on the gender spectrum between female and male.<sup>39</sup> Gender expression pertains to how an individual outwardly expresses or presents his/her gender.<sup>40</sup>

Although sex, gender, gender identity, and gender expression are conceptually distinct, the terms tend to be conflated based on the understanding that most biological women are female/feminine, while most biological men are male/masculine (i.e., cisgender).<sup>41</sup> In other words, gender, gender identity, and gender expression are equated with sex because they are associated, and generally align, with that biological base.<sup>42</sup> This is necessary when it comes to measuring the gender pay gap, as information relevant to making distinctions between sex, gender, gender identity, and gender expression has not previously been collected. For the purposes of this paper, then, women and men are distinguished on the basis of sex, with the assumption that their gender, gender identity, and gender expression are consistent with expectations for people of their sex (i.e., they are cisgender).<sup>43,44</sup> Importantly, Statistics Canada recently established new sex and gender standards (2018), which distinguish between sex assigned at birth and gender identity or expression. In alignment with these new standards, a new gender-inclusive question has been recently implemented on national surveys, including the 2019 Census of Population content test, allowing transgender persons and those with non-binary gender identities or expressions to report their gender.

**2. Measuring the gender pay gap**

Relative earnings often signify how different groups are valued socially and economically.<sup>45</sup> For this reason, the unadjusted gender pay gap—the raw difference between the earnings acquired by women and men through their paid work, which favours the latter—has often been used as a call to action for gender equality and women’s economic empowerment. Not all women earn less than men; in fact, women’s representation among high-income earners has increased: 20.3% of high-income earners were women in 2016, compared with 8.5% in 1981.<sup>46,47</sup> However, among those with earnings, most women earn less than men (Table 1). For this reason, women’s average annual earnings from wages, salaries, and commissions were lower than men’s in 2017: \$40,600 vs. \$59,200 (a difference of \$18,600).

35. Department for Women and Gender Equality, Canada.

36. Ibid.

37. Risman, Barbara J. 2004. “Gender as a social structure: Theory wrestling with activism.” *Gender and Society* 18(4): 429-450.

38. West, Candace and Don H. Zimmerman. 1987. “Doing gender.” *Gender and Society* 1(2): 125-151.

39. Department for Women and Gender Equality, Canada.

40. Ibid.

41. Hewitson, Gillian J. 1999. *Feminist Economics: Interrogating the Masculinity of Rational Economic Man*. Cheltenham, UK: Edward Elgar.

42. Ibid.

43. It is estimated that 0.6% of adults in the United States are transgender (Flores, Andrew R., Jody L. Herman, Gary J. Gates, and Taylor N.T. Brown. 2016. “How many adults identify as transgender in the United States? Los Angeles, CA: The Williams Institute.”). An equivalent estimate for Canada is not available.

44. Beginning with the 2021 Census, Statistics Canada will introduce to its household surveys a two-step sex/gender question that is inclusive of gender diversity. It may then be necessary to revisit measurement of the gender pay gap.

45. Goldin, Claudia. 2014. “A grand convergence: Its last chapter.” *American Economic Review* 104(4): 1091-1119.

46. Lemieux, Thomas and W. Craig Riddell. 2016. “Who are Canada’s top 1 percent?” Pp. 103-155 in *Income Inequality: The Canadian Story*, edited by David A. Green, W. Craig Riddell, and France St-Hilaire. Montreal, QC: Institute for Research on Public Policy.

47. Richards, Elizabeth. 2019. “Who are the working women in Canada’s top 1%?” *Analytical Studies Branch Research Paper Series*, catalogue no. 11F0019M (no. 002). Ottawa: Statistics Canada.

**Table 1**
**Annual wages, salaries and commissions of employed women and men aged 16 and older, 2017**

	Women	Men	Difference (% women - % men)
		percent	
Under \$5,000 (excluding zero earnings and losses)	8.1	6.4	1.7
\$5,000 to \$9,999	8.4	5.8	2.6
\$10,000 to \$19,999	15.6	10.4	5.2
\$20,000 to \$29,999	13.6	9.3	4.3
\$30,000 to \$39,999	12.7	10.2	2.5
\$40,000 to \$49,999	11.5	10.4	1.1
\$50,000 to \$59,999	7.8	9.2	-1.4
\$60,000 to \$79,999	11.0	14.3	-3.3
\$80,000 to \$99,999	6.6	9.6	-3.0
\$100,000 and over	4.8	14.3	-9.5
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>...</b>
		dollars	
Average <sup>1</sup>	40,600.00	59,200.00	-18,600.00
Median	33,400.00	47,500.00	-14,100.00

... not applicable

1. Average and median earnings exclude those with zero earnings.

Source: Statistics Canada, Canadian Income Survey, custom tabulations.

There are two ways of presenting the gender pay gap, whether unadjusted or adjusted, both of which are based on the gender pay ratio—that is, women’s earnings expressed as a proportion of men’s earnings. The gender pay ratio is calculated by dividing women’s earnings by men’s earnings (see Calculating the Gender Pay Gap). It can be interpreted as the number of cents that women earn for every dollar earned by men. Alternatively, the gender pay ratio can be subtracted from one and then multiplied by 100, such that it represents how much less women earn than men in percentage terms.

**Box 2**
**Calculating the Gender Pay Gap**

$$\text{Gender pay ratio} = \frac{\text{Women's average or median earnings}}{\text{Men's average or median earnings}}$$

$$\text{Gender pay gap} = (1 - \text{Gender pay ratio}) * 100$$

$$= \left( \frac{(\text{Men's average or median earnings} - \text{women's average or median earnings})}{\text{Men's average or median earnings}} \right) * 100$$

In 2017, the average hourly wages of all female and male workers aged 15 years and over in Canada were \$24.28 and \$28.00, respectively.

$$\text{2017 gender pay (wage) ratio} = \frac{\$24.28}{\$28.00} = 0.87$$

$$\text{2017 gender pay (wage) gap} = (1 - 0.87) * 100 = 13\%$$

$$\text{2017 gender pay (wage) gap} = \left( \frac{(\$28.00 - \$24.28)}{\$28.00} \right) * 100 = \left( \frac{\$3.72}{\$28.00} \right) * 100 = 13\%$$



This section discusses how implicit or explicit decisions that are made when measuring the unadjusted gender pay gap affect its size, and therefore its perceived seriousness:

1. **Who** estimates are based upon? In other words, which workers are included in the sample from which the gender pay gap is estimated? Key considerations in this regard are:
  - ▶ Age
  - ▶ Labour supply (i.e., hours and weeks worked)
2. **What** type of earnings are counted (i.e., annual earnings or hourly wages)?
3. **How** “typical” earnings are calculated (i.e., average or median)?<sup>48,49</sup>

In addition to affecting the size of the gender pay gap, these decisions are important because they can either justify or challenge the status quo of gender differences in employment and earnings.

## 2.1. Who are estimates based upon?

For the purposes of measuring the gender pay gap, workers are generally defined as paid employees in their main job. Self-employed individuals are excluded because they typically work for themselves as a business owner, freelancer, or independent contractor for another company. Earnings of self-employed individuals usually come directly from the business, instead of from wages, salary or commission-based reimbursement, and they are therefore not comparable to earnings from paid employment.

Ideally, individuals who were enrolled as full-time students during the reference period or the past year would also be excluded, as work was not their primary activity.

Other considerations when defining the sample upon which estimates of the gender pay gap are based—namely, age group and labour supply (i.e., hours and weeks worked)—are discussed below.

### 2.1.1. Age group

Empirical studies of earnings often focus on a segment of the employed adult population in what are considered to be the core working ages, generally defined as 25 to 54. The logic of focusing on the core-working-age population is that younger and older adults are often full-time students or retired, respectively. To the extent that younger and older workers are systematically different from workers in the core working ages (e.g., they have higher or lower socioeconomic status), excluding them from the analytical sample may bias estimates of the gender pay gap. “Selection bias” is discussed in more detail in Section 3.4.2.

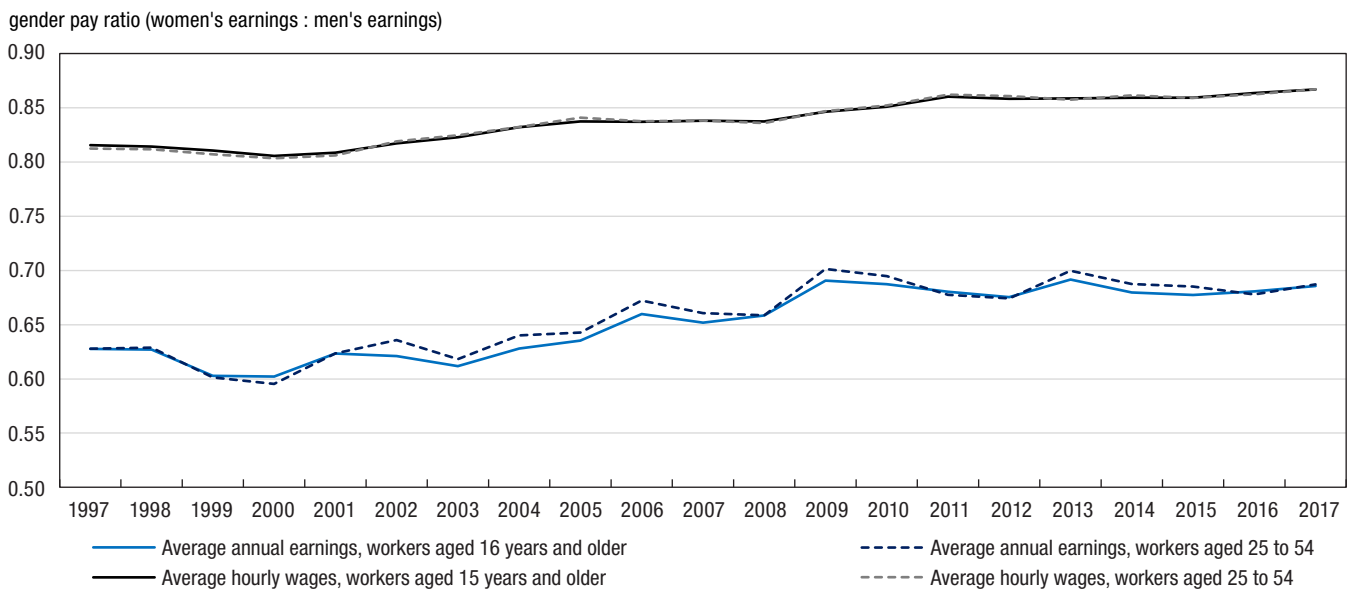
In this paper, data pertain to the employed population aged 15 years and older, unless otherwise indicated, for comparability with international indicators of the gender pay gap. However, it is recognized that the gender pay gap differs by age group. As discussed in Section 3.4.3, earnings inequality between women and men tends to increase with age, both because women experience more employment interruptions related to family responsibilities than men, and because older women generally have lower levels of educational attainment and work experience than younger women (i.e., “cohort effects”). For these reasons, the gender pay gap is narrower among those aged 15/16 to 24 than it is among those aged 25 to 54 and 55 years and older.

Comparison of the average earnings of women and men aged 15/16 years and older and 25 to 54 over the past 30 years demonstrates that the gender pay gap is virtually the same for both age groups, whether measured in terms of annual earnings from wages, salaries and commissions or hourly wages (Chart 1). Given that gender-based earnings inequality tends to increase with age, as the workforce ages (due to both the aging of Canada’s population and the increasing labour force participation of older age groups), estimates of the gender pay gap based on those aged 15/16 years and older and those aged 25 to 54 may eventually diverge.<sup>50</sup>

48. Lips, Hilary M. 2013. “The gender pay gap: Challenging the rationalizations. Perceived equity, discrimination, and the limits of human capital models.” *Sex Roles* 68: 169-185.

49. Lips, Hilary M. 2003. “The gender pay gap: Concrete indicator of women’s progress toward equality.” *Analyses of Social Issues and Public Policy* 3(1): 87-109.

50. Carrière, Yves and Diane Galarneau. 2011. “Delayed retirement: A new trend?” *Perspectives on Labour and Income*, catalogue no. 75-001-X. Ottawa: Statistics Canada.

**Chart 1**
**Gender pay ratio calculated from average hourly wages and annual earnings of employed women and men aged 15/16 years and older and 25 to 54, Canada, 1997 to 2017**


**Note:** Annual earnings refer to annual income from wages, salaries and commissions before taxes among individuals whose main job was as a paid employee. Employees with zero annual earnings are excluded.

**Sources:** Statistics Canada, Survey of Consumer Finances, Survey of Labour and Income Dynamics, and Canadian Income Survey, custom tabulations; Statistics Canada, Labour Force Survey, Table no. 14-10-0340-02.

### 2.1.2. Labour supply

It is well established that women and men differ with respect to characteristics that determine earnings from employment, particularly work hours. According to data from the Labour Force Survey, employed women aged 15 years and older usually worked an average of 32.9 hours per week at their main job in 2017—5.5 fewer hours than men.<sup>51</sup> Also, employed men were three times as likely as employed women to work long work hours—defined as 50 hours or more per week—at their main job (11.0% vs. 3.6%).

Based on data from the 2016 General Social Survey on Canadians at Work and Home, employed women and men aged 15 years and older both worked an average of 44 weeks at all jobs in the past year.<sup>52</sup> However, women were less likely than men to be employed on a full-time, full-year basis, defined as mostly working 30 or more hours per week for 49 to 52 weeks in a given year (43.6% vs. 56.4%).

Although women spend less time, on average, than men on paid work, they spend more time on housework, childrearing, and caregiving.<sup>53</sup> Based on data from the 2015 General Social Survey on Time Use, women aged 15 years and older spent an average of 25.2 hours per week on domestic labour—8.4 hours more than men.<sup>54</sup> Even when women were employed on a full-time basis, they spent more time on domestic labour than their male counterparts: 21.0 vs. 16.1 hours per week (a difference of nearly 5 hours).

Estimates of the gender pay gap can be based on either a sample consisting of all workers, regardless of hours and weeks worked, or a sample consisting of workers employed on a full-time, full-year basis. These samples imply different conceptualizations of women's decision-making about their labour supply.

51. Statistics Canada, Labour Force Survey, table no. 14-10-0031-01.

52. The 2015 General Social Survey does not include a variable indicating multiple-job holding.

53. Moyser, Melissa and Amanda Burlock. 2018. "Time Use: Total work burden, unpaid work, and leisure." *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

54. Statistics Canada, 2015 General Social Survey on Time Use, table no. 45-10-0014-01.

One perspective, coming from economics, is that individuals are rational, self-interested, and preference or “utility” maximizing, meaning that they will always select the course of action from which they derive the most satisfaction, given their relatively stable preferences.<sup>55,56</sup> According to this perspective, women are biologically predisposed to place greater value on family than men and they are more efficient at performing housework, childrearing, and caregiving. For these reasons, women “choose” to perform less, if any, paid work, focusing instead on unpaid work.<sup>57</sup> Viewed from this perspective, earnings inequality between women and men that is related to gender differences in labour supply is justified as the outcome of personal autonomy.<sup>58</sup> It therefore makes sense to limit the sample from which the gender pay gap is estimated to full-time, full-year workers.

An alternative perspective, coming from sociology, is that individuals’ choices are constrained by social norms and cultural expectations related to gender, and the gendered structural conditions of everyday life. Different attitudes, appearances, and behaviours are communally deemed to be appropriate for biologically-based sex categories.<sup>59</sup> Individuals are held morally responsible for “doing gender”—that is, conducting themselves in ways that are consistent with and demonstrate their sex category—lest their competence as members of society be questioned.<sup>60</sup> When women specialize in housework, childrearing, and caregiving and men specialize in breadwinning, according to this perspective, they are doing gender.<sup>61</sup> Individuals are also doing gender when they select the “right” field of study and occupation for their sex.<sup>62,63,64,65,66,67,68</sup>

According to previous research, the gender division of labour is both reflected and reinforced in the labour market through employers’ discriminatory recruitment and promotion practices, which block women from stereotypically “male” occupations and limit their career advancement; gender-based pay inequality that makes it economically disadvantageous for couples to divide domestic labour and paid work more equitably; and work organizations’ preferences for employees who can prioritize paid work due to their limited family responsibilities (usually men).<sup>69,70,71,72</sup> To the extent that women expect to experience gender-based discrimination and inequality in the labour market, it may affect their decisions regarding how much and which type of education and training to invest in and which occupations to pursue. Studies show that, through these feedback effects, the gender division of labour becomes self-reinforcing: women have lower-value human capital (e.g., education) and lower-status occupations, and they therefore earn less, which reduces their bargaining position relative to men in the household, making them more likely to be the one who performs a greater share of housework, childrearing, and caregiving.<sup>73</sup>

55. Folbre, Nancy. 1994. *Who Pays for the Kids? Gender and the Structures of Constraint*. London and New York: Routledge.

56. Petersen, Janice. 2015. “The well-being of working women in times of economic crisis and recovery: Insights from the Great Recession.” Pp. 517-539 in *Handbook on Well-being of Working Women*, edited by Mary L. Connerley and Jiyun Wu. New York and London: Springer.

57. Hewitson, Gillian. 1999. *Feminist Economics: Interrogating the Masculinity of Rational Economic Man*. Cheltenham, UK: Edward Elgar.

58. Lips, Hilary M. 2003. “The gender pay gap: Concrete indicator of women’s progress toward equality.” *Analyses of Social Issues and Public Policy* 3(1): 87-109.

59. West, Candace and Don H. Zimmerman. 1987. “Doing gender.” *Gender and Society* 1(2): 125-151.

60. *Ibid.*

61. *Ibid.*

62. Chevalier, Arnaud. 2002. “Education, motivation and pay of UK graduates: Is it different for girls.” *European Journal of Education* 37(4): 347-370.

63. Crompton, Rosemary, Linda Hantrais, and Patricia Walters. 1990. “Gender relations and employment.” *British Journal of Sociology* 41(3): 329-349.

64. Ferguson, Sarah Jane. 2016. “Women and education: Qualifications, skills and technology.” *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

65. Jacobsen, Joyce P. 2018. “Women and the labor market: A feminist perspective.” Pp. 623-641 in *The Oxford Handbook of Women and the Economy*, edited by Susan L. Averett, Laura M. Argys, and Saul D. Hoffman. New York, NY: Oxford University Press.

66. Ma, Yingyi. 2011. “College major choice, occupational structure, and demographic patterning by gender, race and nativity.” *Social Science Journal* 48(1): 112-129.

67. Machin, Stephen and Patrick A. Puhani. 2003. “Subject of degree and the gender wage differential: Evidence from the UK and Germany.” *Economic Letters* 79(3): 393-400.

68. Moyser, Melissa. 2017. “Women and paid work.” *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

69. Grinza, Elena, Francesco Devicienti, Mariacristina Rossi, and Davide Vannoni. 2017. “How entry into parenthood shapes gender role attitudes: New evidence from longitudinal UK data.” *Institute of Labor Economics (IZA) Discussion Paper Series*, no. 11088. Bonn, Germany: IZA.

70. Albanesi, Stefania and Claudia Olivetti. 2009. “Home production, market production and the gender wage gap: Incentives and expectations.” *Review of Economic Dynamics* 12: 80-107.

71. Acker, Joan. 1990. “Hierarchies, jobs, bodies: A theory of gendered organizations.” *Gender and Society* 4(2): 139-158.

72. Williams, Joan C. 2001. *Unbending Gender: Why Family and Work Conflict and What to Do about It*. New York: Oxford University Press.

73. Jacobsen, Joyce P. 2018. “Women and the labor market: A feminist perspective.” Pp. 623-641 in *The Oxford Handbook of Women and the Economy*, edited by Susan L. Averett, Laura M. Argys, and Saul D. Hoffman. New York, NY: Oxford University Press.

Previous research supports this interpretation of women's decisions about their labour supply, as it demonstrates that women's employment status and work hours are negatively affected by their ideological support for gender-differentiated roles.<sup>74,75,76,77,78</sup> Further, Pedulla and Thébaud find that the preferences of young, unmarried, childless women and men in the United States regarding their future gender division of labour are responsive to institutional constraints.<sup>79</sup> Specifically, women and men generally prefer egalitarian relationships, but, in the absence of supportive work-family policies, women and men with higher levels of education and men with lower levels of education have a "fallback plan" of neo-traditional relationships (i.e., the female spouse/partner is primarily responsible for managing the household, while the male spouse/partner is primarily responsible for breadwinning).<sup>80</sup> Less educated women have a fall-back plan of self-reliance (i.e., themselves as the primary breadwinner).<sup>81</sup>

Under these circumstances, women (and men) make constrained choices about how much paid work they do.<sup>82</sup> Estimates of the gender pay gap that are based on samples that are limited to full-time, full-year workers omit the gendered processes involved in women's decisions about their labour supply.

## 2.2. What type of earnings are counted?

There are three main ways of counting earnings: (1) the annual earnings of all workers; (2) the annual earnings of workers employed on a full-time, full-year basis; and (3) the hourly wages of all workers.<sup>83</sup> Annual earnings are defined here as the sum of wages, salaries and commissions from all jobs in a given year **before taxes** among individuals whose main job was as a paid employee. Employees with zero annual earnings are excluded. Hourly wages are defined as the rate that an employer pays an employee per hour worked at his/her main job.

Three limitations characterize all three ways of counting earnings. First, earnings are only measured for individuals in paid employment. If employed women and men differ systematically from their counterparts who are not employed with respect to characteristics that affect earnings, the gender pay gap will be biased, irrespective of what type of earnings are counted (see Section 3.4.1).

Second, earnings derived from (self-)employment in the underground economy are excluded from all three measures. By definition, economic activities within the underground economy escape measurement because they are unreported, hidden or illegal. In 2016, the underground economy accounted for 2.5% (or \$51.6 billion) of Canada's Gross Domestic Product.<sup>84</sup> It is unclear whether women and men in Canada participate equally in the underground economy, where workers are often poorly paid and lack access to promotional opportunities, legal protections, and employment benefits, because important illegal industries—namely, drugs and sex work—are excluded from national estimates.<sup>85,86</sup> Also, national estimates of the underground economy rely on assumptions, weak indicative information, and various indirect methods because it is difficult to obtain information on hidden, illegal, and informal activities.<sup>87</sup> With these caveats in mind, the three industries that accounted for more than half of measured underground economic activity in Canada in 2016 were residential construction (26.6%), retail trade (13.5%), and accommodation and food services (12.1%).<sup>88</sup> These industries have been the main contributors since 1992, the first year of study.<sup>89</sup>

74. Cunningham, Mick. 2008. "Influences of gender ideology and housework allocation on women's employment over the life course." *Social Science Research* 37(1): 254-267.

75. Cunningham, Mick, Ann M. Beutel, Jennifer S. Barber, and Arland Thornton. 2005. "Reciprocal relationships between attitudes about gender and social contexts during young adulthood." *Social Science Research* 34(4): 862-892.

76. Fortin, Nicole M. 2005. "Gender role attitudes and the labour-market outcomes of women across OECD countries." *Oxford Review of Economic Policy* 21(3): 416-438.

77. Johnston, David W., Stefanie Schurer, and Michael A. Shields. 2012. "Maternal gender role attitudes, human capital investment, and labour supply of sons and daughters." *Institute for the Study of Labor (IZA) Discussion Paper Series*, no. 6656. Bonn, Germany: IZA.

78. Vella, Francis. 1994. "Gender roles and human capital investment: The relationship between traditional attitudes and female labour market performance." *Economica* 61(242): 191-211.

79. Pedulla, David S. and Sarah Thébaud. 2015. "Can we finish the revolution? Gender, work-family ideals, and institutional constraint." *American Sociological Review* 80(1): 116-139.

80. *Ibid.*

81. *Ibid.*

82. Ferree, Myra Marx. 1990. "Beyond separate spheres: Feminism and family research." *Journal of Marriage and Family* 52(4): 866-884.

83. The gender pay gap can also be measured in terms of weekly wages, but doing so is less common than using either annual earnings from wages, salaries, and commissions or hourly wages.

84. Statistics Canada. 2018. "The underground economy in Canada, 2016." *The Daily*, October 12. Ottawa: Statistics Canada.

85. International Labour Organization. 2018. "Women and men in the informal economy: A statistical picture." *Geneva: International Labour Organization*.

86. Morissette, Charles. 2014. "The underground economy in Canada, 1992-2011." *Income and Expenditure Accounts Technical Series*, catalogue no. 13-604-M (no. 73). Ottawa: Statistics Canada.

87. *Ibid.*

88. Statistics Canada. 2018. "The underground economy in Canada, 2016." *The Daily*, October 12. Ottawa: Statistics Canada.

89. *Ibid.*

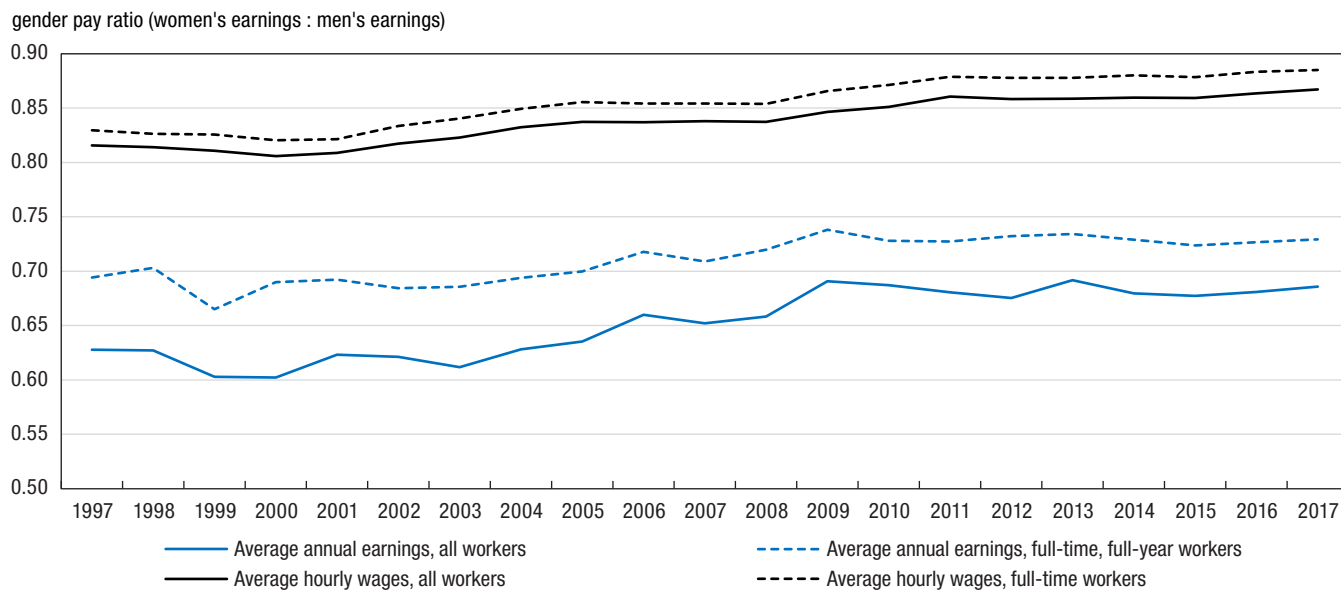
Third, other sources of compensation related to employment, such as (supplementary) medical and dental benefits, pension plans, stock options, and use of company cars, are not counted as earnings. Previous research suggests that women may have less access to some of these employer-provided perks, relative to men, because they are more likely to work part-time and they are less likely to hold higher-status occupations and work for large corporations.<sup>90,91,92</sup> However, employed women in Canada were somewhat more likely than men to be covered by employer-sponsored pension plans in 2015 (40% vs. 36%), due to the fact that they are overrepresented in the three industries with the highest rates of pension coverage: education, health, and public administration.<sup>93</sup> Consequently, women may have more discretionary income than men after saving for retirement—even with the same earnings.<sup>94</sup> Gender inequality in non-monetary employee compensation is not reflected in any estimate of the gender pay gap that is currently available.

### 2.2.1. Comparing the annual earnings of all women and men, regardless of how much they work

The most inclusive, and therefore the largest, measure of the gender pay gap involves comparison of the annual earnings of **all** employed women and men, including those who worked on a part-time and/or part-year basis (Chart 2). By implication, this measure captures gender differences in both pay (i.e., the price of labour) and hours and weeks worked (i.e., labour supply).<sup>95</sup> It can therefore be thought of as an unrestricted measure of the gender pay gap.

#### Chart 2

#### Gender pay ratio calculated from average annual earnings and hourly wages of employed women and men aged 15/16 years and older, Canada, 1997 to 2017



**Note:** Annual earnings refer to annual income from wages, salaries and commissions before taxes among individuals whose main job was as a paid employee. Employees with zero annual earnings are excluded.

**Sources:** Statistics Canada, Survey of Consumer Finances, Survey of Labour and Income Dynamics, and Canadian Income Survey, custom tabulations; Statistics Canada, Labour Force Survey, Table no. 14-10-0340-02.

90. Manning, Alan and Farzad Saidi. 2010. "Understanding the gender pay gap: What's competition got to do with it?" *Industrial and Labor Relations Review* 63(4): 681-698.

91. McGee, Andrew, Peter McGee, and Jessica Pan. 2015. "Performance pay, competitiveness, and the gender wage gap: Evidence from the United States." *Economics Letters* 128: 35-38.

92. Perrons, Diane, Linda McDowell, Colette Fagan, Kath Ray, and Kevin Ward. 2007. "Gender, social class and work-life balance in the new economy." Pp. 133-151 in *Women, Men, Work and Family in Europe*, edited by Rosemary Crompton, Suzan Lewis, and Clare Lyonette. Basingstoke: Palgrave Macmillan.

93. Fox, Dan and Melissa Moyser. 2018. "The economic well-being of women in Canada." *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

94. Lips, Hilary M. 2013. "The gender pay gap: Challenging the rationalizations. Perceived equity, discrimination, and the limits of human capital models." *Sex Roles* 68: 169-185.

95. Baker, Michael and Marie Drolet. 2010. "A new view of the male/female pay gap." *Canadian Public Policy* XXXVI (4): 429-464.

The typical criticism of the unrestricted measure of the gender pay gap is that it is “confounded” by gender differences in hours and weeks worked. The counterargument is that the unrestricted measure of the gender pay gap captures the full scope of the financial implications of gender, which partly result from women’s reduced labour supply, relative to men, given their greater family responsibilities.

Annual earnings have an advantage over hourly wages when it comes to conveying the economic significance of the gender pay gap, as it speaks to the women’s and men’s different command over goods and services. As Lips explains: “When a woman applies for a mortgage or a car loan, she is not asked about her hourly income. The income statistic that affects whether or not she gets the loan, and indeed what kind of life she is able to afford, is her annual income.”<sup>96</sup> Measuring the gender pay gap in terms of annual earnings provides an index of gender differences in purchasing power and material well-being that the gender wage gap does not. In other words, the gender pay gap, as measured from annual earnings, speaks to women’s overall economic well-being.

### 2.2.2. Comparing the annual earnings of women and men employed on a full-time, full-year basis

Traditionally, the gender pay gap has been measured from the annual earnings of women and men who worked full-time, defined as a minimum of 35 hours per week, for 50 to 54 weeks in the reference year. Measured as such, the gender pay gap will be smaller than it would be if workers employed a part-time and/or part-year basis—who are predominantly women—are included in the estimate (Chart 2). However, gender differences in work hours are only partially removed when the gender pay gap is measured from the annual earnings of full-time, full-year workers. The reason is that women work fewer hours each week than men, on average, even when they are employed on a full-time, full-year basis. Based on data from the Labour Force Survey, women aged 15 years and older who were employed full-time usually worked an average of 38.5 hours per week at their main job in 2017, while their male counterparts usually worked an average of 41.5 hours (a difference of three hours per week).

The exclusion of workers employed on a part-time and/or part-year basis from measurement of the gender pay gap implies the idealization of full-time, full-year employment—a pattern typified by men, both historically and currently.<sup>97</sup> Studies show that the male pattern of employment itself depends on housework, childrearing, and caregiving disproportionately performed by women.<sup>98,99,100</sup> Requiring full-time, full-year employment can therefore be construed as marginalizing mothers, who often experience work interruptions related to childrearing, and other women for whom it is impractical to fit that pattern, due to their greater family responsibilities, relative to men.<sup>101,102</sup> Further, it renders invisible domestic labour, its financial cost to women, and its benefits to the economy.<sup>103</sup>

### 2.2.3. Comparing the hourly wages of women and men

Although there is no agreement internationally on a standard way of counting earnings for the purposes of measuring the gender pay gap, there is a strong preference for hourly wages. The ratio of women’s hourly wages to men’s hourly wages—known as the gender wage gap—is the most restricted measure of the gender pay gap, as it captures only the per-unit price of labour, and it is therefore largely unaffected by gender differences in labour supply.<sup>104</sup> For this reason, hourly wages yield the smallest estimate of the gender pay gap (Chart 2). For example, between 1997 and 2017, the gender wage ratio among workers aged 15/16 years and older ranged from 0.81 to 0.89, while the annual-earnings-based gender pay ratio ranged from 0.60 to 0.74. In many years the gender wage ratio was higher than the annual-earnings-based gender pay ratio by nearly 20 percentage points.

In theory, it is not necessary to exclude part-time workers when estimating the gender wage gap in order to control for gender differences in work hours, as labour supply is irrelevant when earnings are measured on a per-unit basis. Indeed, the move from all workers to full-time workers makes little difference when the gender pay gap is measured in terms of hourly wages, as opposed to annual earnings (Chart 2).

96. Lips, Hilary M. 2003. “The gender pay gap: Concrete indicator of women’s progress toward equality.” *Analyses of Social Issues and Public Policy* 3(1): 87-109.

97. *Ibid.*

98. Acker, Joan. 1990. “Hierarchies, jobs, bodies: A theory of gendered organizations.” *Gender and Society* 4(2): 139-158.

99. Ferree, Myra Marx. 1990. “Beyond separate spheres: Feminism and family research.” *Journal of Marriage and Family* 52(4): 866-884.

100. Williams, Joan C. 2001. *Unbending Gender: Why Family and Work Conflict and What to Do about It*. New York: Oxford University Press.

101. Moyser, Melissa. 2017. “Women and paid work.” *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

102. Moyser, Melissa and Amanda Burlock. 2018. “Time Use: Total work burden, unpaid work, and leisure.” *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

103. Mulvaney, Kelly. 2013. “For what it’s worth: An examination of the persistent devaluation of ‘women’s work’ in capitalism and considerations for feminist politics.” *Gender 2*: 27-44.

104. Baker, Michael and Marie Drolet. 2010. “A new view of the male/female pay gap.” *Canadian Public Policy* XXXVI (4): 429-464.

The fact that the gender wage gap is not confounded by gender differences in labour supply can be viewed as a drawback. Treating gender differences in work hours as a separate issue from the gender pay gap rests on the assumption that women freely choose to work fewer hours than men, with the implication being that their lower earnings are deserved. In this way, the gendered processes that give rise to women's reduced labour supply, relative to men, and the contribution of those processes to the gender wage gap are hidden from view.

Many workers are not paid on an hourly basis; instead, they are paid on the basis of an annual salary.<sup>105</sup> According to the Labour Force Survey, 41.4% of women aged 15 years and older were salaried employees in 2017, as were 47.1% of men. For salaried employees, estimates of hourly wages are generally made by either assuming a standard 40 hour work week, or dividing their annual salary by their usual weekly work hours multiplied by the number of weeks in a year. However, 16.0% of salaried employees reported that their work hours varied from one week to the next in 2017, and 13.6% of salaried employees reported usual work hours in excess of 40 per week. It follows that, for many workers, estimates of hourly wages on the basis of an annual salary and usual work hours will be less accurate.

Notably, hourly wages do not reflect contingent or “pay-for-performance” that is included in annual earnings.<sup>106</sup> Women are less likely than men to receive contingent pay for a number of reasons.<sup>107</sup> First, they are less likely to be employed in leadership positions and higher-status occupations, particularly in the private sector, that offer contingent pay.<sup>108</sup> Second, negotiation plays a greater role in determining bonuses and stock options than it does in fixed salaries.<sup>109,110</sup> Women are less likely than men to negotiate more favorable employment terms with respect to base salary, stock options, and bonuses.<sup>111,112</sup> Third, women tend to have lower risk tolerance in financial decision-making than men, with the implication that they are less likely to take jobs in which a significant component of compensation is dependent on performance.<sup>113</sup>

In addition to women being less likely than men to receive contingent pay, previous research demonstrates that the gender pay gap is more pronounced for contingent pay than fixed salaries, possibly because the latitude for management discretion is greater in the case of contingent pay.<sup>114,115,116,117</sup> For these reasons, the gender wage gap may underestimate to some extent earnings inequality between women and men.

### 2.3. How typical earnings are counted: Mean or median?

In addition to which workers are included in the samples from which the gender pay gap is estimated and what type of earnings are counted, the size of the gender pay gap depends on the statistic chosen to represent “typical” earnings: the mean (more commonly known as the average) or the median. To calculate the mean, the earnings of all workers of a given sex are summed and the resulting value is divided by the number of workers of that sex. The mean is interpreted as the pay that each worker of a given sex would receive, if the earnings of all workers of that sex were divided evenly among them.

To calculate the median, the earnings of all workers of a given sex are put in ascending/descending order, and the middle of that earnings distribution is identified. The median separates the half of workers who earn less than that amount from the other half of workers who earn more.

105. Lips, Hilary M. 2013. “The gender pay gap: Challenging the rationalizations. Perceived equity, discrimination, and the limits of human capital models.” *Sex Roles* 68: 169-185.

106. Ibid.

107. Grund, Christian. 2015. “Gender pay gaps among highly-educated professionals – Compensation components do matter.” *Labour Economics* 34: 118-126.

108. Bertrand, Marianne and Kevin F. Hallock. 2001. “The gender gap in top corporate jobs.” *Industrial and Labor Relations Review* 55(1): 3-21.

109. Manning, Alan and Farzad Saidi. 2010. “Understanding the gender pay gap: What’s competition got to do with it?” *Industrial and Labor Relations Review* 63(4): 681-698.

110. McGee, Andrew, Peter McGee, and Jessica Pan. 2015. “Performance pay, competitiveness, and the gender wage gap: Evidence from the United States.” *Economics Letters* 128: 35-38.

111. Manning, Alan and Farzad Saidi. 2010. “Understanding the gender pay gap: What’s competition got to do with it?” *Industrial and Labor Relations Review* 63(4): 681-698.

112. McGee, Andrew, Peter McGee, and Jessica Pan. 2015. “Performance pay, competitiveness, and the gender wage gap: Evidence from the United States.” *Economics Letters* 128: 35-38.

113. Sapienza, Paola, Luigi Zingales, and Dario Maestri. 2009. “Gender differences in financial risk aversion and career choices are affected by testosterone.” *Proceedings of the National Academy of Sciences of the United States of America* 106(36): 15268-15273.

114. Chauvin, Keith W. and Ronald A. Ash. 1994. “Gender earnings differentials in total pay, base pay, and contingent pay.” *Industrial and Labor Relations Review* 47(4): 634-649.

115. Grund, Christian. 2015. “Gender pay gaps among highly-educated professionals – Compensation components do matter.” *Labour Economics* 34: 118-126.

116. Heywood, John S. and Daniel Parent. 2014. “Performance pay, the gender earnings gap and parental status.” *Journal of Labor Economics*, 30(2): 249-290.

117. Rubery, Jill. 1995. “Performance-related pay and the prospects for gender pay equity.” *Journal of management Studies* 32(5): 637-654.

Averages have the advantage of taking into account the earnings of every worker, which medians do not. The downside of this characteristic is that averages can be skewed by workers with very low or very high earnings to a greater extent than medians.<sup>118</sup> At the same time, it can be argued that the overrepresentation of women among workers with very low earnings, and the underrepresentation of women among workers with very high earnings, are central to the issue of gender-based pay inequality, and should therefore be reflected in the statistic used to measure central tendency.<sup>119</sup> Further, previous research demonstrates that the gender pay gap increases over the earnings distribution, being greater at the top than the bottom.<sup>120,121,122,123,124,125,126,127</sup> Measuring the gender pay gap at the median minimizes the impact of the segment of the workforce with the highest earnings.<sup>128</sup>

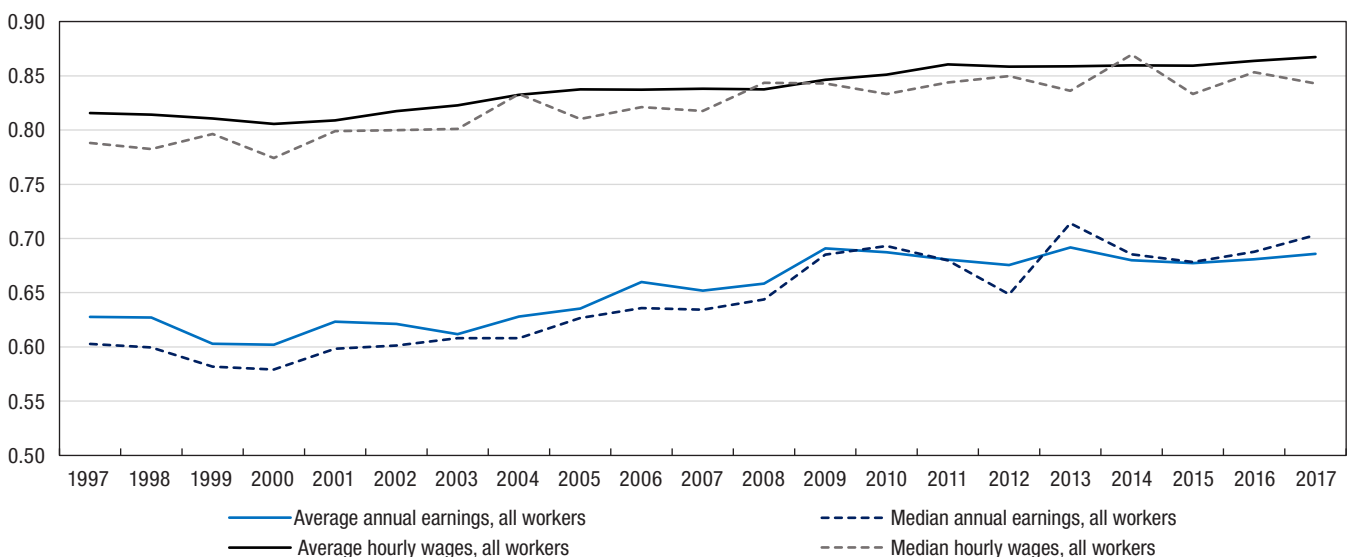
Another advantage of the mean, over the median, is that the multivariate methods of data analysis that are typically used to examine the gender pay gap—ordinary least squares regression and standard decomposition techniques—are based on the mean.<sup>129</sup>

Chart 3 shows the gender pay ratio calculated from average and median annual earnings (all workers) and hourly wages. Notably, since the late 2000s, the average and median gender pay ratios have generally been more similar when annual earnings are used, as opposed to hourly wages.

### Chart 3

#### Average and median annual earnings and hourly wages of employed women and men aged 15/16 and older, Canada, 1997 to 2017

gender pay ratio (women's earnings : men's earnings)



**Note:** Annual earnings refer to annual income from wages, salaries and commissions before taxes among those whose main job was as a paid employee. Employees with zero annual earnings are excluded.

**Sources:** Statistics Canada, Survey of Consumer Finances, Survey of Labour and Income Dynamics, and Canadian Income Survey, custom tabulations; Statistics Canada, Labour Force Survey, Table no. 14-10-0340-02.

118. Lips, Hilary M. 2003. "The gender pay gap: Concrete indicator of women's progress toward equality." *Analyses of Social Issues and Public Policy* 3(1): 87-109.

119. Ibid.

120. Arulampala, Wiji, Alison L. Booth, and Mark L. Bryan. 2007. "Is there a glass ceiling over Europe? Exploring the gender pay gap across the wage distribution." *Industrial and Labor Relations Review* 60(2): 163-186.

121. Blau, Francine D. and Lawrence M. Kahn. 2017. "The gender wage gap: Extent, trends, and explanations." *Journal of Economic Literature* 55(36): 789-865.

122. Bonikowska, Aneta, Marie Drolet, and Nicole M. Fortin. 2019. "Earnings inequality and the gender pay gap in Canada: The role of women's under-representation among top earners." *Economic Insights*, catalogue no. 11-626-X. Ottawa: Statistics Canada.

123. Boudarbat, Brahim and Marie Connolly. 2013. "The gender wage gap among recent post-secondary graduates in Canada: A distributional approach." *Canadian Journal of Economics* 46(3): 1037-1065.

124. Drolet, Marie. 2011. "Why has the gender wage gap narrowed?" *Perspectives on Labour and Income* 23(1):3-13. Catalogue no. 75-001-X. Ottawa: Statistics Canada.

125. Fortin, Nicole M., Brian Bell, and Michael Böhm. "Top earnings inequality and the gender pay gap: Canada, Sweden and the United Kingdom." *IZA Institute of Labor Economics (IZA) Discussion Paper Series*, no. 10829. Bonn, Germany: IZA.

126. Kassenboehmer, Sonja C. and Mathias G. Sinning. 2014. "Distributional changes in the gender wage gap." *Industrial and Labor Relations Review* 67(2): 335-361.

127. Olsen, Wendy, Vanessa Gash, Sook Kim, and Min Zhang. 2018. "The gender pay gap in the UK: Evidence from the UKHLS." Manchester: Government Equalities Office.

128. Ibid.

129. Ibid.

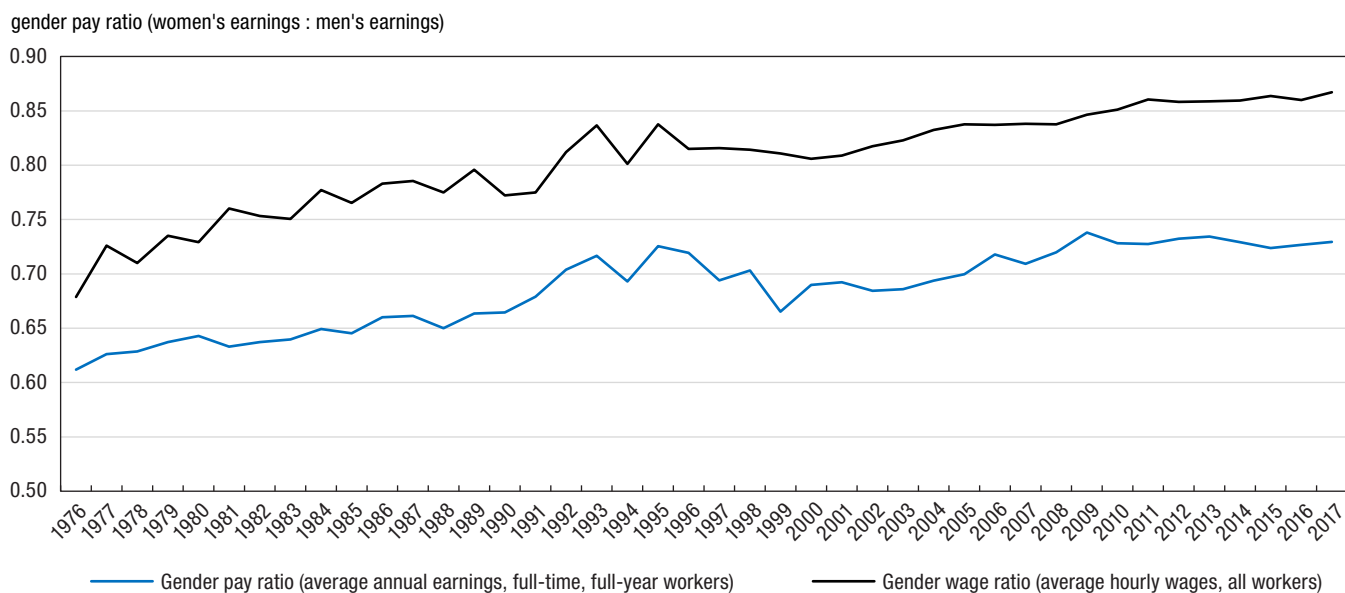


## 2.4. Comparison of different measures over time

Different measures of the gender pay gap yield different stylized facts regarding the evolution of earnings inequality between women and men in Canada over time, and different implications for future progress. Based on the average annual earnings of full-time, full-year workers, the prevailing narrative highlights the fact that the gender pay ratio hovered around 0.70 between 1992 and 2008 (Chart 4).<sup>130</sup> This contrasts with the preceding 15 years, during which time there was a steady narrowing of the gender pay gap (from 0.39 in 1976 to 0.32 in 1991).<sup>131</sup> Since 2009, the gender pay ratio has been marginally higher than that observed between 1992 and 2008, hovering around 0.73. Given similar findings in the United States, some scholars wonder whether progress toward equal pay between women and men has stalled.<sup>132</sup>

**Chart 4**

**Gender pay ratio calculated from the average annual earnings of full-time, full-year workers aged 15 and older and the average hourly wages of all workers aged 15 and older, Canada, 1976 to 2017**



**Notes:** Data on hourly wages are not consistently available prior to 1997, when they started to be collected through the Labour Force Survey (LFS). Consequently, we estimate hourly wages for 1976 to 1996 by dividing the aggregate annual earnings for each year by the aggregate number of usual work hours in the LFS reference week multiplied by 52. Annual earnings refer to annual income from wages, salaries and commissions before taxes among individuals whose main job was as a paid employee. Employees with zero annual earnings are excluded.

**Sources:** Statistics Canada, Survey of Consumer Finances, Survey of Labour and Income Dynamics, and Canadian Income Survey, 11-10-0239-01 and custom tabulations; Statistics Canada, Labour Force Survey, Table no. 14-10-0340-02 and 14-10-0043-01.

Using the hourly wages of all female and male workers, instead of annual earnings, reveals that the pace of growth in the gender pay ratio slowed considerably between 1992 and 2000, but did not stall.<sup>133</sup> The gender pay ratio picked up again in 2001, signalling the resumption of a strong, long-term trend towards convergence in women's and men's pay.

130. Baker, Michael and Marie Drolet. 2010. "A new view of the male/female pay gap." *Canadian Public Policy* XXXVI (4): 429-464.

131. Ibid.

132. Blau, Francine D. and Lawrence M. Kahn. 2007. "The gender pay gap: Have women gone as far as they can?" *Academy of Management Perspectives* 21: 7-23.

133. Baker, Michael and Marie Drolet. 2010. "A new view of the male/female pay gap." *Canadian Public Policy* XXXVI (4): 429-464.

**Box 3****Selecting a measure of the gender pay gap**

Although all of the previously-discussed measures of the gender pay gap are meaningful, each one approaches the issue from a different angle, and is therefore more or less informative, depending on the question/s being addressed. For example, pay equity legislation mandates equal pay for work of equal or comparable value to the employer, regardless of employees' work hours and terms of employment (i.e., permanent, temporary, seasonal, or casual). It follows that the gender pay gap in hourly wages is more relevant to pay equity legislation than the gender pay gap in annual earnings, as the latter is confounded by gender differences in work hours. On the other hand, when used as a reflection of the realities of women's and men's lives, the gender pay gap is best measured in terms of the annual earnings of all workers, as doing so encompasses all of the different ways in which gender results in women having lower pay, and ultimately less purchasing power, than men.

For the purposes of monitoring progress toward gender equality, as per the **Government of Canada's Gender Results Framework**, it is recommended that two measures of the gender pay gap be presented: one based on the annual earnings of all workers, and the other based on the hourly wages of all workers. Doing so highlights the contribution of gender differences in work hours to the gender pay gap, without implying that women's route to pay equity with men lies in them adopting stereotypically-male patterns of work and labour-force attachment.

Similar contextual "fit" should guide the use of mean or median. In many cases, it makes sense that the gender pay gap be measured in terms of the mean, as opposed to the median. While the mean can be skewed by workers with either very high or very low earnings, the overrepresentation of women at the bottom of the earnings distribution and their underrepresentation at the top are central to the gender pay gap, as is the widening of the gender pay gap as one moves up the earnings distribution. Also, standard decomposition techniques used to identify the factors affecting the gender pay gap and the magnitude of their effects apply to the mean (see Appendix A). However, when undertaking a more thorough analysis of the gender pay gap, it is recommended that the earnings of women and men be examined at different points along the earnings distribution, including the median (see Appendix A).

**3. Analyzing the gender pay gap**

No matter which measure is used, the unadjusted gender pay gap reflects, among other influences or "predictors," gender differences in education, work experience, job tenure, occupation, and industry, as well as gender-based discrimination. Untangling the mechanisms that give rise to the gender pay gap requires the use of statistical control in the context of ordinary least squares regression or some other multivariate method of data analysis. Statistical control enables us to estimate earnings, holding constant the effects of various predictors. If the gender pay gap is calculated from these earnings, it is "adjusted." Importantly, the adjusted gender pay gap reflects a **hypothetical situation** in which female and male workers are equally skilled and evenly distributed across occupations and industries. It should therefore not be interpreted as evidence that the gender pay gap is inconsequential or does not exist.

In this section, explanations for the gender pay gap and changes in the relative importance of related predictors are discussed. Considerations when studying trends in the gender pay gap are also presented. Although a brief overview of the statistical technique typically used to analyze the gender pay gap is provided here, readers are referred to Appendix A for more information.

**3.1. Traditional economic explanations for the gender pay gap**

Traditional economic explanations for the gender pay gap have largely focused on (1) gender differences in human capital, such as education, work experience, and job tenure; (2) occupational/industrial gender segregation; and (3) gender differences in the treatment of similarly-qualified and similarly-positioned workers (i.e., discrimination).<sup>134,135</sup>

134. Blau, Francine D. and Lawrence M. Kahn. 2017. "The gender wage gap: Extent, trends, and explanations." *Journal of Economic Literature* 55(3): 789-865.

135. Blau, Francine D. and Lawrence M. Kahn. 1999. "Analyzing the gender pay gap." *Quarterly Review of Economics and Finance* 39: 625-646.

### 3.1.1. Gender differences in human capital

Human capital refers to individuals' stock of skills, knowledge, competencies, and other intangible assets, whether innate or acquired, that increase their productivity and therefore their economic value (i.e., earnings). Although many factors contribute to one's human capital, education, work experience, and job tenure are among the most influential and amenable to measurement.

In the context of neoclassical economic theories of human capital and rational choice, women's lower wages, relative to men's, are understood as a consequence of their lower productivity.<sup>136</sup> Women may be less productive in the workplace because of the traditional division of labour within the family, whereby women specialize housework, childrearing, and caregiving, and men specialize in earning.<sup>137</sup> Given these gender roles, women can rationally expect shorter and more discontinuous careers.<sup>138</sup> Women therefore have less incentive to invest in market-oriented formal education and on-the-job training; they choose occupations and industries where such investments are less important and where pecuniary penalties for work interruptions are smaller; they avoid jobs that require significant investments in firm-specific skills, as returns to those investments accrue only as long as one remains with the firm; and they put less effort into their work.<sup>139,140,141</sup> Also, these theories suggest that women's human capital depreciates during their relatively frequent employment interruptions.<sup>142,143</sup>

Contrary to the hypotheses of the human capital model, women in Canada have sustained a long-term trend toward higher education.<sup>144</sup> Based on data from the Census of Population, the proportion of women aged 25 to 34 with at least a bachelor's degree increased by 27.0 percentage points between 1986 and 2016, from 13.7% to 40.7%.<sup>145</sup> The proportion of men in the same age group with at least a bachelor's degree also increased, but to a lesser extent: 13.6 percentage points, from 15.5% in 1986 to 29.1% in 2016.

Although recent cohorts of women have surpassed the educational attainment of their male counterparts, gender differences persist in field of study. According to data from the 2016 Census of Population, women constituted the majority of Canadians aged 25 to 34 with at least a bachelor's degree in all broad fields of study, with the exception of the lucrative engineering, computer science, and mathematics fields (Chart 5).<sup>146</sup>

136. Ibid.

137. Ibid.

138. Ibid.

139. Ibid.

140. Blau, Francine D. and Lawrence M. Kahn. 2017. "The gender wage gap: Extent, trends, and explanations." *Journal of Economic Literature* 55(3): 789-865.

141. Blau, Francine D. and Lawrence M. Kahn. 2007. "The gender pay gap? Have women gone as far as they can?" *Academy of Management Perspectives* 21(1): 7-23.

142. Mincer, Jacob and Haim Ofek. 1982. "Interrupted work careers: Depreciation and restoration of human capital." *Journal of Human Resources* 17(1): 2-24.

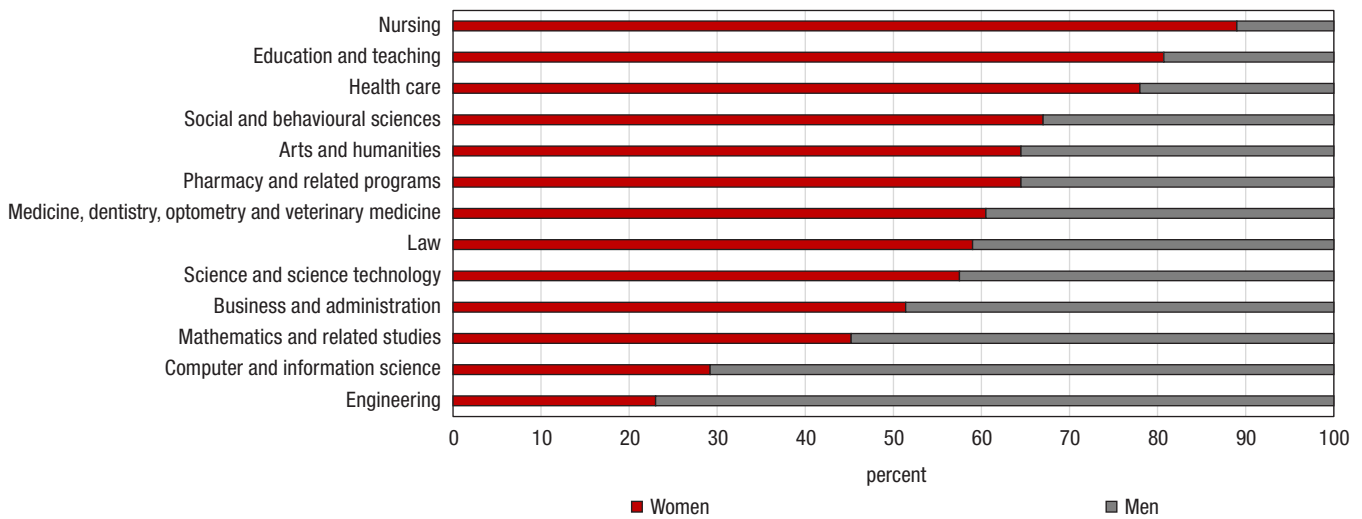
143. Mincer, Jacob and Solomon Polachek. 1974. "Family investments in human capital: Earnings of women." *Journal of Political Economy* 82(2): 76-108.

144. Ferguson, Sarah Jane. 2016. "Women and education: Qualifications, skills and technology." *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

145. Refers to a university certificate, diploma or degree at the bachelor level or above.

146. Frenette, Marc and Kristyn Frank. 2016. "Earnings of postsecondary graduates by detailed field of study." *Economic Insights*, catalogue no. 11-626-X (no. 056). Ottawa: Statistics Canada.

**Chart 5**  
**Proportion of university-degree holders aged 25 to 34 by field of study and sex, Canada, 2016**



**Note:** A university degree refers to a university certificate, diploma or degree at the bachelor level or above.  
**Source:** Statistics Canada, 2016 Census of Population, custom tabulations.

Data show, however, that women are more likely than men to experience work absences and interruptions—both long-term, scheduled absences related to childbearing and childrearing, and short-term, sporadic absences related to a child’s illness or a major household appliance in need of repair.<sup>147,148</sup> Previous research documents the stigmatization of work absences and interruptions, as well as fewer subsequent promotion opportunities and earnings increases.<sup>149,150</sup>

The 2011 General Social Survey on Families tracks respondents’ work history retrospectively, given its interrelationship with family transitions. In the context of this survey, a work interruption is defined as being away from work for more than three months since the respondent first started working for a period of six months or longer. A greater proportion of men aged 15 years and older than women had either no work interruptions (67.3% vs. 31.6%) or one work interruption (32.1% vs. 24.3%). Conversely, more women than men had two or more work interruptions (36.3% vs. 8.3%). Given women’s greater number of work interruptions, relative to men, they had an average of three fewer years of work experience (19.6 vs. 22.7 years).

In addition to having less work experience, women tend to have slightly less job tenure—that is, fewer consecutive months or years working for their current (or most recent) employer. Based on data from the Labour Force Survey, employed women aged 15 years and older had an average of 100.2 months with their current employer in 2017—6.2 months fewer than men.

### 3.1.2. Occupational/industrial gender segregation

Occupational gender segregation, also known simply as “gender segregation,” refers to the uneven distribution of women and men within and across occupations. It takes two forms—vertical segregation and horizontal segregation—both of which contribute to the gender pay gap. Vertical segregation describes the concentration of women at the bottom of the occupational hierarchy and men at the top, and it is suggestive of the extent to which women face obstacles to career advancement that ultimately prevent them from reaching highly-paid positions

147. Bächmann, Ann-Christin and Dörthe Gatermann. 2017. “The duration of family-related employment interruptions—the role of occupational characteristics.” *Journal of Labour Market Research* 50: 143-160.  
 148. Moyser, Melissa. 2017. “Women and paid work.” *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.  
 149. Judiesch, Michael K. and Karen S. Lyness. 1999. “Left behind? The impact of leave of absence on managers’ career success.” *Academy of Management Journal*. 42(6): 641-651.  
 150. Murrell, Audrey J. 2001. “Career advancement: Opportunities and barriers.” Pp. 211-218 in *Encyclopedia of women and gender: Sex similarities and differences and the impact of society on gender* (volume 1), edited by Judith Worell. San Diego, CA: Academic Press.

(i.e., the proverbial “glass ceiling”).<sup>151,152</sup> Using data from the Labour Force Survey, occupations (four-digit National Occupational Classification) were sorted in ascending order by average hourly wages. In this context, 14.4% of women aged 15 and older had an occupation with average hourly wages in the bottom 20% of the occupational distribution in 2017, compared with 9.6% of men. On the other hand, 1.6% of women had an occupation with average hourly wages in the top 20% of the occupational distribution in 2017, compared with 2.7% of men.

In addition to women’s underrepresentation in higher-status occupations, the gender pay gap may be greater at the top of the occupational hierarchy than the bottom. Previous research demonstrates that wage inequality between women and men is greater and declined more slowly over time at the top of the wage distribution than the bottom.<sup>153,154,155,156,157,158,159</sup> Based on data from the Labour Force Survey, the unadjusted gender pay ratio at the highest end of the wage distribution (i.e., the 95<sup>th</sup> percentile) was 0.86 in 2017, compared with 0.97 at the lowest end (i.e., the 5<sup>th</sup> percentile). These findings suggest that, even within higher-status occupations, women may encounter glass ceilings that prevent them from reaching the earnings of the highest-paid men.

Horizontal segregation refers to the concentration of women and men in different occupations and industries. It affects the gender pay gap to the extent that female-dominated occupations and industries are paid less than male-dominated occupations and industries, even when they involve the same skill levels.

Although breadwinning has become a central and enduring role for most women in Canada, their employment often parallels traditional female gender roles.<sup>160</sup> In other words, what is typically designated as “women’s work” in the private sphere tends to be designated as such in the public sphere as well.<sup>161</sup>

Many women in Canada are employed in traditionally-female occupations—teaching, nursing and related health occupations, social work, clerical or other administrative positions, or sales and services—in which women have been concentrated historically. This is reflected in Table 2, showing the proportion of women and men aged 15 years and older in the 20 occupations (of 140, based on the three-digit National Occupational Classification) with the greatest concentration of women in 2017. About 27% of women were employed in these occupations, many of which involve the “5 Cs” of caring, clerical, catering, cashiering, and cleaning. In contrast, 5.2% of men were employed in the 20 occupations with the greatest concentration of women. Conversely, 11.5% of men were in the 20 occupations with the greatest concentration of men in 2017, as were less than one percent of women (Table 3). In addition to illustrating how women’s paid work tends to parallel their unpaid work, these findings demonstrate that women are concentrated in sex-typed occupations to a greater extent than men (27.1% vs. 11.5%).

151. According to previous research, these obstacles include the association of leadership with assertive, decisive, and independent behaviours that are generally deemed to be the purview of men; entrenched organizational structures and work practices that presuppose the malebreadwinner/femalehomemaker model of family, and therefore render the combination of earning and caring roles problematic; women’s limited access to informal networks, influential colleagues and mentors related to their organizational roles, their tendency to interact with others of the same sex, and the inclination of men in positions of power to direct opportunities for development to junior men; and the lack of female role models to emulate and serve as mentors, suggesting to women that being female is a barrier to upward occupational mobility.

152. In addition to the glass ceiling, other concepts have been used to understand gender differences in access to leadership positions, including the “leaky pipeline” and “sticky floor.” The leaky pipeline refers to the decrease in women’s representation as one moves up organizational hierarchies (Bishu, Sebawit G. and Mohamad G. Alkadry. 2017. “A systematic review of the gender pay gap and factors that predict it.” *Administration and Society* 49(1): 65-104). The sticky floor pertains to the systematic ways in which women are denied opportunities for career advancement, such that they remain concentrated in lower-level positions within organizations (Ibid.).

153. Arulampala, Wiji, Alison L. Booth, and Mark L. Bryan. 2007. “Is there a glass ceiling over Europe? Exploring the gender pay gap across the wage distribution.” *Industrial and Labor Relations Review* 60(2): 163-186.

154. Baker, Michael, Dwayne Benjamin, Andree Desaulniers Cegep, and Mary Grant. 1995. “The distribution of the male/female earnings differential, 1971-1990.” *Canadian Journal of Economics* 28(3): 479-501.

155. Blau, Francine D. and Lawrence M. Kahn. 2017. “The gender wage gap: Extent, trends, and explanations.” *Journal of Economic Literature* 55(36): 789-865.

156. Boudarbat, Brahim and Marie Connolly. 2013. “The gender wage gap among recent post-secondary graduates in Canada: A distributional approach.” *Canadian Journal of Economics* 46(3): 1037-1065.

157. Cohen, Philip N., Matt L. Huffman, and Stefanie Knauer. 2009. “Stalled progress? Gender segregation and wage inequality among managers, 1980-2000.” *Work and Occupations* 36(4): 318-342.

158. Drolet, Marie. 2011. “Why has the gender wage gap narrowed?” *Perspectives on Labour and Income* 23(1):3-13. Catalogue no. 75-001-X. Ottawa: Statistics Canada.

159. Kassenboehmer, Sonja C. and Mathias G. Sinning. 2014. “Distributional changes in the gender wage gap.” *Industrial and Labor Relations Review* 67(2): 335-361.

160. Moyser, Melissa. 2017. “Women and paid work.” *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

161. Ibid.

**Table 2**  
**Proportion of women and men aged 15 and older employed in the 20 occupations with the greatest concentration of women in 2017, Canada**

Occupations	Women	Men	Difference (% women - % men)
	percent		
Office administrative assistants - general, legal and medical	2.36	0.15	2.22
Professional occupations in nursing	2.16	0.21	1.95
Home care providers and educational support occupations	1.54	0.15	1.38
Other occupations in personal service	0.55	0.07	0.48
General office workers	2.30	0.30	2.00
Assisting occupations in support of health services	2.07	0.30	1.77
Therapy and assessment professionals	0.44	0.07	0.37
Paraprofessional occupations in legal, social, community and education services	2.90	0.49	2.41
Medical technologists and technicians (except dental health)	0.96	0.17	0.78
Financial, insurance and related administrative support workers	1.39	0.27	1.12
Technical occupations in dental health care	0.24	0.05	0.19
Cashiers	2.30	0.54	1.76
Court reporters, transcriptionists, records management technicians and statistical officers	0.13	0.03	0.10
Finance, insurance and related business administrative occupations	1.36	0.34	1.02
Specialized occupations in personal and customer services	0.72	0.20	0.52
Machine operators and related workers in textile, fabric, fur and leather products processing and manufacturing	0.15	0.04	0.11
Library, correspondence and other clerks	0.27	0.08	0.19
Secondary and elementary school teachers and educational counsellors	2.60	0.81	1.78
Librarians, archivists, conservators and curators	0.09	0.03	0.06
Administrative and regulatory occupations	2.52	0.85	1.67
<b>Total</b>	<b>27.05</b>	<b>5.16</b>	<b>...</b>

... not applicable

Source: Statistics Canada, Labour Force Survey, custom tabulations.

**Table 3**  
**Proportion of women and men aged 15 and older employed in the 20 occupations with the greatest concentration of men in 2017, Canada**

Occupations	Women	Men	Difference (% women - % men)
	percent		
Mine service workers and operators in oil and gas drilling	0.01	0.08	0.08
Central control and process operators in processing and manufacturing	0.01	0.14	0.13
Train crew operating occupations	0.00	0.06	0.05
Contractors and supervisors, industrial, electrical and construction trades and related workers	0.06	1.08	1.01
Other installers, repairers and servicers	0.03	0.49	0.46
Other transport equipment operators and related maintenance workers	0.02	0.29	0.28
Underground miners, oil and gas drillers and related occupations	0.02	0.35	0.33
Logging machinery operators	0.00	0.08	0.08
Contractors and supervisors, mining, oil and gas	0.01	0.19	0.18
Supervisors, logging and forestry	0.00	0.03	0.03
Machining, metal forming, shaping and erecting trades	0.05	1.31	1.26
Masonry and plastering trades	0.02	0.57	0.55
Automotive service technicians	0.04	1.06	1.03
Heavy equipment operators	0.03	0.90	0.87
Electrical trades and electrical power line and telecommunications workers	0.04	1.31	1.27
Machinery and transportation equipment mechanics (except motor vehicle)	0.04	1.49	1.46
Plumbers, pipefitters and gas fitters	0.01	0.62	0.60
Carpenters and cabinetmakers	0.02	1.11	1.09
Other mechanics and related repairers	0.00	0.21	0.21
Crane operators, drillers and blasters	0.00	0.14	0.14
<b>Total</b>	<b>0.40</b>	<b>11.52</b>	<b>...</b>

... not applicable

Source: Statistics Canada, Labour Force Survey, custom tabulations.

In a similar vein, in 2017, the three industries (of 20, based on the two-digit North American Industry Classification System) with the greatest share of women were (1) health care and social assistance, (2) educational services, and (3) accommodation and food services. The proportion of women aged 15 years and older who worked in these three industries combined was 40.1%, compared with 14.1% of men. By comparison, the three industries with the greatest share of men were (1) construction, (2) forestry, fishing, mining, oil and gas, and (3) manufacturing. The proportion of men who worked in these three industries combined was 23.2%, compared with 5.1% of women. As with occupation, women were concentrated in sex-typed industries to a greater extent than men (40.1% versus 23.2%).

Female-dominated occupations and industries tend to be compensated less than male-dominated ones—even when they involve the same skill level.<sup>162</sup> For example, using data from the 2017 Labour Force Survey, the effect of being employed in a female-dominated occupation (at the 4-digit level of the National Occupational Classification) on the (log) hourly wages of workers aged 15 and older was estimated. Workers of both sexes employed in occupations in which 90% of incumbents were female earned an average of \$6.60 less per hour than workers employed in occupations in which 10% of incumbents were female (\$29.78 vs. \$36.38). The negative effect of being employed in a female-dominated occupation on hourly wages remained the same when educational attainment was controlled.

**Why do women end up in different occupations than men?** There are both “supply (employee)-side” and “demand (employer)-side” processes at play. The former pertains to employees’ tastes and preferences for different kinds of work, while the latter pertains to employers’ greater demand for workers of a certain sex and differential valuation of occupations depending on their gender composition.<sup>163</sup>

According to some theories, individuals act in rational ways, and therefore select courses of action that they believe will lead to the most desirable outcome.<sup>164</sup> Individuals’ preferences influence the means that they choose to pursue their goals.<sup>165</sup> Given social norms and cultural expectations that assign primary responsibility for housework, childrearing, and caregiving to women, and primary responsibility for breadwinning to men, women may place more importance on the non-pecuniary attributes of occupations than men.<sup>166,167,168</sup> They may therefore trade off higher earnings for occupations that require less time, energy, and emotional input, in order to conserve these resources for their family responsibilities; occupations that engender greater intrinsic, altruistic, and social rewards; and/or occupations that offer amenities like temporal flexibility that facilitate work-family balance.<sup>169,170,171,172</sup>

Gender differences in psychological attributes may also make some occupations more or less attractive to women, relative to men.<sup>173</sup> For example, previous research demonstrates that women tend to be more risk averse and less competitive than men.<sup>174,175</sup> These psychological attributes may lead women and men to choose occupations that differ with respect to job security, earnings stability, injury and fatality risk, performance evaluation, and competitiveness.<sup>176</sup> To the extent that these occupational characteristics are associated with higher earnings, gender differences in risk aversion and competitiveness may contribute to the gender pay gap through choice of occupation.<sup>177</sup>

162. Levanon, Asaf, Paula England, and Paul Allison. 2009. “Occupational feminization and pay: Assessing causal dynamics using 1950-2000 U.S. census data.” *Social Forces* 88(2): 865-892.

163. Cohen, Philip N. and Matt L. Huffman. 2003. “Occupational segregation and the devaluation of women’s work across U.S. labor markets.” *Social Forces* 81(3): 881-908.

164. Firestone, Juanita M., Richard J. Harris, and Linda C. Lambert. 1999. “Gender role ideology and the gender based differences in earnings.” *Journal of Family and Economic Issues* 20(2): 191-215.

165. *Ibid.*

166. *Ibid.*

167. Chevalier, Arnaud. 2007. “Education, occupation and career expectations: Determinants of the gender pay gap for UK graduates.” *Oxford Bulletin of Economics and Statistics* 69(6): 819-842.

168. Croson, Rachel and Uri Gneezy. 2009. “Gender differences in preferences.” *Journal of Economic Literature* 47(2): 448-474.

169. *Ibid.*

170. Flabby, Luca and Andrea Moro. 2012. “The effect of job flexibility on female labor market outcomes: Estimates from a search and bargaining model.” *Journal of Econometrics* 168: 81-95.

171. Goldin, Claudia. 2014. “A grand convergence: Its last chapter.” *American Economic Review* 104(4): 1091-1119.

172. Goldin, Claudia and Lawrence Katz. 2011. “The cost of workplace flexibility for high-powered professionals.” *Annals of the American Academy of Political and Social Science* 638(1): 45-67.

173. Cortes, Patricia. 2017. “Occupation and gender.” *Institute for Labor Economics (IZA) Discussion Paper Series*, no. 10672, Bonn, Germany: IZA.

174. Azmat, Ghazala and Barbera Petrongolo. 2014. “Gender and the labor market: What have we learned from field and lab experiments?” *Labor Economics* 30: 32-40.

175. Bertrand, Marianne. 2011. “New perspectives on gender.” Pp. 1545-1592 in *Handbook of Labor Economics*, volume 4b, edited by Orley C. Ashenfelter and David Card. Amsterdam: Elsevier.

176. Cortes, Patricia and Jessica Pan. 2018. “Occupation and gender.” Pp. 425-452 in *The Oxford Handbook of Women and the Economy*, edited by Susan L. Averett, Laura M. Argys, and Saul D. Hoffman. New York, NY: Oxford University Press.

177. *Ibid.*

Employers' conscious or unconscious preferences for employees of a particular sex for certain occupations can also generate and maintain occupational segregation through their effects on hiring and promotion.<sup>178,179</sup> However, formal human resource practices and policies may limit the extent to which employers' discretion, and therefore gender bias, come into play in occupational placement and advancement.<sup>180</sup>

**Why do occupations dominated by women pay less than those dominated by men?** The two main alternative accounts of the relationship between gender segregation and gender-based wage inequality are (1) "crowding" and (2) the cultural devaluation of women's work. Both imply discrimination by employers. The crowding hypothesis posits that the exclusion of women from stereotypically "male" occupations through employers' discriminatory hiring and promotion practices results in an oversupply of labour for "female" occupations, thereby depressing the wages of equally-productive workers.<sup>181,182</sup>

The theory of the cultural devaluation of women's work posits that female-dominated occupations are under-rewarded because of their association with women.<sup>183,184</sup> This theory suggests that women, as a group, tend to be valued less than men in the cultures of western industrialized countries, so anything associated with them, including occupations, are valued less by extension.<sup>185,186,187,188</sup> Female-dominated occupations also tend to involve temporal flexibility (e.g., part-time work and telework) that does not conform to the organizational norms (i.e., full-time work, overtime, and a constant presence, except when travelling for work), which are predicated on male patterns.<sup>189,190</sup> As England explains, this is a form of discrimination whereby "employers see the worth of predominantly female jobs through biased lenses and, as a result, set pay levels for both men and women in predominantly female jobs lower than they would be if the jobs had a more heavily male sex composition."<sup>191</sup> This account of the relationship between gender segregation and gender-based wage inequality is supported by previous research, which shows that the average earnings within occupations decrease as the proportion of women within occupations increases.<sup>192,193</sup>

### 3.1.3. Gender differences in the treatment of similarly-qualified and similarly-positioned workers

Even with the same amount of human capital and employment in the same occupations and industries, women and men may be paid differently due to gender-based discrimination.<sup>194</sup> Standard economic models suggest that discrimination can arise in a variety of ways. As per Becker, employers, coworkers, and customers or clients may have personal prejudice against members of particular groups, manifested in a desire to maintain social distance from them.<sup>195</sup> Such prejudice will cause a wage differential between women and men when

178. Kmec, Julie A. 2005. "Setting occupation sex segregation in motion: Demand-side explanations of sex traditional employment." *Work and Occupations* 32(3): 322-354.

179. Huffman, Matt L., Philip N. Cohen, and Jessica Pearlman. 2010. "Engendering change: Organizational dynamics and workplace gender desegregation, 1975-2005." *Administrative Science Quarterly* 55(2): 255-277.

180. Kmec, Julie A. 2005. "Setting occupation sex segregation in motion: Demand-side explanations of sex traditional employment." *Work and Occupations* 32(3): 322-354.

181. Jacobsen, Joyce P. 2018. "Women and the labor market: A feminist perspective." Pp. 623-641 in *The Oxford Handbook of Women and the Economy*, edited by Susan L. Averett, Laura M. Argys, and Saul D. Hoffman. New York, NY: Oxford University Press.

182. Kmec, Julie A. 2005. "Setting occupation sex segregation in motion: Demand-side explanations of sex traditional employment." *Work and Occupations* 32(3): 322-354.

183. It is this form of discrimination that pay equity policies attempt to address.

184. Cohen, Philip N. 2013. "The persistence of workplace gender segregation in the US." *Sociology Compass* 7(11): 889-899.

185. Ibid.

186. Cohen, Philip N. and Matt L. Huffman. 2003. "Individuals, jobs, and labor markets: The devaluation of women's work." *American Sociological Review* 68: 443-463.

187. Leuze, Kathrin and Susanne Straus. 2016. "Why do occupations dominated by women pay less? How 'female-typical' work tasks and working-time arrangements affect the gender wage gap among higher education graduates." *Work, Employment and Society* 30(5): 802-820.

188. Moyser, Melissa. 2017. "Women and paid work." *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

189. Ibid.

190. Goldin, Claudia. 2014. "A grand gender convergence: Its last chapter." *American Economic Review* 104(4): 1091-1119.

191. England, Paula. 2010. "The gender revolution: Uneven and stalled." *Gender and Society* 24(2): 149-166 (p. 153).

192. Cohen, Philip N. 2013. "The persistence of workplace gender segregation in the US." *Sociology Compass* 7(11): 889-899.

193. Levanen, Asaf, Paula England, and Paul Allison. 2009. "Occupational feminization and pay: Assessing causal dynamics using 1950-2000 U.S. Census data." *Social Forces* 88(2): 865-892.

194. Duguet, Emmanuel, Yannick L'Horty, Dominique Meurs, and Pascale Petit. 2010. "Measuring discriminations: An introduction." *Annals of Economics and Statistics* 99/100: 5-14.

195. Becker, Gary S. 1971. *The Economics of Discrimination*. Chicago: University of Chicago Press.



Discriminatory employers will only hire women at a sufficient wage discount that compensates them for the disutility of employing women. Discriminatory male workers will demand a wage premium to work with women, thus raising men's relative wages, and the reluctance of discriminatory customers or clients to buy goods or services provided by women will make women less productive in terms of revenue brought in, thus depressing their relative wages.<sup>196</sup>

In theory, competitive forces should reduce or eliminate employer discrimination in the long run because the least discriminatory firms, which would hire more female workers because the price of their labour is less than that of male workers, would have lower costs of production and should therefore drive the more discriminatory firms out of business.<sup>197</sup> However, discrimination has persisted, and “statistical discrimination” has been used to explain its persistence. Given employer uncertainty about either the productivity of prospective employees or the reliability with which their productivity can be predicted, employers observe prospective employees' group identity (e.g., sex/gender, Aboriginal status, immigrant status, visible minority status, and/or disability status), and then make hiring, placement, or remuneration decisions on the basis of the expected or “average” level of productivity of that group.<sup>198</sup> Employers may discriminate on the basis of that average.<sup>199</sup>

### 3.2. Determining the relative importance of various explanations for the gender pay gap: Decomposition

Faced with the unadjusted gender pay gap, we usually want to know how much of that gap is attributable to gender differences in human capital, occupation, and industry. To make this determination, researchers often begin by using ordinary least square regression to model the logarithmic (log) earnings of workers as a function of sex—coded as one for women and zero for men—and other predictors.<sup>200</sup> The baseline model usually includes only the indicator for sex, such that its coefficient represents the unadjusted difference in the log earnings of female and male workers, with a negative number indicating that the former earn less than the latter on average. Other predictors of log earnings are added in successive models. In these models, the regression coefficient for sex measures the extent to which the log earnings of female and male workers are different—all other predictors in the model being equal (i.e., statistically controlled). In this way, what the gender pay gap would be were it not for gender differences in various characteristics can be determined. For example, based on Labour Force Survey data, the unadjusted gender log wage gap among workers aged 15 years and older was -0.13 in 2017, while the adjusted gender log wage gap was -0.11 (net of province, human capital, union status, public-sector employment, occupation, and industry).

The contribution of human capital, occupation, and industry to explanation of the unadjusted gender pay gap can be then be more formally estimated using the Oaxaca-Blinder decomposition method (see Appendix A for a more technical discussion of this method). After estimating the log earnings of women and men separately as a function of human capital and other productivity-enhancing characteristics, a counterfactual exercise is undertaken, whereby one implicitly asks: what would women's average earnings be if they received the same remuneration to their human capital, occupation, and industry as men? The portion of the gender pay gap that is “explained” by compositional differences between women and men in terms of their human capital, occupation, and industry is then calculated by subtracting women's average earnings under the counterfactual scenario from men's average earnings. The “unexplained” portion of the gender pay gap is the difference between the counterfactual earnings of women and their actual earnings, capturing different returns to women's and men's human capital, occupation, and industry. Although this portion of the gender pay gap is typically used as an estimate of gender-based discrimination in the labour market, it also includes the effects of omitted predictors of the gender pay gap.<sup>201</sup>

196. Blau, Francine D. and Lawrence M. Kahn. 2017. “The gender wage gap: Extent, trends, and explanations.” *Journal of Economic Literature* 55(3): 789-865.

197. *Ibid.*

198. Fang, Hanming and Andrea Moro. 2011. “Theories of statistical discrimination and affirmative action: A survey.” Pp. 134-197 in *Handbook on Social Economics*, volume 1A, edited by Jess Benhabib, Matthew O. Jackson and Alberto Bisin. The Netherlands: North-Holland.

199. Blau, Francine and Lawrence M. Kahn. 2000. “Gender differences in pay.” *Journal of Economic Perspectives* 14(4): 75-99.

200. Baker, Michael and Marie Drolet. 2010. “A new view of the male/female pay gap.” *Canadian Public Policy* XXXVI (4): 429-464.

201. Baker, Michael, Dwayne Benjamin, Andree Desautels Cegep, and Mary Grant. 1995. “The distribution of the male/female earnings differential, 1970-1990.” *Canadian Journal of Economics* 28(3): 479-501.

An important caveat regarding these empirical methods for analyzing the gender pay gap is that the predictors do not “explain” earnings inequality between women and men in a social or cultural sense.<sup>202</sup> Each predictor is embedded in several layers of context that shape its meaning and effect on earnings.<sup>203</sup> In other words, each predictor is itself complicated and requires explanation.<sup>204</sup> Also, seemingly neutral predictors may incorporate elements of the discriminatory gender system, and therefore the distinction between the explained and unexplained portion of the gender pay gap is imprecise.<sup>205</sup> Gender differences in education and occupation, for example, themselves need to be understood as the outcomes of gendered processes that channel women and men toward different types of degrees, fields of study, and jobs.

**What proportion of the gender pay gap in Canada is explained vs. unexplained?** As seen in Section 2.4, the gender wage gap in Canada has narrowed over time, although the pace slowed considerably during the 1990s. There is no single, ongoing source of Canadian data on hourly wages for an extended period of time prior to 1997, when the Labour Force Survey began collecting these data.<sup>206</sup> For this reason, the gender wage gap among all workers aged 15 years and older from the late 1990s onward is analyzed here (Table 4). Nearly half of the decrease in the gender wage gap that occurred between 1997 and 2017 was explained by changes in the relative characteristics of women and men. Particularly important in this regard were occupation and education. Specifically, the increased representation of women in high-paying managerial and professional occupations was the driving force behind the narrowing of the gender wage gap, followed by the increased proportion of women with a university degree at the bachelor level or above. These two factors are related, as a university degree is typically required for managerial and professional occupations.<sup>207</sup>

**Table 4**  
**Decomposition of change in the gender wage gap among workers aged 15 and older, Canada, 1997 to 2017**

Change in real log gender wage ratio	0.062
Gender gap in log wages in 2017	-0.134
Gender gap in log wages in 1997	-0.196
<b>Percent due to change in gender differences in characteristics (“explained”)</b>	<b>46.8</b>
Province	-3.3
Education	13.1
Age	-5.3
Job tenure	2.4
Union status	11.2
Public-sector employment	8.9
Occupation	27.7
Industry	-8.0
<b>Percent due to changes in gender differences in returns to characteristics (“unexplained”)</b>	<b>53.2</b>

Source: Statistics Canada, Labour Force Survey, custom tabulations.

While less important to explaining the decrease in the gender wage gap that occurred between 1997 and 2017, women’s increased job tenure, the reduced proportion of men with union coverage, and the increased proportion of women employed in the well-paid public sector and the decreased proportion of men employed there also played a role.<sup>208</sup>

Notably, as the gender wage gap has narrowed over time, what remains is increasingly unexplained. Nearly 70% of the gender wage gap in 2017 could not be explained by gender differences in province, human capital, union status, public-sector employment, occupation, and industry. By comparison, focusing on full-time workers aged 25 to 54, Baker and Drolet find that 61% of the gender wage gap in 1981 was unexplained by a similar model specification.<sup>209</sup> In effect, as women have surpassed men in terms of educational attainment and increased their representation

202. Lips, Hilary M. 2013. “The gender pay gap: Challenging the rationalizations. Perceived equity, discrimination, and the limits of human capital models” *Sex Roles* 68: 169-185.

203. Ibid.

204. Ibid.

205. Ibid.

206. Baker, Michael and Marie Drolet. 2010. “A new view of the male/female pay gap.” *Canadian Public Policy* XXXVI(4): 429-464.

207. Employment and Skills Development Canada, National Occupational Classification Matrix 2016.

208. In December 2000, parental-leave benefits in Canada were increased from 10 to 35 weeks. Combined with the 25 weeks of maternity-leave benefits that had been in place since 1990, this change effectively increased total maternity- and parental-leave time from 6 months to one year. Such benefits may positively affect work experience and job tenure to the extent that they deter parents from breaking ties with their current employer, either to leave the workforce or switch to a more child-friendly job.

209. Baker, Michael and Marie Drolet. 2010. “A new view of the male/female pay gap.” *Canadian Public Policy* XXXVI(4): 429-464.

in managerial and professional occupations, the remaining gender wage gap has largely become an issue of the unequal returns to such characteristics that women and men receive in the labour market.

### 3.3. Explanations for the remaining gender pay gap

As compositional differences between women and men in terms of human capital and occupation have been vastly reduced, if not eliminated (i.e., the gender education gap), it has become necessary to consider other explanations for the remaining gender pay gap. In addition to discrimination (previously discussed), motherhood earnings penalties, the high “price” of temporal flexibility in certain occupations, and gender differences in personality traits, psychological attributes, and non-cognitive skills are plausible candidates.

#### 3.3.1. Motherhood earnings penalties

Previous research demonstrates that the gender pay gap is virtually non-existent during early adulthood, but increases with age thereafter (see Section 3.4.3).<sup>210,211</sup> It also demonstrates that childless women have higher earnings than women with children; the earnings of childless women are almost equal to those of their male counterparts; and men with children earn as much, if not more, than childless men.<sup>212,213,214,215,216,217</sup> Taken together, these findings are suggestive of gender differences in the effects of parenthood on earnings. Specifically, women with children experience “motherhood earnings penalties,” while men with children do not and may even benefit from “fatherhood earnings premiums.”<sup>218</sup>

There are a number of ways that motherhood can negatively affect women’s earnings, both before and after having children. Women may pre-emptively invest less in human capital or select family-friendly, but lower-paying, career paths in anticipation of becoming a mother.<sup>219,220</sup> In response to becoming a mother, women may reduce their work hours or switch their occupation or firm to a more child-friendly one.<sup>221,222,223</sup> Now that women invest in human capital to a similar extent as men and they have increased their representation in higher-status occupations, post-motherhood effects may be more important for understanding motherhood earnings penalties than pre-motherhood effects. In other words, women may largely be incurring earnings penalties after they have children, rather than before.

**How does women’s employment change after they have children?** The transition to parenthood tends to move previously-egalitarian couples toward a more traditional gendered division of labour.<sup>224,225,226</sup> For this reason, mothers often adjust their labour supply in a downward fashion—leaving the workforce, temporarily or permanently, or reducing their work hours if they remain employed—to accommodate their greater responsibility for childrearing, relative to fathers.<sup>227,228</sup> These strategies negatively affect earnings in both the short-term, by reducing time spent at

210. Bertrand, Marianne, Claudia Goldin, and Lawrence F. Katz. 2010. “Dynamics of the gender gap for young professionals in the financial and corporate sectors.” *American Economic Journal: Applied Economics* 13(2): 228-255.

211. Manning, Alan and Joanna Swaffield. 2008. “The gender gap in early-career wage growth.” *Economic Journal* 118(530): 983-1024.

212. Budig, Michelle J. and Paula England. 2001. “The wage penalty for motherhood.” *American Sociological Review* 66(2): 204-225.

213. Budig, Michelle J. and Melissa J. Hodges. 2010. “Differences in disadvantage: Variation in the motherhood penalty across white women’s earnings distribution.” *American Sociological Review* 75(5): 705-728.

214. Glauber, Rebecca. 2008. “Race and gender in families and at work: The fatherhood wage premium.” *Gender and Society* 22(1): 8-30.

215. Gough, Margaret and Mary Noonan. 2013. “A review of the motherhood wage penalty in the United States.” *Sociology Compass* 7(4): 328-342.

216. Pal, Ipsita and Jane Waldfogel. 2016. “The family gap in pay: New evidence for 1967 to 2013.” *Russell Sage Foundation Journal of the Social Sciences* 2(4): 104-127.

217. Zhang, Xuelin. 2009. “Earnings of women with and without children.” *Perspectives on Labour and Income* 10(3). Ottawa: Statistics Canada.

218. Grimshaw, Damian and Jill Rubery. 2015. “The motherhood pay gap: A review of the issues, theory and international evidence.” *Geneva: International Labour Organization*.

219. Blau, Francine D. and Lawrence M. Kahn. 2017. “The gender wage gap: Extent, trends, and sources.” *Journal of Economics Literature* 55(3): 789-865.

220. Budig, Michelle J. and Paula England. 2001. “The wage penalty for motherhood.” *American Sociological Review* 66(2): 204-225.

221. Blau, Francine D. and Lawrence M. Kahn. 2017. “The gender wage gap: Extent, trends, and sources.” *Journal of Economics Literature* 55(3): 789-865.

222. Budig, Michelle J. and Paula England. 2001. “The wage penalty for motherhood.” *American Sociological Review* 66(2): 204-225.

223. Gangl, Markus and Andrea Ziefle. 2009. “Motherhood, labor force behavior, and women’s careers: An empirical assessment of the wage penalty for motherhood in Britain, Germany, and the United States.” *Demography* 46(2): 341-369.

224. Fox, Bonnie. 2009. *When Couples Become Parents: The Creation of Gender in the Transition to Parenthood*. Toronto: University of Toronto Press.

225. Katz-Wise, Sabra L., Heather A. Priess, and Janet S. Hyde. 2010. “Gender-role attitudes and behavior across the transition to parenthood.” *Developmental Psychology* 46(1): 18-28.

226. Perales, Francisco, Yara Jarallah, and Janeen Baxter. 2018. “Men’s and women’s gender-role attitudes across the transition to parenthood: Accounting for child’s gender.” *Social Forces* 97(1): 251-276.

227. Beaujot, Roderic, and Zenaida R. Ravenera. 2009. “Family Models for Earning and Caring: Implications for Child Care and Family Policy.” *Canadian Studies in Population* 36(1-2):145-166.

228. Landivar, Liana Christin. 2014. “Opting out, scaling back, or business-as-usual? An occupational assessment of women’s employment.” *Sociological Forum* 29(1): 189-214.

work, and the long-term, by reducing work experience and job tenure.<sup>229</sup> However, previous research demonstrates that motherhood earnings penalties persist after controlling for differences in overall work experience and full-time and part-time work experience.<sup>230,231</sup>

Mothers may also be less productive at, or committed to, work—or perceived to be so by employers (i.e., statistical discrimination)—insofar as their family responsibilities leave them exhausted and/or distracted, or they put less effort forth at work in order to conserve their energy for later use at home.<sup>232,233</sup> Exploring this issue, Kmec finds that mothers and fathers in the United States in the mid-2000s were similar on five out of seven “pro-work” behaviours and conditions: work effort; frequency with which the respondent’s responsibilities at home reduced his/her work effort; the extent to which the respondent’s home life helps with him/her relax and feel ready for the next day’s work; the frequency with which the respondent’s activities and chores at home prevented him/her from getting the needed amount of sleep to do his/her job well; and the frequency with which providing what was needed at home made the respondent work harder at his/her job.<sup>234</sup> When they differed, mothers reported greater job engagement and work intensity than fathers.<sup>235</sup> Further, mothers were no different from childless women and men on all outcomes.<sup>236</sup>

Given mother’s disproportionate responsibility for childrearing, it may be the case that they trade off higher earnings for greater “non-pecuniary amenities” that enable to them balance work and family life, such as less demanding tasks, flexible work hours, few demands for travel or weekend or evening work, and/or on-site childcare.<sup>237,238</sup> This mechanism, operating through occupation, industry and/or firm, is elaborated below.

### 3.3.2. Trading off earnings for temporal flexibility

The majority of the current gender pay gap in Canada derives from earnings inequality between women and men within occupations, as opposed to the uneven distribution of women and men across occupations.<sup>239</sup> Based on similar findings for the United States, Goldin argues the gender pay gap is wider in some occupations than others, largely due to differences in the importance attributed to long work hours, set schedules and “face time,” and job tenure.<sup>240</sup> Some occupations, particularly in the corporate, financial, and legal worlds, have high penalties for even short work interruptions, and earnings that increase disproportionately or “non-linearly” with hours worked.<sup>241</sup> In these occupations, temporal flexibility—fewer and more discretionary work hours—comes at a high price in terms of earnings.<sup>242</sup> Due to women’s greater family responsibilities, they may desire more temporal flexibility than men and they may therefore willing to trade off earnings for that amenity, contributing to gender-based earnings inequality within occupations.<sup>243</sup>

In a similar vein, Cha and Weeden suggest that the increasing prevalence of long work hours, defined as 50 or more hours per week, and rising earnings returns to overwork contribute to the gender pay gap, as men are more likely than women to perform long work hours.<sup>244</sup> Notably, they demonstrate that the effects of overwork on trends in the gender pay gap in the United States between 1970 and 2009 were most pronounced in managerial and professional occupations, where long work hours are particularly common and the norm of overwork is deeply embedded in organizational practices and occupational cultures.

229. Budig, Michelle J. and Paula England. 2001. “The wage penalty for motherhood.” *American Sociological Review* 66(2): 204-225.

230. Ibid.

231. Waldfogel, Jane. 1997. “The wage effects of children.” *American Sociological Review* 62: 209-217.

232. Budig, Michelle J. and Paula England. 2001. “The wage penalty for motherhood.” *American Sociological Review* 66(2): 204-225.

233. Kmec, Julie A. 2011. “Are motherhood penalties and fatherhood bonuses warranted? Comparing pro-work behaviors and conditions of mothers, fathers, and non-parents.” *Social Science Research* 40:444-459.

234. Ibid.

235. Ibid.

236. Ibid.

237. Blau, Francine D. and Lawrence M. Kahn. 2017. “The gender wage gap: Extent, trends, and sources.” *Journal of Economics Literature* 55(3): 789-865.

238. Budig, Michelle J. and Paula England. 2001. “The wage penalty for motherhood.” *American Sociological Review* 66(2): 204-225.

239. Moyser, Melissa. 2017. “Women and paid work.” *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

240. Goldin, Claudia. 2014. “A grand convergence: Its last chapter.” *American Economic Review* 104(4): 1091-1119.

241. Ibid.

242. Ibid.

243. Goldin, Claudia and Lawrence F. Katz. 2011. “The cost of workplace flexibility for high-powered professionals.” *Annals of the American Academy of Political and Social Science* 638: 45-67.

244. Cha, Youngjoo and Kim A. Weeden. 2014. “Overwork and the slow convergence in the gender gap in wages.” *American Sociological Review* 79(3): 457-484.

### 3.3.3. Gender differences in personality traits, psychological attributes, and non-cognitive skills

While it is unclear whether gender differences in personality traits, psychological attributes, and non-cognitive skills are the product of genetics, culture, or a combination of the two, studies have found that, compared with men, women tend to place a lower value on money; to be less willing to negotiate and compete; to be more risk averse; to have lower self-esteem; to be less self-confident; and to be more agreeable.<sup>245</sup> Personality traits, psychological attributes, and non-cognitive skills may affect earnings directly, by increasing productivity like other forms of human capital, and/or indirectly, by influencing human capital, occupation, and industry.<sup>246</sup>

Notably, the same personality trait, psychological attribute, or non-cognitive skill in women and men may be rewarded differently in the labour market. For example, Mueller and Plug find that women's greater agreeableness (i.e., being more trusting, straightforward, altruistic, compliant, modest, and sympathetic), relative to men, is not related to their wages.<sup>247</sup> However, men earned a premium for being disagreeable.<sup>248</sup> There is also anecdotal and empirical evidence that women are often in a no-win situation at work, in that they face potential penalties for behaving in gender-stereotypical ways (e.g., not negotiating over salaries, raises, or promotions), but, if they try to act more like men, they may elicit negative or less positive responses than men, as they are behaving in "unfeminine" ways.<sup>249,250</sup>

## 3.4. Considerations when studying trends in the gender pay gap

When analyzing and interpreting trends in the gender pay gap, whether using annual earnings or hourly wages, it is necessary to consider changes over time in both the characteristics of workers and the prevailing macroeconomic conditions. Specifically:

- Female labour force participation has increased dramatically in the past 60 years, and therefore the composition of the female workforce—that is, the characteristics of employed women—may have changed in non-random ways (i.e., selection into employment based on shared characteristics).<sup>251</sup>
- Meaningful comparisons of earnings at different time points require that observed earnings be adjusted for inflation, such that they are expressed in constant or "real" dollars.<sup>252</sup>
- Earnings are affected by the business cycle—the pattern of expansion, contraction, and recovery in the economy—in gendered ways. There is evidence from the United States that women's earnings decrease, relative to men's, during business-cycle expansions (i.e., the gender pay gap increases) and increase during recessions (i.e., the gender pay gap decreases).<sup>253</sup>
- Technological changes, particularly advances in information and computer technologies, and globalization have affected the wage structure—that is, returns to human capital, occupation, and industry—and contributed to increasing earnings inequality in Canada since the 1980s.<sup>254,255,256</sup> Given gender differences in human capital and occupational/industrial gender segregation, technological changes may have affect women's and men's earnings differently.
- The gender pay gap at a given time simultaneously reflects age, period, and cohort effects. Understanding trends in the gender pay gap therefore requires that these effects be distinguished.

This section explores the implications for trends in the gender pay gap of (1) selection into employment, (2) overall earnings inequality and the wage structure, and (3) age, period and cohort effects, as these issues have received considerable attention in the academic literature.

245. Blau, Francine D. and Lawrence M. Kahn. 2017. "The gender wage gap: Extent, trends, and explanations." *Journal of Economic Literature* 55(3): 789-865.

246. *Ibid.*

247. Mueller, Gerrit and Erik Plug. 2006. "Estimating the effect of personality on male and female earnings." *Industrial and Labor Relations Review* 60(1): 3-22.

248. *Ibid.*

249. Bernard, Stephen. 2010. "Normative discrimination and the motherhood penalty." *Gender and Society* 24(5): 616-646.

250. Blau, Francine D. and Lawrence M. Kahn. 2017. "The gender wage gap: Extent, trends, and explanations." *Journal of Economic Literature* 55(3): 789-865.

251. Machado, Cecilia. 2017. "Unobserved selection heterogeneity and the gender wage gap." *Journal of Applied Econometrics* 32: 1348-1366.

252. Real earnings are calculated by dividing the observed earnings for a given year by the consumer price index for that year.

253. Finio, Nicholas J. 2010. "The trend of the gender wage gap over the business cycle." *Gettysburg Economic Review* 4(1): 87-117.

254. Blau, Francine D. and Lawrence M. Kahn. 2017. "The gender wage gap: Extent, trends, and explanations." *Journal of Economic Literature* 55(3): 789-865.

255. Green, David A., W. Craig Riddell, and France St-Hilaire. 2016. "Income inequality in Canada: Driving forces, outcomes, and policy." Pp. 1-73 in *Income Inequality: The Canadian Story*, edited by David A. Green, W. Craig Riddell, and France St-Hilaire. Montreal, QC: Institute for Research on Public Policy.

256. Green, David A. and Benjamin M. Sand. 2016. "Has the Canadian labour market polarized?" "Income inequality in Canada: Driving forces, outcomes, and policy." Pp. 217-227 in *Income Inequality: The Canadian Story*, edited by David A. Green, W. Craig Riddell, and France St-Hilaire. Montreal, QC: Institute for Research on Public Policy.

### 3.4.1. Selection into employment

Labour force participation is central to understanding the gender pay gap, both because receipt of earnings is conditional on employment, and because work experience is a predictor of earnings.<sup>257</sup> Given that earnings data are only available for workers, and additional restrictions may be placed on the analytic sample of workers (i.e., workers employed on a full-time, full-year basis), it is possible that observed earnings reflect a non-random or self-selected group of individuals that chose paid work over staying home.<sup>258</sup> Selection bias has generally been considered to be more influential for women's earnings than men's, as women are less likely than men to participate in the labour market.<sup>259,260</sup> As Blau and Kahn explain, "...the closer the wage sample is to 100 percent of the underlying population, the smaller the selection bias."<sup>261</sup>

Women with the potential to earn more in the labour market due to their human capital, who therefore face higher opportunity costs to staying home in the form of foregone wages, may be more likely to be employed (i.e., positive selection).<sup>262,263</sup> Furthermore, if women receive lower returns to their human capital, occupation, and industry than men, they may rationally and disproportionately choose not to enter the labour market. In this case, the observed gender pay gap will be understated or biased downward (and the gender pay ratio will be biased upward), relative to the corrected estimate.

Alternatively, women with the potential to earn more in the labour market may be less likely to be employed (i.e., negative selection). It is well-established that individuals tend to marry/cohabit with those who are similar to themselves in terms of education (i.e., "educational homogamy"), due to both preferences and greater opportunities to meet such spouses/partners by virtue of attending the same type of educational institutions.<sup>264,265,266,267,268</sup> Given that earnings are positively associated with education, educational homogamy implies that women with more education are better positioned financially to remain home, insofar as their spouse/partner has relatively high earnings. In this case, the observed gender pay gap will be overstated or biased upward (and the gender pay ratio biased downward), relative to the corrected estimate.

As the labour force participation of women has increased and women have become more similar to men with respect to labour supply and human capital, scholars have questioned the continuing relevance of selection bias to the gender pay gap.<sup>269,270</sup> Using a statistical technique to control for selectivity (i.e., Heckman's method), as outlined in Appendix B, the gender wage gap among workers aged 15 and older in 2017 was estimated from the Labour Force Survey.<sup>271</sup> There was no evidence that the gender wage gap was affected by selection bias.

When studying longer time series (or different geographies), correcting for selection bias may be necessary to make valid inferences.<sup>272,273</sup> Women's employment has increased dramatically since the 1960s, and therefore the characteristics of employed women may be different in 2017, as compared to say 1977, in ways that affect estimates of women's earnings and the gender pay gap (Chart 6).<sup>274</sup> The characteristics of employed women may also change

257. Blau, Francine D. and Lawrence M. Kahn. 2017. "The gender wage gap: Extent, trends, and explanations." *Journal of Economic Literature* 55(3): 789-865.

258. Ibid.

259. Ibid.

260. Machado, Cecilia. 2017. "Unobserved selection heterogeneity and the gender wage gap." *Journal of Applied Econometrics* 32(7): 1348-1366.

261. Blau, Francine D. and Lawrence M. Kahn. 2017. "The gender wage gap: Extent, trends, and explanations." *Journal of Economic Literature* 55(3): 789-865.

262. Jarrell, Stephen B. and T.D. Stanley. 2004. "Declining bias and gender wage discrimination? A meta-regression analysis." *Journal of Human Resources* 39(3): 828-838.

263. Olivetti, Claudia and Barbara Petrongolo. 2008. "Unequal pay or unequal employment? A cross-country analysis of gender gaps." *Journal of Labor Economics* 26(4): 621-654.

264. Greenwood, Jeremy, Nezhil Guner, Georgi Kocharkov, and Cezar Santos. 2014. "Marry your like: Assortative mating and income inequality." *American Economic Review* 104(5): 348-353.

265. Hou, Feng and John Myles. 2007. "The changing role of education in the marriage market: Assortative marriage in Canada and the United States since the 1970s." *Analytical Studies Branch Research Paper Series*, no. 299. Ottawa: Statistics Canada.

266. Nielsen, Helena Skyt and Michael Svarer. 2009. "Educational homogamy: How much is opportunities?" *Journal of Human Resources* 44(4): 1066-1086.

267. Schwartz, Christine R. and Robert D. Mare. 2005. "Trends in educational assortative marriage from 1940 to 2003." *Demography* 42(4): 621-646.

268. Siow, Aloysius. 2015. "Testing Becker's theory of positive assortative matching." *Journal of Labor Economics* 33(2): 409-441.

269. Altonji, Joseph and Rebecca Blank. 1999. "Race and gender in the labour market." Pp. 3143-3259 in *Handbook of Labor Economics*, edited by Orley Ashenfelter and David Card. Amsterdam: Elsevier.

270. Jarrell, Stephen B. and T.D. Stanley. 2004. "Declining wage discrimination? A meta-regression analysis." *Journal of Human Resources* 39(3): 828-838.

271. The hourly-wage equation included only sex as a predictor (1=female, 0=male). The employment equation included sex, and added as exclusion restrictions (i.e., variables that affect labour supply, but not wages, and that are therefore unique to the employment equation): number of children in the household, presence of a pre-school aged child/ren (child under the age of 5 vs. no child under the age of 5), and spouse/partner's work hours (spouse/partner employed full-time and spouse/partner employed part-time vs. no spouse/partner or spouse/partner not employed).

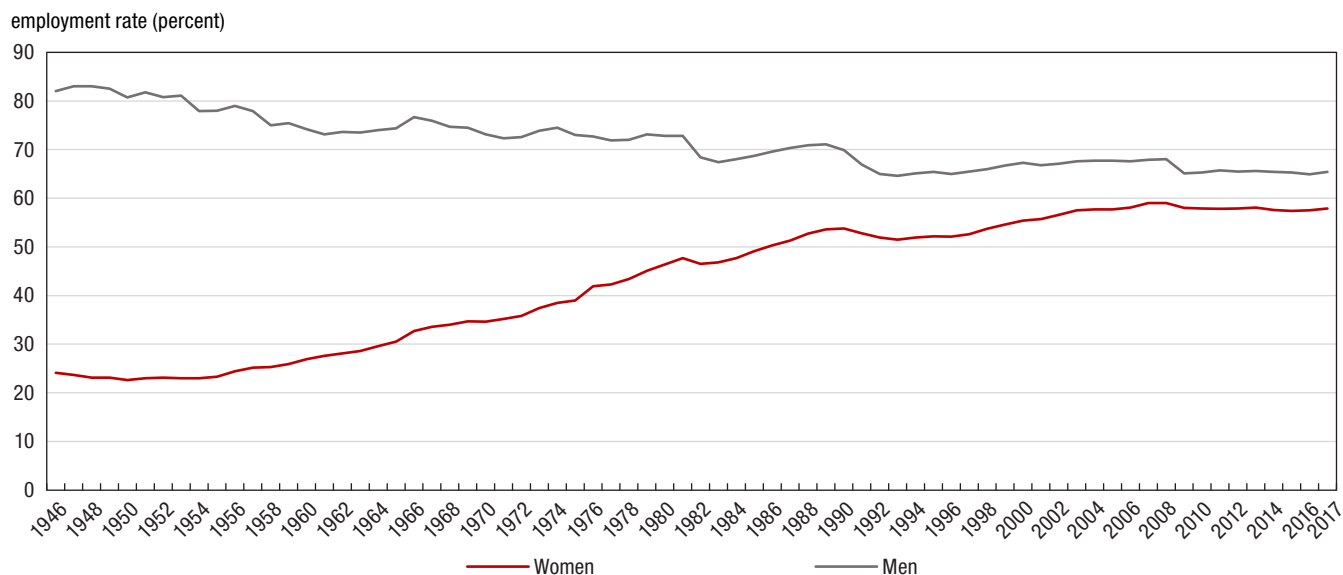
272. Kunze, Astrid. 2018. "The gender wage gap in developed countries." Pp. 369-394 in *The Oxford Handbook of Women and the Economy*, edited by Susan L. Averett, Laura M. Argys, and Saul D. Hoffman. New York, NY: Oxford University Press.

273. Olivetti, Claudia and Barbara Petrongolo. 2008. "Unequal pay or unequal employment? A cross-country analysis of gender gaps." *Journal of Labor Economics* 26(4): 621-654.

274. Ibid.

over time, even if female labour force participation remains constant, in response to changes in earnings returns to human capital, occupation, and industry (see Section 3.4.2). For example, Mulligan and Rubinstein provide evidence that the selection of women into full-time, full-year employment in the United States shifted from negative in the 1970s to positive in the 1990s.<sup>275</sup> Further, they demonstrate that the majority of the apparent narrowing of the gender pay gap in the United States during that period reflected these changes in the characteristics of employed women.<sup>276</sup> Baker, Benjamin, Cegep, and Grant reach the same conclusion regarding the gender pay gap in Canada between 1970 and 1990.<sup>277</sup>

**Chart 6**  
**Employment rates of women and men aged 15 years and older, Canada, 1946 to 2017**



**Note:** Estimates covering the period of 1946 to 1975 exclude Newfoundland.

**Sources:** Statistics Canada, Labour Force Survey, custom tabulations (1946-1975) and table no. 14-10-0018 (1976-2017).

### 3.4.2. Overall earnings inequality and wage structure

Since 1980, earnings inequality (i.e., dispersion) in Canada has increased significantly, as the real earnings of individuals at the top of the earnings distribution have risen dramatically.<sup>278,279</sup> At the same time, the earnings of middle-income earners have stagnated, and the earnings of low-income earners have fallen.<sup>280</sup> Increasing earnings inequality tends to offset to some extent trends toward reducing the gender pay gap, as women are underrepresented at the top of the earnings distribution and overrepresented at the bottom.<sup>281,282,283</sup> In effect, women have been “swimming upstream” by narrowing the gender pay gap despite economy-wide forces working against them.<sup>284</sup>

275. Mulligan, Casey B. and Yona Rubinstein. 2008. “Selection, investment, and women’s relative wages over time.” *Quarterly Journal of Economics* 123(3): 1061-1110.

276. *Ibid.*

277. Baker, Michael, Dwayne Benjamin, Andree Desaulniers Cegep, and Mary Grant. 1995. “The distribution of the male/female earnings differential, 1970-1990.” *Canadian Journal of Economics* 28(3): 479-502.

278. Green, David A., W. Craig Riddell, and France St-Hilaire. 2016. “Income inequality in Canada: Driving forces, outcomes, and policy.” Pp. 1-73 in *Income Inequality: The Canadian Story*, edited by David A. Green, W. Craig Riddell, and France St-Hilaire. Montreal, QC: Institute for Research on Public Policy.

279. Lemieux, Thomas and W. Craig Riddell. 2016. “Who are Canada’s top 1 percent?” Pp. 103-155 in *Income Inequality: The Canadian Story*, edited by David A. Green, W. Craig Riddell, and France St-Hilaire. Montreal, QC: Institute for Research on Public Policy.

280. *Ibid.*

281. *Ibid.*

282. Drolet, Marie and Karen Mumford. 2012. “The gender pay gap for private-sector employees in Canada and Britain.” *British Journal of Industrial Relations* 50(3): 529-553.

283. Richards, Elizabeth. 2019. “Who are the working women in Canada’s top 1?” *Analytical Studies Branch Research Paper Series*, catalogue no. 11F0019M (no. 002). Ottawa: Statistics Canada.

284. Blau, Francine D. and Lawrence M. Kahn. 2017. “The gender wage gap: Extent, trends, and explanations.” *Journal of Economic Literature* 55(3): 789-865.

Changes in the wage structure—that is, changes in returns to human capital, occupation, and industry—have contributed to increasing earnings inequality.<sup>285</sup> New technologies, particularly computers in the workplace, tend to enhance productivity and therefore earnings in high-skill occupations involving cognitive tasks (e.g., managerial and professional occupations), while replacing workers who perform routine tasks (often found in middle-skill secretarial and clerical occupations), resulting in lower demand and earnings for those workers.<sup>286,287</sup> Although low-skill sales and services occupations that entail non-routine tasks and personal interaction are less likely to be affected by greater use of computers, earnings in these occupations may decrease as job loss in middle-skilled occupations and manufacturing increases the supply of available workers.<sup>288,289</sup> To the extent that these changes favor men over women or vice versa, given gender differences in human capital and occupational/industrial gender segregation, they may affect trends in the gender pay gap.<sup>290</sup>

While weekly-wage returns to work experience have not changed in Canada since the 1980s, Foley and Green demonstrate that wage returns to education increased throughout the 1980s and 1990s, even as the supply of more educated workers grew.<sup>291</sup> This pattern can be expected to have benefited women to a greater extent than men, as the share of university graduates rose faster among women than men after 1990.<sup>292</sup>

In the 2000s, wage returns to university degrees, relative to high school diplomas, declined among men, and the trend toward increasing educational attainment stalled.<sup>293</sup> Foley and Green attribute these findings to the resource (oil and gas) boom in western and Atlantic Canada, in that it increased demand for middle- and low-skilled workers, particularly young men, thereby increasing their wages.<sup>294</sup> Notably, this shift in demand can be expected to have benefitted men, relative to women. However, in the wake of lower oil prices, Foley and Green predict that demand for workers in the resource sector will decline.<sup>295</sup>

According to Lemieux and Riddell, certain occupations and industries drove the growth in top incomes in Canada (around 80% of which came from earnings) between 1981 and 2011.<sup>296</sup> Specifically, senior managers in the finance and insurance industry, individuals in business and finance occupations, and individuals in natural and applied sciences occupations came to represent a much larger proportion of the top 1 percent, and their incomes grew much more rapidly than those of other top-income earners.<sup>297</sup> The share of top earners also increased significantly in oil and gas extraction, while it decreased in manufacturing.<sup>298</sup> Given women's underrepresentation in leadership positions, STEM occupations, and resource extraction, increasing returns to these occupations and industries is increasingly unfavorable to women and puts them at a growing disadvantage when it comes to narrowing the gender pay gap.<sup>299</sup>

285. Ibid.

286. Green, David A., W. Craig Riddell, and France St-Hilaire. 2016. "Income inequality in Canada: Driving forces, outcomes, and policy." Pp. 1-73 in *Income Inequality: The Canadian Story*, edited by David A. Green, W. Craig Riddell, and France St-Hilaire. Montreal, QC: Institute for Research on Public Policy.

287. Green, David A. and Benjamin M. Sand. 2016. "Has the Canadian labour market polarized?" "Income inequality in Canada: Driving forces, outcomes, and policy." Pp. 217-227 in *Income Inequality: The Canadian Story*, edited by David A. Green, W. Craig Riddell, and France St-Hilaire. Montreal, QC: Institute for Research on Public Policy.

288. Institutional factors, such as the regulatory environment, minimum wages and unionization, may also affect the extent of earnings inequality.

289. Green, David A. and Benjamin M. Sand. 2016. "Has the Canadian labour market polarized?" "Income inequality in Canada: Driving forces, outcomes, and policy." Pp. 217-227 in *Income Inequality: The Canadian Story*, edited by David A. Green, W. Craig Riddell, and France St-Hilaire. Montreal, QC: Institute for Research on Public Policy.

290. Ibid.

291. Foley, Kelly and David A. Green. 2015. "Why more education will not solve rising inequality (and may make it worse)." Pp. 347-397 in *Income Inequality: The Canadian Story*, edited by David A. Green, W. Craig Riddell, and France St-Hilaire. Montreal, QC: Institute for Public Policy Research.

292. Ibid.

293. Ibid.

294. Ibid.

295. Ibid.

296. Lemieux, Thomas W. Craig Riddell. 2015. "Who are Canada's top 1 percent?" Pp. 103-155 in *Income Inequality: The Canadian Story*, edited by David A. Green, W. Craig Riddell, and France St-Hilaire. Montreal, QC: Institute for Public Policy Research.

297. Ibid.

298. Ibid.

299. Blau, Francine D. and Lawrence M. Kahn. 2017. "The gender wage gap: Extent, trends, and explanations." *Journal of Economic Literature* 55(3): 789-865.



### 3.4.3. Age, period and cohort effects

It is well-established that the wages of young women and men are more equal than the wages of older women and men, and that the gradual convergence of the gender pay gap over time is driven by the replacement of older cohorts by younger ones.<sup>300,301,302,303</sup> In order to understand these patterns, the effects of age, period, and cohort must be distinguished. In the simplest terms, age effects refer to variations produced by the physiological or social processes of aging.<sup>304</sup> Studies consistently show that the gender pay gap is minimal at the time of entry into the labour market, but grows as women and men age and, in the process, form families (Table 5, reading across the rows).<sup>305</sup> Since women's employment is shaped to a greater extent by their caregiving roles and/or employers' presumptions of these roles than men's, women's wages are more affected by growing older than men's.<sup>306</sup> As they age, women work fewer hours outside of the home than men and they experience more work interruptions and absences related to childcare.<sup>307</sup> Women are also less likely than men to have high-wage jobs with promotional opportunities and they may face barriers to advancement.<sup>308</sup>

**Table 5**

**Gender pay ratio as measured from the average hourly wages of employed women and men by period and age group, Canada, 1997, 2007 and 2017**

	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65 years and over
	ratio					
1997	91.2	87.6	80.7	75.3	73.8	77.9
2007	89.4	89.0	82.2	81.0	79.1	81.1
2017	93.0	89.5	85.7	84.8	83.4	89.6

Source: Statistics Canada, Labour Force Survey, custom tabulations.

There is evidence that the gender wage gap is not increasing with age among recent cohorts, as it did among their predecessors.<sup>309</sup> In other words, the negative association between aging and the gender pay ratio is weakening over time.<sup>310</sup> Based on data from the Labour Force Survey, in 1997, the gender wage ratio was 16.4 percentage points lower among seniors aged 65 years and older (0.78) than it was among 15-to-19-year-olds (0.94). By 2017, the difference between the gender wage ratio of younger and older workers was reduced to 5.6 percentage points. These findings suggest that cohort replacement drives the convergence of the gender wage gap over time: as younger cohorts replace older ones, the overall gender wage gap decreases simply because the gender pay gap is smaller among younger cohorts than older ones.<sup>311</sup>

Period effects refer to variations produced by events that simultaneously affect all ages and cohorts.<sup>312</sup> A number of dramatic social and economic changes have occurred in Canada since the 1970s, which may have contributed to the decrease in the gender pay gap over time. For example, the federal government has offered more legal protections against gender-based discrimination (e.g., Employment and Pay Equity legislation), and gender attitudes have become more egalitarian.<sup>313</sup> At the same time, broad structural changes in the Canadian economy that have disproportionately affected men—such as the shift away from manufacturing toward the provision of services, and declining union coverage rates—have worsened their labour market position, thereby reducing the gender pay gap.<sup>314</sup>

300. Blau, Francine D. and Lawrence M. Kahn. 2007. "The gender pay gap: Have women gone as far as they can?" *Academy of Management Perspectives* 21(1): 7-23.

301. Blau, Francine D. and Lawrence M. Kahn. 2000. "Gender differences in pay." *Journal of Economic Perspectives* 14(4): 75-99.

302. Campbell, Colin and Jessica Pearlman. 2013. "Period effects, cohort effects, and the narrowing gender wage gap." *Social Science Research* 42: 1693-1711.

303. Roche, Kristen 2017. "Millennials and the gender wage gap in the U.S.: A cross-cohort comparison of young workers born in the 1960s and the 1980s." *Atlantic Economic Journal* 45: 333-350.

304. Campbell, Colin and Jessica Pearlman. 2013. "Period effects, cohort effects, and the narrowing gender wage gap." *Social Science Research* 42: 1693-1711.

305. Manning, Alan and Joanna Swaffield. 2008. "The gender gap in early-career wage growth." *Economic Journal* 118(530): 983-1024.

306. Moyser, Melissa. 2017. "Women and paid work." *Women in Canada: A Gender-based Statistical Report*. Ottawa: Statistics Canada.

307. Blau, Francine D. and Lawrence M. Kahn. 2000. "Gender differences in pay." *Journal of Economic Perspectives* 14(4): 75-99.

308. *Ibid.*

309. Drolet, Marie. 2011. "Why has the gender wage gap narrowed?" *Perspectives on Labour and Income*. Ottawa: Statistics Canada.

310. *Ibid.*

311. *Ibid.*

312. Campbell, Colin and Jessica Pearlman. 2013. "Period effects, cohort effects, and the narrowing gender wage gap." *Social Science Research* 42: 1693-1711.

313. *Ibid.*

314. Moyser, Melissa. 2017. "Women and paid work." *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.

Period effects are difficult to separate from cohort effects: variations produced by being born at a particular time, within a particular social context.<sup>315</sup> Recent cohorts of women have more education, work experience, and representation in higher-status occupations than their predecessors. They also have greater control over their fertility and more egalitarian personal relationships.<sup>316</sup> For these reasons, the gender wage gap has decreased across successive cohorts (Table 5, reading down the columns), indicating that each new cohort of women has fared better than the previous one.<sup>317</sup>

Although the narrowing of the gender pay gap is primarily related to the entry of new cohorts, within-cohort earnings growth has also played a role for older cohorts.<sup>318</sup> The relatively high gender wage ratios for younger women (under the age of 35) tend to decline as they age (Table 5, reading diagonally), largely due to women's tendency to interrupt or discontinue their labour force participation for family reasons. However, the gender wage ratios of older women (aged 35 years and older) tend to increase as they age, likely because the demands of motherhood ease as children mature.

## 4. Conclusion

The unadjusted gender pay gap is an important indicator of gender equality and women's economic empowerment. Decisions made by analysts regarding who estimates are based upon (i.e., age and labour supply), what earnings are counted (i.e., annual earnings vs. hourly wages), and how typical earnings are calculated (i.e., average or median) affect the size of the gender pay gap and its perceived seriousness.

Whichever estimate of the unadjusted gender pay gap is used, it reflects, among other predictors, gender differences in human capital, occupation, and industry, as well as gender-based discrimination. Statistical control in the context of ordinary least squares regression enables estimation of the gender pay gap adjusted for the effects of various predictors. The adjusted gender pay gap reflects a hypothetical situation in which female and male workers are equally skilled and evenly distributed across occupations and industries. It should therefore not be interpreted as evidence that the gender pay gap is inconsequential or does not exist.

Traditional economic explanations for the gender pay gap focus on gender differences in human capital, occupation and industry, and returns to these characteristics (i.e., discrimination). Women's increased educational attainment, both overall and relative to men, stronger attachments to the labour market over the life course, and greater representation in managerial and professional occupations have contributed to the narrowing of the gender pay gap over time. However, the remaining gender pay gap is largely unexplained by gender differences in human capital, occupation, and industry, making it necessary to consider other explanations. In addition to gender-based discrimination, motherhood penalties, the high "price" of temporal flexibility in certain occupations, and gender differences in personality traits, psychological attributes, and non-cognitive skills are plausible candidates.

It is important to recognize that, in the context of ordinary least squares regression and Oaxaca-Blinder decomposition, predictors of the gender pay gap do not "explain" it in a social or cultural sense. Gender differences in education and occupation, for example, themselves need to be understood as the outcomes of gendered processes that channel women and men toward different types of degrees, fields of study, and jobs.

Also, when analyzing trends in the gender pay gap, it is necessary to consider changes over time in both the characteristics of workers and the prevailing macroeconomic conditions, including the degree and direction of selection bias, overall earnings inequality, and age, period and cohort effects.

315. Campbell, Colin and Jessica Pearlman. 2013. "Period effects, cohort effects, and the narrowing gender wage gap." *Social Science Research* 42: 1693-1711.

316. Ibid.

317. Blau, Francine D. and Lawrence M. Kahn. 2000. "Gender differences in pay." *Journal of Economic Perspectives* 14(4): 75-99.

318. Ibid.

## Appendix A: Decomposing the gender pay gap

### Oaxaca-Blinder decomposition

Faced with an unadjusted pay gap between women and men (on average), researchers typically endeavor to determine how much of that gap can be explained by gender differences in human capital and other productivity-related characteristics. To do so, they use the Oaxaca-Blinder decomposition method in the context of an ordinary least squares regression, estimating the logarithmic (log) mean wages of women and men separately, as a function of productivity characteristics (equations a and b). After estimating an earnings equation for women and one for men, a counterfactual exercise is undertaken, whereby one implicitly asks: what would women's average earnings be if they received the same remuneration to their human-capital characteristics as men (equation c)? The portion of the gender pay gap that is explained by compositional differences between women and men with respect to their human-capital characteristics is then calculated by subtracting women's average earnings under the counterfactual scenario from men's average earnings (equation d). The unexplained portion of the gender pay gap is the difference between the counterfactual earnings of women and their actual earnings, capturing different returns to women's human capital (equation e).

- a) Earnings equation for women:  $\bar{E}_w = \alpha_w + \beta_w \bar{X}_w + \mu_w$
- b) Earnings equation for men:  $\bar{E}_m = \alpha_m + \beta_m \bar{X}_m + \mu_m$
- c) Counterfactual equation for women:  $\bar{E}_w^* = \alpha_m + \beta_m \bar{X}_w + \mu_w$
- d) "Explained" variation:  $\bar{E}_m - \bar{E}_w^*$
- e) "Unexplained" variation:  $\bar{E}_w^* - \bar{E}_w$

Change in the unadjusted gender pay gap over time (equation f) can also be decomposed into an explained portion attributable to changes in the average human capital of women and men (equation g), and an unexplained portion attributable to changes in women's and men's returns to human capital (equation h).<sup>319</sup>

- f) Change in the gender pay gap between two time points (t and t-1):  $(\bar{E}_{m_t} - \bar{E}_{m_{t-1}}) - (\bar{E}_{f_t} - \bar{E}_{f_{t-1}})$
- g) Explained variation between two time points:  $[\beta_{m_t}(\bar{X}_{m_t} - \bar{X}_{m_{t-1}}) - \beta_{w_t}(\bar{X}_{w_t} - \bar{X}_{w_{t-1}})]$
- h) Unexplained variation between two time points:  $[\bar{X}_{m_{t-1}}(\beta_{m_t} - \beta_{m_{t-1}}) - \bar{X}_{f_{t-1}}(\beta_{f_t} - \beta_{f_{t-1}})]$

Although there is no universally accepted set of predictors that should be included in a wage analysis, there are a number of widely-used predictors: personal characteristics, including presence/number of children in the household, age of the youngest child in the household, and province of residence; productivity-enhancing characteristics, including standardized test scores, highest level of educational attainment, work experience in quadratic terms, and job tenure; and work characteristics, including job permanence, class of worker (private or public sector), and union status.<sup>320,321</sup> **Presence/number of children** and **age of the youngest child in the household** are intended to capture family responsibilities that can affect labour supply, but they may also be a harbinger of discrimination (i.e., motherhood earnings penalties). These variables may also be considered to be endogenous to women's decisions about their labour supply, and therefore exclude from analysis of the gender pay gap.<sup>322</sup>

**Province of residence** controls for differences between local labour markets in wage structure and tightness (i.e., the number of job vacancies relative to the number of unemployed people).<sup>323</sup> **Standardized test scores, education, and work experience** (typically approximated by age) are included in the gender wage gap decomposition as productivity-enhancing characteristics. Work experience squared captures diminishing returns to work experience as its duration lengthens. Job tenure with one's current employer, as distinct from work experience, measures both **job-specific knowledge** and **loyalty**. **Job permanence, class of worker, and union status** account for

319. Drolet, Marie. 2011. "Why has the gender wage gap narrowed?" *Perspectives on Labour and Income* 23(1), catalogue no. 75-001-X. Ottawa: Statistics Canada.  
320. It should be noted that many public-sector jobs are unionized. For this reason, either class of worker or union status should be included in the analysis—not both variables simultaneously.

321. Boudarbat, Brahim and Marie Connolly. 2013. "The gender wage gap among recent post-secondary graduates in Canada: A distributional approach." *Canadian Journal of Economics* 46(3): 1037-1065.

322. Blau, Francine D. and Lawrence M. Kahn. 2017. "The gender wage gap: Extent, trends, and explanations." *Journal of Economic Literature* 55(3): 789-865.

323. Wage structure refers to the array of prices set for human capital and the compensation associated with employment in particular industries.

differences in wage structures between different types of jobs (i.e., seasonal, temporary, and permanent jobs; private- and public-sector jobs; and unionized and non-unionized jobs).

Assuming that productivity-related differences between women and men are precisely measured, and that they are not themselves the product of discriminatory behavior by employers, the unexplained portion of the gender pay gap can be interpreted as evidence of discrimination.<sup>324</sup> In effect, women and men with the same human capital are paid unequally on the grounds of a characteristic that has no direct effect on their productivity (i.e., gender). However, any analytic approach that relies on the statistical residual is open to question as to whether all of the relevant predictors were included in the regression.<sup>325</sup> When human capital characteristics explain only a portion of the gender pay gap, the possibility exists that unmeasured productivity-related characteristics, such as effort, may be reflected in the residual.<sup>326,327</sup> If men are more highly endowed with those characteristics than women, the extent of discrimination will be overestimated.<sup>328</sup> Until recently, work experience has been particularly problematic in this regard. In the absence of retrospective data on work histories, as collected through the General Social Survey on Families until 2011, for example, “potential” experience is approximated by age or estimated by subtracting from respondents’ current age the number of years spent in school plus four (corresponding to the pre-school years). This solution tends to overestimate women’s actual experience because they have more frequent and longer lasting career interruptions than do men.<sup>329</sup> However, as continuous labour force participation over the life course has become more typical among recent cohorts of women, relative to their predecessors, the accuracy of estimates of women’s potential experience has improved.<sup>330,331</sup>

Additional and somewhat controversial predictors of the gender pay gap include field of study, occupation, and industry. Inclusion of any one of these characteristics (or all of them) in the analysis takes into account occupational/industrial gender segregation.<sup>332</sup> However, if occupational/industrial gender segregation reflects gendered processes and gender-based discrimination, the unexplained portion of the gender pay gap will be underestimated when field of study, occupation, and/or industry are included. Given that these variables are controversial predictors of the gender pay gap, a worthwhile strategy is to present the results of a series of model specifications that alternately include and exclude them.

## Gender pay gap at different points across the earnings distribution

Although most research focuses on the gender pay gap at the mean, it is worthwhile to examine the gender pay gap across the entire earnings distribution. Studies that have done so reveal that earnings inequality between women and men has decreased more at the bottom of the wage distribution than it has at the top of the wage distribution.<sup>333,334,335,336,337,338,339</sup>

324. Kunze, Astrid. 2008. “Gender wage gap studies: Consistency and decomposition.” *Empirical Economics* 35: 63-76.
325. Blau, Francine D. and Lawrence M. Kahn. 2007. “The gender pay gap: Have women gone as far as they can?” *Academy of Management Perspectives* 21: 7-23.
326. Ibid.
327. Duguet, Emmanuel, Yannick L’Horty, Dominique Meurs, and Pascale Petit. 2010. “Measuring discriminations: An introduction.” *Annals of Economics and Statistics* 99/100: 5-14.
328. Blau, Francine D. and Lawrence M. Kahn. 2007. “The gender pay gap: Have women gone as far as they can?” *Academy of Management Perspectives* 21: 7-23.
329. Moyser, Melissa. 2017. “Women and paid work.” *Women in Canada: A Gender-based Statistical Report*, catalogue no. 89-503-X. Ottawa: Statistics Canada.
330. Munasinghe, Lalith, Tania Reif, and Alice Henriques. 2008. “Gender gap in wage returns to job tenure and experience.” *Labour Economics* 15: 1296-1316.
331. Goldin, Claudia. 2014. “A grand gender convergence: Its last chapter.” *American Economic Review* 104(4): 1091-1119.
332. Blau, Francine and Lawrence M. Kahn. 2000. “Gender differences in pay.” *Journal of Economic Perspectives* 14(4): 75-99.
333. Arulampala, Wiji, Alison L. Booth, and Mark L. Bryan. 2007. “Is there a glass ceiling over Europe? Exploring the gender pay gap across the wage distribution.” *Industrial and Labor Relations Review* 60(2): 163-186.
334. Baker, Michael, Dwayne Benjamin, Andree Desaulniers Cegep, and Mary Grant. 1995. “The distribution of the male/female earnings differential, 1970-1990.” *Canadian Journal of Economics* 28(3): 479-501.
335. Blau, Francine D. and Lawrence M. Kahn. 2017. “The gender wage gap: Extent, trends, and explanations.” *Journal of Economic Literature* 55(36): 789-865.
336. Bonikowska, Aneta, Marie Drolet, and Nicole M. Fortin. 2019. “Earnings inequality and the gender pay gap in Canada: The role of women’s underrepresentation among top earners.” *Economic Insights*, Catalogue no. 11-626-X, no. 088. Ottawa: Statistics Canada.
337. Boudarbat, Brahim and Marie Connolly. 2013. “The gender wage gap among recent post-secondary graduates in Canada: A distributional approach.” *Canadian Journal of Economics* 46(3): 1037-1065.
338. Drolet, Marie. 2011. “Why has the gender wage gap narrowed?” *Perspectives on Labour and Income* 23(1):3-13. Catalogue no. 75-001-X. Ottawa: Statistics Canada.
339. Kassenboehmer, Sonja C. and Mathias G. Sinning. 2014. “Distributional changes in the gender wage gap.” *Industrial and Labor Relations Review* 67(2): 335-361.

Decompositions can be performed at various points (i.e., percentiles) along the wage distribution. Doing so requires use of the unconditional quantile regression method, recently developed by Firpo, Fortin, and Lemieux<sup>340,341</sup> and Fortin, Lemieux, and Firpo.<sup>342</sup> This method involves finding women's and men's (log) wages at a given percentile (separately)—typically the 10<sup>th</sup> and/or 90<sup>th</sup> percentile, representing the bottom and top of the wage distribution, respectively. Each gender gap can then be decomposed as per the standard Oaxaca-Blinder approach, using a transformed dependent variable, known as the “re-centered influence function,” in the OLS regressions. For a given percentile ( $j$ ), the recentered influence function (RIF) is computed for each individual ( $i$ ) in the pooled male-female sample as such:

$$RIF_{ji} = w_j + \frac{j - 1\{w_i \leq w_j\}}{f_Y(w_j)}$$

Where,  $w_j$  is the wage at a given percentile ( $j$ );  $\{w_i \leq w_j\}$  is an indicator function taking the value of one, if an individual's wage is less than the wage at the  $j^{\text{th}}$  percentile, and a value of zero otherwise; and  $f_Y(w_j)$  is the density of the wage at the  $j^{\text{th}}$  percentile, estimated by kernel density.

340. Firpo, Sergio, Nicole M. Fortin and Thomas Lemieux. 2009. “Unconditional quantile regressions.” *Econometrica* 77(3): 953-973.

341. Firpo, Sergio, Nicole M. Fortin and Thomas Lemieux. 2009. “Supplement to ‘Unconditional quantile regressions’: Estimation and testing.” *Econometrica Supplementary Material*.

342. Nicole M. Fortin, Thomas Lemieux and Sergio Firpo. 2010. “Decomposition methods in economics.” *National Bureau of Economic Research Working Paper*, no. 16-045.

## Appendix B: Correcting for selection bias

### Simple method

The possibility that the gender pay gap reflects selection bias can be assessed using a technique delineated by Baker, Benjamin, Cegep, and Grant and Drolet.<sup>343,344</sup> After estimating the earnings equations for employed women and men at a given time point ( $t$ ), as per equations *a* and *b* in Appendix A, the mean log wages of those who were not employed (and who were therefore not part of the analytic sample) at that time are estimated by substituting their mean values ( $\bar{X}_w$  or  $\bar{X}_m$ ) for the corresponding regression coefficients ( $\beta_w$  or  $\beta_m$ ).

To look at changes over time, one year is designated as the base year ( $t = 0$ ). For all of the subsequent years, a new weighted estimate of women's log wages are calculated as:

$$\bar{E}_t^w = \bar{\omega}_t^w \bar{E}_{pt}^w + [(1 - \bar{\omega}_t^w) * \bar{E}_{nt}^w]$$

Where,

$$\bar{E}_{pt}^w = \text{Mean log wages of employed women at time } t$$

$$\bar{\omega}_t^w = \frac{\text{Employment rate of women at time } t}{\text{Employment rate of women at time } 0}$$

$$\bar{E}_{nt}^w = \text{Mean log wages of women who were not employed at time } t$$

New weighted estimates of men's log wages would be similarly calculated.

Although the term,  $\bar{E}_{nt}^w$ , controls for observable differences between employed women and those who are not employed, it is also possible to control unobservable differences by multiplying that term by a scale factor ( $k$ ).<sup>345</sup> Assuming that those who are not employed would receive lower wage offers than those who are employed, a  $k$  value less than 1.0 would be appropriate. Baker and his colleagues (1995) present adjusted results for both  $k = 1.0$  and  $k = 0.9$ .

### Heckman two-step correction

Heckman's two-step correction makes it possible to assess whether selection bias is present, identify its determinants, and control for it in estimating an outcome of interest.<sup>346</sup> To begin, the substantive models of the outcomes of interest—in this case, women's wages—are estimated by means of OLS regression. In the first step of the "Heckman," a selection model is developed for women, which estimates the likelihood of participation vs. non-participation—in this case, (1) employed versus (0) not employed—by means of binary probit regression.<sup>347,348</sup> Multiple predictors of women's employment status will be included in the selection model, most of which will also be included in the substantive models of women's wages. It is important that the selection model contain at least one variable that can be legitimately excluded from the substantive models, so as to safeguard against collinearity between these models and properly identify the effect of selection. In effect, such a variable (or "instrument") must

343. Baker, Michael, Dwayne Benjamin, Andree Desaulniers Cegep, and Mary Grant. 1995. "The distribution of male/female earnings differential, 1970-1990." *Canadian Journal of Economics* 28(3): 479-501.

344. Drolet, Marie. 2011. "Why has the gender wage gap narrowed?" *Perspectives on Labour and Income* 23(1):3-13. Catalogue no. 75-001-X. Ottawa: Statistics Canada.

345. Ibid.

346. Sales, Anne E., Mary E. Plomondon, David J. Magid, John A. Spertus, and John S. Rumsfeld. 2004. "Assessing response bias from missing quality of life data: The Heckman method." *Health and Quality of Life Outcomes* 2:49-59.

347. Ibid.

348. In the context of the Oaxaca-Blinder decomposition, the Heckman correction is traditionally done only for women, as they are considered to be affected by selection bias due to their family responsibilities. (Goraus, Karolina, Joanna Tyrowicz, and Lucas van der Velde. 2017. "Which gender wage gap estimates to trust? A comparative analysis." *Review of Income and Wealth* 63(1): 118-146.)

strongly predict women's employment status, but not their wages: marital status, family type, or the availability and level of non-earned income within the household have previously been used in this way.<sup>349</sup>

In the second step, the residuals (error terms) from the selection model are used to derive a new variable called the Inverse Mills Ratio (IMR).<sup>350</sup> The IMR is then added to the substantive model to capture both observed and unobserved variables that affect selection. Here, two factors are of interest in terms of determining whether there is significant sample-selection bias that results from the exclusion of non-working respondents from the substantive models. First, if the IMR is significant, it is suggestive of sample-selection bias in the substantive models. A second factor to consider is whether there have been significant changes in the parameter estimates of the other predictors in the substantive models before and after correction.

349. Goraus, Karolina, Joanna Tyrowicz, and Lucas van der Velde. 2017. "Which gender wage gap estimates to trust? A comparative analysis." *Review of Income and Wealth* 63(1): 118-146.

350. Sales, Anne E., Mary E. Plomondon, David J. Magid, John A. Spertus, and John S. Rumsfeld. 2004. "Assessing response bias from missing quality of life data: The Heckman method." *Health and Quality of Life Outcomes* 2:49-59.

## Appendix C: Data Sources

Statistics Canada has a vast repository of data sources that can be used to examine the gender pay gap. Since the variables included in these data sources differ, the appropriateness and usefulness of a given dataset depends on the empirical questions being addressed. Below, an overview of relevant datasets is provided.

### Census of Population

On one specific day every five years, Statistics Canada conducts the Census of Population in order to develop a statistical portrait of the people in Canada by their demographic, social and economic characteristics. While all households receive a short-form questionnaire, a sample of approximately 25% of Canadian households receive a long-form questionnaire (with the exception of 2011). The short-form census enumerates the entire Canadian population, which consists of Canadian citizens (by birth and by naturalization), landed immigrants and non-permanent residents and their families living with them in Canada.<sup>351</sup> The long-form census includes the same target population as the short-form census, with the exception of Canadian citizens living temporarily in other countries; full-time members of the Canadian Forces stationed outside Canada; persons living in institutional collective dwellings such as hospitals, nursing homes and penitentiaries; and persons living in non-institutional collective dwellings such as work camps, hotels and motels, and student residences.

For the first time, the 2016 Census included administrative data from the Canada Revenue Agency (CRA) on annual income from various sources in 2015 for those who completed the short-form census.<sup>352</sup> From these data, the gender pay gap can be calculated in terms of annual earnings. Using information on the number of weeks worked in the year preceding the census day and the number hours worked in the week preceding the census day, annual income can be converted to hourly (or weekly) wages—if one assumes that both the number of weeks worked in the year preceding the census day, and the number of hours worked in the week preceding the census day, are typical. Even with that assumption, information on weeks worked and work hours is only available for a sub-sample of the Canadian population (i.e., those who completed the long-form census).

The long-form census includes a number of variables that correspond to key predictors of the gender pay gap, including: age, family composition, education, labour market activity, full-time and part-time weeks worked, class of worker, occupation, and industry. It also includes indicators of diversity characteristics beyond sex: Aboriginal status; immigrant status, birthplace, year of immigration, and immigrant generation and birthplace of parents; visible minority status; and religion (asked every five years, with the next time being in 2021). Importantly, the large sample size for long-form census enables analysts to produce reliable estimates of outcomes among small population groups or for low levels of geography.

### Labour Force Survey (LFS)

The Labour Force Survey (LFS) is a household survey conducted monthly by Statistics Canada. It provides timely information on major labour market trends by dividing the working-age population (aged 15 and older) into three mutually exclusive categories—employed, unemployed and not in the labour force—and collecting data on a variety of demographic, socioeconomic, and employment characteristics.

The LFS is based on a sample of approximately 56,000 households (corresponding to around 100,000 individuals) each month. It uses a rotating panel sample design, meaning that households remain in the sample for six consecutive months, with one-sixth of the sample being replaced each month. Persons living on reserves and other Aboriginal settlements in the provinces, full-time members of the Canadian Armed Forces, the institutionalized population, and households in extremely remote areas with low population density are not covered by the LFS.

Since 1997, the LFS has collected data on weekly and hourly wages. It is the only data source to do so. The LFS contains a number of variables that correspond to key predictors of the gender pay gap, including: age, age of the youngest child in the household, education, labour force status, work hours, class of worker (i.e., self-employed,

351. The short-form census also counts Canadian citizens and landed immigrants who are temporarily outside the country on census day (i.e., federal and provincial government employees working outside Canada, Canadian embassy staff posted to other countries, members of the Canadian Forces stationed abroad, all Canadian crew members of merchant vessels and their families). Foreign residents, such as representatives of a foreign government assigned to an embassy, high commission or other diplomatic mission in Canada, and residents of another country who are visiting Canada temporarily, are not covered by the census.

352. Previously, income data from the CRA were included only for those who completed the long-form.



unpaid family worker, public-sector employee, and private-sector employee), job tenure, union status, occupation, and industry. However, the LFS is more limited when it comes to identity factors beyond sex. While the LFS includes Aboriginal status, immigrant status, birthplace, and year of immigration, there is no variable pertaining to racialization.

It is often useful to work with annual estimates, instead of monthly ones, particularly for descriptive purposes. Calculated on the basis of 12 months of data, annual estimates avoid the problem of seasonality that affects unadjusted monthly estimates. Annualizing the monthly data can be done in three steps:

1. For a given calendar year, stack or append its 12 months of data (i.e., merge by adding cases).
  - ▶ There will now be one large dataset, containing a year's worth of responses.
  - ▶ Some respondents will have been observed up to six times, depending on the rotation schedule.
    - The survey date (SYEAR and SMTH) in combination with household ID (HHLID) and person ID (LINE) can be used to uniquely identify respondents, if need be.
2. Divide the weight variable (FINALWT) by 12.
3. Apply the weight variable, and calculate estimates as you would using a single month of data.<sup>353</sup>

## Canadian Income Survey (CIS)

The Canadian Income Survey (CIS) provides information on the annual income and income sources of Canadians, along with their individual and household characteristics. The CIS is administered to a sub-sample of LFS respondents, consisting of the outgoing rotation groups in January, February, March and April. Each of these rotation groups consists of approximately 8,400 respondents.

The CIS gathers information about labour market activity, school attendance, disability, support payments, child care expenses, inter-household transfers, personal income, and characteristics and costs of housing. This content is supplemented with information on individual and household characteristics from the LFS. CRA data on annual income and income sources are also combined with the CIS data.

Although the first CIS was conducted in 2012, the data series can be extended using its predecessors, including the Survey of Labour and Income Dynamics (SLID) and the Survey of Consumer Finances (SCF).

## Longitudinal and International Study of Adults (LISA)

The Longitudinal and International Study of Adults (LISA) is a household survey that has collected data every two years since 2011 from the non-institutionalized population aged 15 or older living in Canada's ten provinces. LISA is made up of two parts: (1) the interview portion, which collects information on respondents' education, work, health, life events, pensions and finances, and (2) its linkage to administrative data from a variety of sources, as appropriate.

While the LISA is a relatively new data source, its longitudinal nature lends itself to being one of the richest data sources available in the study of the gender pay gap. In addition to personal and productivity-enhancing characteristics, the LISA includes other variables that may help us to better understand the gender pay gap: actual work experience, field of study, and variables pertaining skills used at work and job flexibility. It also includes indicators for identity factors beyond sex: Aboriginal status; immigrant status, year of immigration, birthplace, and birthplace of parents; and visible-minority status.

## General Social Survey (GSS)

Since 1986, the General Social Survey (GSS) has gathered information on social trends in order to monitor changes in the living conditions and well-being of Canadians. The target population consists of all non-institutionalized persons 15 years of age or older, living in the 10 provinces of Canada. Survey content rotates, with themes generally recurring every five years. Notably, GSS cycles on "families" collect retrospective data on union formation and dissolution, childbearing, and work history. Although income data in the GSS pertain only to the reference year, Cycle 25 of

353. Note that a similar process can be used to produce three-month moving averages, except that three years of data are stacked and the weight variable is divided by three.

the GSS (2011) has recently been linked to administrative tax data, enabling analysts to study the gender pay gap longitudinally in relation to time-varying variables. Standard predictors of the gender pay gap (i.e., demographic and productivity-enhancing characteristics, occupation, and industry), as well as a variety of identity factors, including sexual orientation, are available in the GSS.

**Canadians at Work and Home**, cycle 30 of the GSS (2016), provides information that is not typically found in labour/income surveys, yet which can yield greater knowledge of the challenges women face with respect to paid work: work load, work ethic, work environment, perceived unfair treatment at work, and division of chores within the household.

### **Longitudinal Worker File (LWF)**

The Longitudinal Worker File (LWF) is an administrative data set consisting of a 10% random sample of all Canadian workers. It is constructed from four separate data sources: the T4 and T1 files from Canada Revenue Agency (CRA), the Record of Employment (ROE) files from Human Resources and Skills Development Canada (HRSDC), and the Longitudinal Employment Analysis Program (LEAP) file constructed by Statistics Canada. The current version of the LWF provides longitudinal information on individuals over the period from 1983 to 2015. In addition, an older, but comparable, version covers the period from 1978 to 1989.

The LWF provides the sample size necessary to examine the gender pay gap at the upper end of the earnings distribution. However, the lack of predictors other than sex and age limits its usefulness.