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Research article

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Abstract

Previous studies of earnings differences across groups of Canadian-born individuals have used cross-sectional data, leaving unanswered the important question of what earnings differences amount to when measured over workers' lifecycle. Using data from Statistics Canada's Longitudinal Worker File and the 1996 and 2001 censuses of population, this study fills this gap and quantifies differences in cumulative earnings—the sum of earnings received over a 20-year period—for four different groups of Canadian-born individuals.

The study shows that the higher cumulative earnings of Chinese (+20%) and South Asian (+15%) men (relative to White men) can be mostly or entirely accounted for by their higher education levels and their overrepresentation in science, technology, engineering, and mathematics (STEM) fields of study. Conversely, the lower cumulative earnings of Black men (relative to White men) cannot be accounted for by differences in sociodemographic characteristics, human capital, job characteristics or work histories. The higher cumulative earnings of Chinese and South Asian women relative to White women can be explained mostly or entirely by cross-group differences in these observable factors, the most important being education and representation in STEM fields. By contrast, Black and White women had similar cumulative earnings over the 20-year periods considered.

Keywords: earnings; employment; population groups; visible minority; racialized groups; discrimination.

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Introduction

In 2006, American economists Haider and Solon noted that economic studies involving personal or family income often used measures reflecting short-term values, such as annual income, "…even though, in most cases, it appeared that the relevant economic construct was a longer-term value" (p. 1308). In part, the absence of longer-term measures of income reflected the data sources available to researchers at that time. Longitudinal files covering time spans long enough to directly measure longer-term outcomes, such as lifetime earnings, were generally not available.

Much has changed since then. In Canada, longitudinal administrative data files now provide comprehensive and robust information on employment and earnings over extended periods of people's lives. Such data can be used to understand how earnings over the course of people's lives are shaped by characteristics and events such as educational attainment, divorce, illness, childbirth, job loss and retraining (Morissette & Qiu, 2021). For example, Statistics Canada's Longitudinal Worker File (LWF) currently tracks Canadian workers from 1989 to 2021, allowing the computation of their cumulative earnings—the sum of earnings received over several years—for up to 33 years.

Cumulative earnings have important implications for individuals and families. They have a direct bearing on consumption, savings and wealth accumulation (Poterba et al., 2007; Ruel & Hauser, 2013; Brown, 2016) and therefore may affect the likelihood of home ownership and families' ability to buffer income shocks and unexpected expenditures. In addition, they are a key determinant of Canada Pension Plan and Quebec Pension Plan retirement benefits.[1]

In some subject-matter areas, estimates of cumulative earnings have not yet been used for analysis. For example, the earnings of Canadian-born individuals in different population groups have been exclusively analyzed using cross-sectional data on weekly earnings (Hou & Coulombe, 2010; Qiu & Schellenberg, 2022a, 2022b) or annual earnings (Pendakur & Pendakur, 1998, 2002, 2011). How the relative earnings of workers in these categories compare over a longer observation period is currently unknown.[2]

There are several reasons why cross-sectional estimates of earnings differences across population groups may not be informative of their differences in cumulative earnings. Cross-sectional earnings differences may widen over the lifecycle **if** population groups that have relatively low earnings at the beginning of their career a) are less educated and if highly educated workers have steeper age-earnings profiles than less educated workers; b) are more likely to be laid off during recessions or have lower re-employment rates following job loss; c) face a glass ceiling later on in their career, thereby preventing earnings convergence; d) are more likely to start their career in jobs that do not match their field of study, possibly leading to the erosion of their skills and putting them on flatter earnings trajectories; and e) experience greater employment and earnings child penalties than others following childbirth. If so, cross-sectional estimates of earnings differences at, for example, ages 25 to 34, will underestimate differences in the cumulative earnings for a given cohort.

1. Conversely, annual earnings measures may shed light on numerous issues, such as credit constraints, low income and labour force participation.
2. In other subject-matter areas, estimates of cumulative earnings have been used for analysis. In Canada, Frenette (2014a, 2014b) documents cumulative earnings over a 20-year span across individuals with different levels of educational attainment. Within levels of educational attainment, differences in cumulative earnings across fields of study have also been documented (Ostrovsky & Frenette, 2014). Similar work has been done in the United States (Kim et al., 2015; Kim & Tamborini, 2019). Changes in the cumulative earnings of successive birth cohorts have been documented in the United States by Guvenen et al. (2022).

Conversely, cross-sectional earnings differences may narrow over time within a given cohort **if** population groups with relatively low earnings at the beginning of their career a) upgrade their skills to a greater extent than other groups and b) are constrained by discriminatory hiring practices at the beginning of their career but less so later on, as employers' attitudes toward some groups may evolve over time. Under these scenarios, cross-sectional estimates of earnings differences at ages 25 to 34 will overestimate differences in cumulative earnings for a given cohort.

In sum, the degree to which cross-sectional earnings differences across population groups align with differences in cumulative earnings is an empirical question. The goal of this study is to examine this question. To do so, the study uses the LWF and the 1996 and 2001 censuses of population and quantifies the differences in cumulative earnings that Canadian-born individuals in selected population groups received over a 20-year period.

In addition to using a different metric for studying earnings differences, the study contributes to the literature on earnings differences across population groups in an important way. While previous Canadian studies using cross-sectional estimates of earnings differences focused on between-group differences in sociodemographic characteristics, human capital and job characteristics as contributing factors, this study adds an important set of controls for three events that may have a major impact on longer-term earnings: job loss, injuries and illnesses, and parental leaves. By doing so, the study integrates the lessons learned from three bodies of literature on the earnings effects of job displacement (Jacobson et al., 1993; Morissette et al., 2013; Lachowska et al., 2020; Braxton & Taska, 2023; Jarosch, 2023; Schmieder et al., 2023), those of injuries and illnesses (e.g., Jeon, 2017; Haas et al., 2021) and those of childbirth (Kleven et al., 2019; Kleven et al., 2021; Kleven, 2022). Using Blinder–Oaxaca decompositions, the study quantifies the degree to which differences in sociodemographic characteristics, human capital, job characteristics and the occurrence of these three important events account for cross-group differences in cumulative earnings among Canadian-born individuals. This exercise deepens the understanding of the drivers of the earnings differences observed across groups of Canadian-born individuals.

Literature review

Relatively few studies have examined earnings differences across population groups among Canadian-born individuals. All studies use cross-sectional data from the Census of Population.

Pendakur and Pendakur (1998) use data from the 1991 Census of Population to examine cross-group differences in annual earnings for workers aged 20 to 64. They find that "conditional on observable characteristics, Canadian-born visible-minority men face an earnings gap of 8 per cent… in comparison with Canadian-born white men" but that "Canadian-born visible minority women face no earnings gap in comparison with Canadian-born white women" (p. 520).

Pendakur and Pendakur (2002) assemble data from 1971 to 1996 to examine differences in annual earnings for individuals aged 25 to 64. They find that for "both broad ethnic categories studied—Aboriginals and visible minorities—there was stasis or mild improvement in relative earnings compared to white workers between 1971 and 1981, stasis through 1991, and then decline in relative earnings between 1991 and 1996" (p. 510).

Pendakur and Pendakur (2011) examine differences in annual earnings over the 1996-to-2006 period for individuals aged 25 to 64. They show that "the earnings gaps faced by Canadian-born visible minorities have not eroded since the 1990s" (p. 305).

Hou and Coulombe (2010) use 2006 data to examine weekly earnings differences across population groups in the private and public sectors for individuals aged 25 to 64. They find that "visible minorities and Whites receive similar pay for similar jobs in the public sector. By contrast, in the private sector visible minority men earn significantly less than observationally comparable Whites" (p. 29).

Qiu and Schellenberg (2022a) use 2016 data to document substantial heterogeneity in earnings differences across population groups. They observe that, among Canadian-born workers aged 25 to 44, weekly earnings relative to White men are significantly **lower** among men in 4 of 10 designated visible minority categories, with the largest differences observed among Latin American and Black men. Among women, weekly earnings are significantly **higher** among those in 4 of 10 designated visible minority categories, with the largest difference among Chinese women. Qiu and Schellenberg (2022b) also use 2016 data to assess whether cross-group differences in weekly earnings are—for workers aged 25 to 44—larger in small and medium-sized commercial enterprises than they are in large commercial enterprises and in organizations and enterprises in the non-commercial sector.

Except for Pendakur and Pendakur (2002)—who control only for sociodemographic characteristics and human capital—all studies also include controls for job characteristics.[3]

While these studies provide valuable information on earnings differences across population groups in cross-sectional data, they cannot shed light on whether these cross-sectional estimates align with differences in cumulative earnings. Nor can they assess the degree to which important events in individuals' work histories, such as job loss, injuries and illnesses, and parental leaves, account for cross-group differences in cumulative earnings. This study fills this gap by integrating the LWF with the 1996 and 2001 censuses of population.

Data and methods

This study uses data from the 1996 and 2001 censuses of population linked to the LWF. The LWF is a longitudinal administrative database containing information from T1 and T4 tax files, the Record of Employment, and the Longitudinal Employment Analysis Program.

The sample for this study consists of two cohorts of individuals aged 25 to 34 years drawn from the 1996 and 2001 censuses. To abstract from labour market challenges experienced by immigrants because of, for example, difficulties with credential recognition or official language fluency, the study focuses on Canadian-born individuals.

To ensure sufficiently large sample sizes, the analysis is restricted to four population groups: Chinese, South Asian, Black and White.[4] These long-form census respondents are then linked to their tax records from the T1 and T4 administrative tax files over a 20-year span, from 1995 to 2014 for the 1996 Census cohort and from 2000 to 2019 for the 2001 Census cohort. The sample is further restricted to individuals who either filed a T1 tax form or were issued a T4 information slip in the first and the last year of the

3. Hou and Coulombe (2010), Pendakur and Pendakur (2011), and Qiu and Schellenberg (2022a, 2022b) use a first set of regressions that control only for sociodemographic characteristics and human capital and a second one that adds controls for job characteristics. Pendakur and Pendakur (1998) use the second set of regressions. Examples of job characteristics include occupation and full-time or part-time status.
4. Individuals who reported being White as well as Chinese or South Asian or Black (i.e., reported belonging to two population groups, one of which was White) are grouped together with individuals who reported belonging to a single group. For example, individuals who reported being Chinese and White are grouped together with those who reported being only Chinese. Individuals who reported an Indigenous identity, those who were Registered or Treaty Indians, and those who were members of a First Nation or Indian band are excluded from the sample.

20-year timeframe, had cumulative earnings from paid employment of at least $1,000 (measured in 2019 constant dollars), and did not have earnings from paid employment above $10 million (2019 constant dollars) in any single year. A handful of individuals who reported not being able to speak either English or French on the census are also excluded from the sample.

The dependent variable in this study is the cumulative earnings (measured in 2019 constant dollars) received from all paid jobs held over the 20-year periods defined above. The annual earnings (wages and salaries) information is drawn from T1 tax records. If no earnings are found in the T1 data in a given year but the respondent is linked to at least one T4 record in that year, earnings from all available T4 information slips are used to determine earnings in that year. If no earnings information is found in either T1 or T4 data for a given year, earnings in that year are set to zero.

To quantify the sources of the observed differences in cumulative earnings across population groups, the study uses Blinder–Oaxaca decompositions conducted on pairwise earnings comparisons of Chinese, South Asian and Black workers relative to White workers, by gender. The goal is to decompose the difference in cumulative earnings between two groups into two parts: the explained component, attributable to differences in observable characteristics, and the residual or unexplained component.[5] The explained component can be broken down further into the contributions of 1) sociodemographic characteristics and human capital; 2) job characteristics; and 3) work history events such as job loss, injuries and illnesses, and childbirth.[6]

Underlying the Blinder–Oaxaca decompositions are regression models of cumulative earnings of each group of workers considered in this study (four population groups and two genders). To support these decompositions, three sets of explanatory variables are included in each regression model:

1) sociodemographic characteristics and human capital
2) variables synthesizing job characteristics over a 20-year period
3) work history events (job loss, injuries and illnesses, and parental leaves).

Information on sociodemographic characteristics and human capital is drawn from census data and includes controls for work experience (defined as age minus years of schooling minus 6), education, activity limitations, knowledge of official languages, geographic location and a cohort indicator.[7] These variables are measured during the census reference week.

Variables synthesizing job characteristics over a 20-year period are drawn from the LWF and are based on the main job held in a given year (the job with the highest earnings in that year). In line with a large literature in labour economics that documents sizable wage differences by union status, firm size and industry for observationally equivalent workers, these variables include the number of years (out of 20) in which the main job was a) unionized; b) found in firms of different sizes (500 or more employees, 100 to 499 employees and 25 to 99 employees, with 1 to 24 employees as the reference category); c) found

5. To quantify the explained component, the study weighs differences in observable characteristics by the estimated returns to (or parameter estimates for) these characteristics observed for White workers.
6. The unexplained component is a function of cross-group differences in the returns to observable characteristics.
7. Specifically, sociodemographic characteristics and human capital are measured using a quadratic in potential work experience (i.e., work experience and work experience squared); indicators for the highest certificate, diploma or degree completed (included categories are less than high school, high school diploma, trades certificate, college certificate or diploma, and postgraduate certificate or degree, with bachelor's degree as the reference category); indicators for the presence of an activity limitation and for whether the respondent answered the activity limitation question on the census; knowledge of official languages (speaks French only, and speaks English and French, with speaks English only as the reference category); geographic location (Vancouver, Toronto, Montréal, the Atlantic provinces, Quebec [other than Montréal], Manitoba, Saskatchewan, Alberta, British Columbia [other than Vancouver] and the territories, with Ontario [other than Toronto] as the reference category); and a cohort indicator.

in high-wage or middle-wage industries, with low-wage industries as the reference category.[8] An indicator for missing information is also included if information on some aspect of the main job is missing in any of the 20 years.

Work history events are drawn from the LWF and are measured using an indicator for having experienced at least one permanent layoff during the 20-year study period, an indicator for having experienced at least one permanent job separation because of illness or injury, and a variable capturing the number of maternity or parental leaves taken over that period.[9] These work history variables account for the fact that job displacement (Jacobson et al., 1993; Lachowska et al., 2020; Braxton & Taska, 2023; Jarosch, 2023; Schmieder et al., 2023), injuries and illnesses (e.g., Jeon, 2017; Haas et al., 2021), and childbirth (Kleven et al., 2019; Klevenet al., 2021; Kleven, 2022) often affect workers' earnings trajectories and therefore need to be included in a cumulative earnings model.

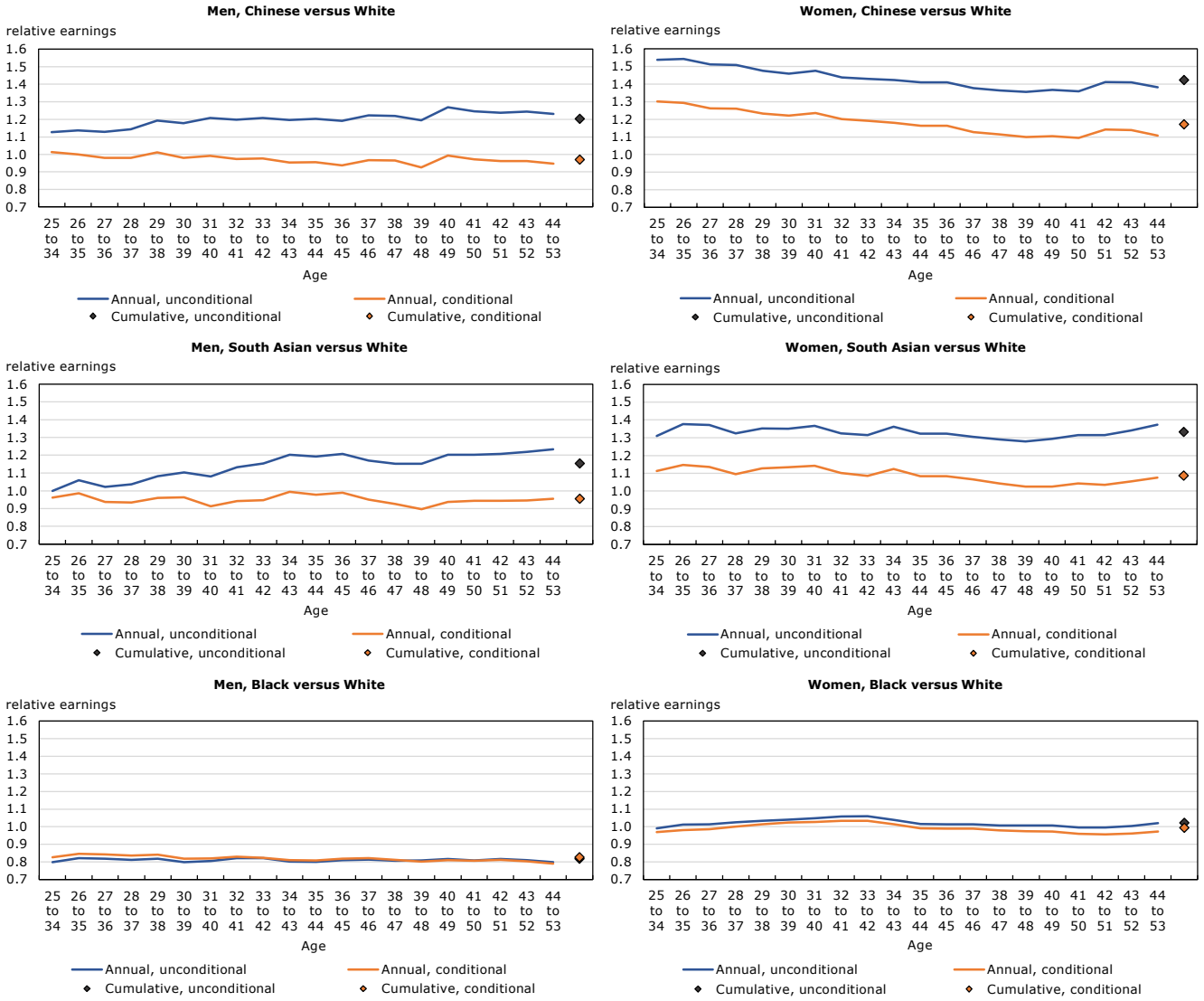
Cross-sectional earnings differences through the lifecycle

Cross-sectional earnings differences between population groups may widen or narrow over the lifecycle for a variety of reasons. For example, if population groups that have relatively low earnings at the beginning of their career see their earnings grow at a lower rate than those of other groups, cross-sectional earnings differences measured at, for example, ages 25 to 34, will underestimate differences in cumulative earnings for a given cohort.

Chart 1 investigates this question. It shows how gender-specific measures of average conditional and unconditional annual earnings—measured relative to White individuals—evolved over time within the two cohorts selected for the study.[10]

8. Mean hourly wages from 2000 to 2019 are computed for each three-digit industry using the Labour Force Survey. Industries are then ranked according to their mean hourly wages and grouped into three categories depending on whether they are found in the top third of industries, the middle third or the bottom third.
9. The number of maternity or parental leaves captures the number of job separations attributable to maternity or parental leaves and therefore is not necessarily equal to the number of children women had over a 20-year period or the total number of interruptions in labour force participation they had because of childbearing and childcare.
10. Conditional relative annual earnings are obtained by regressing, for each year and gender, annual wages and salaries on population group indicators, a quadratic term for experience, education indicators and a cohort indicator. The resulting cross-group earnings differences are then expressed in relative terms by dividing them by the annual wages and salaries of White men and White women in a given year, plus 1. Unconditional relative earnings simply equal the average annual wages and salaries of a given population group divided by those of White individuals.

Chart 1
Average unconditional and conditional annual and cumulative earnings of Chinese, South Asian and Black workers relative to those of their White counterparts



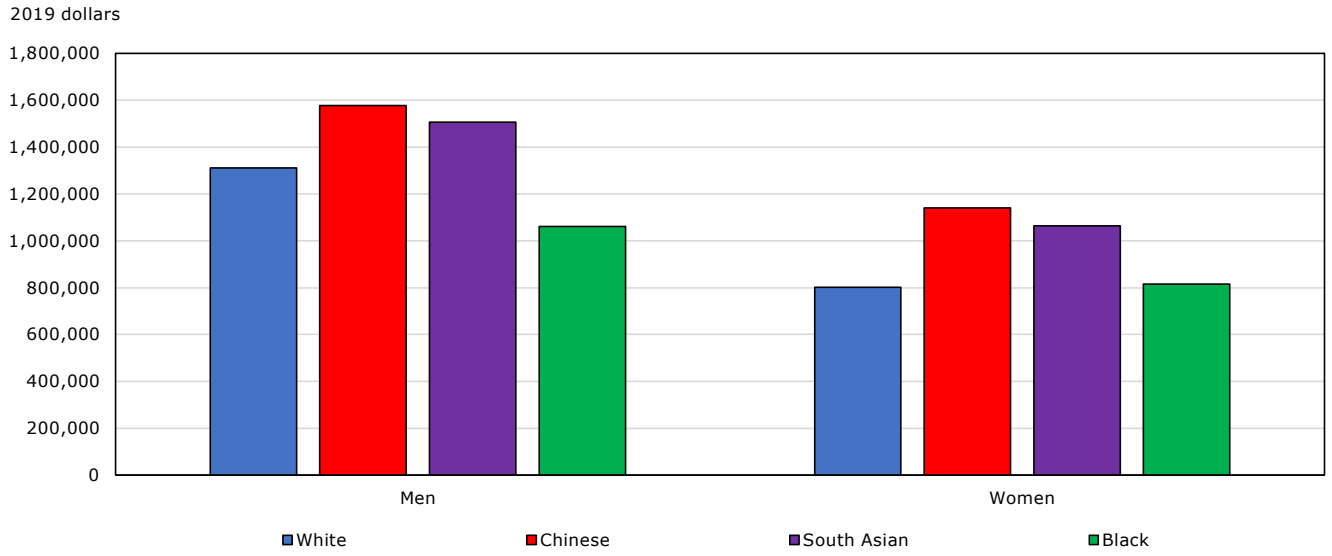
Note: The conditional estimates are obtained from an ordinary least squares regression with controls for potential work experience and experience squared, highest level of education completed, and an indicator for the 2001 Census.
Sources: Statistics Canada, Census of Population, 1996 and 2001; and Longitudinal Worker File, 1995 to 2019.

Several points are worth noting. For Chinese women, conditional and unconditional relative earnings fell significantly over time. After the analysis controlled for potential labour market experience and education, Chinese women earned, at ages 44 to 53, 11% more than their White counterparts. This earnings advantage is almost three times smaller compared with the 30% registered at ages 25 to 34. As a result, the conditional cumulative earnings of Chinese women ended up being 17% higher than those of White women. Hence, for Chinese women, conditional earnings differences measured at the beginning of their career clearly overestimate conditional differences in cumulative earnings. By contrast, conditional earnings differences measured at ages 25 to 34 are, for other groups of women, fairly similar to conditional differences in cumulative earnings.

Chart 1 also shows that unconditional relative earnings of Chinese and South Asian men increased substantially over the lifecycle. For example, South Asian men earned roughly the same as White men at ages 25 to 34 but 23% **more** at ages 44 to 53. The growth in the unconditional relative earnings of Chinese and South Asian men largely reflects the fact that they have higher education levels than White men and that highly educated men have steeper age-earnings profiles than their less educated counterparts. Once one controls for education (and potential labour market experience), the relative earnings of these two groups no longer increase systematically over the lifecycle. By contrast, the unconditional and conditional relative earnings of Black men were fairly stable, indicating that a) Black men earned about 20% less than White men, regardless of the lifecycle segment considered, and b) differences in education and experience are not driving this result.

Chart 2 shows the average unconditional cumulative earnings received by Black, Chinese, South Asian and White men and women over the 20-year periods defined above. Chinese men had the highest average cumulative earnings ($1.58 million in 2019 dollars), followed by South Asian men ($1.51 million), White men ($1.31 million) and Black men ($1.06 million). As was the case for men, Chinese women ($1.14 million) and South Asian women ($1.06 million) were the two groups with the highest average cumulative earnings among Canadian-born women. Black women averaged slightly higher cumulative earnings ($0.82 million) than White women ($0.80 million).

Chart 2
Average unconditional cumulative earnings, by population group and gender



Sources: Statistics Canada, Census of Population, 1996 and 2001; and Longitudinal Worker File, 1995 to 2019.

Descriptive statistics

These differences in average unconditional cumulative earnings may result from cross-group differences in sociodemographic characteristics, human capital, job characteristics and work histories, all of which are shown in Table 1.

Table 1
Descriptive statistics

	Men				Women			
	Chinese	South Asian	Black	White	Chinese	South Asian	Black	White
				mean				
Baseline characteristics[1]								
Age	30.4	29.0	29.7	30.7	30.2	28.8	29.7	30.7
Years of potential work experience	8.1	6.9	9.4	10.9	8.0	6.6	9.1	10.6
				percent				
Highest completed credential								
No high school	5.5	9.0	16.5	19.6	3.9	4.7	12.4	15.3
High school	15.8	17.1	28.9	23.7	13.2	14.5	21.0	23.5
Trades	8.0	6.3	12.7	17.2	4.5	4.6	10.9	10.5
Certificate or diploma below bachelor's degree	21.0	20.2	24.0	20.6	24.9	25.0	30.9	28.2
Bachelor's degree in STEM field	17.2	10.4	3.8	4.8	13.9	7.9	2.9	3.6
Bachelor's degree in non-STEM field	21.2	18.9	11.0	9.5	29.0	23.4	16.7	13.6
Postgraduate degree, certificate or diploma in STEM field	6.3	9.9	0.9	1.7	4.1	7.0	1.1	1.3
Postgraduate degree, certificate or diploma in non-STEM field	5.1	8.2	2.3	2.9	6.4	12.9	4.2	4.0
Official languages								
English or French only	88.1	84.6	77.6	76.7	83.9	78.0	75.9	76.6
English and French	11.9	15.4	22.4	23.3	16.1	22.0	24.1	23.4
Some activity limitations[2]	4.7	5.5	6.1	5.3	3.9	4.9	7.7	5.3
Location in census year								
Atlantic provinces	1.3	1.9	9.9	9.5	1.6	1.3	13.2	9.9
Quebec (except Montréal)	0.9	x	2.2	15.7	0.4	x	1.1	15.2
Ontario (except Toronto)	8.5	14.3	18.8	23.5	8.5	10.0	16.7	23.7
Manitoba	1.7	2.5	2.0	3.5	1.3	2.8	2.0	3.4
Saskatchewan	1.4	1.0	x	3.2	1.1	1.3	x	3.2
Alberta	12.6	6.7	6.3	10.6	13.2	7.9	5.0	10.1
British Columbia (except Vancouver)	4.5	7.5	2.3	5.8	4.6	8.7	2.2	6.0
Territories	0.1	x	x	0.2	0.1	x	x	0.2
Montréal	5.7	4.4	16.5	12.3	5.7	4.3	15.5	12.5
Toronto	28.9	32.4	37.2	10.9	28.9	32.5	39.7	11.0
Vancouver	34.3	28.8	3.9	4.9	34.6	30.5	3.7	4.8
Work histories[3]								
Experienced permanent layoff(s)	28.1	32.1	45.8	41.1	24.4	27.9	37.8	34.9
Experienced permanent job separation(s) attributable to illness or injury	1.8	2.9	4.1	3.9	2.3	3.6	5.7	6.2
				mean				
Number of maternity or parental leaves taken	0.1	0.1	0.1	0.1	0.7	0.8	0.5	0.4
Characteristics of main job								
Years in unionized job	4.3	4.5	5.6	5.4	5.3	6.4	5.8	5.7
Years in firm with 500 or more employees	10.5	10.2	10.6	8.5	11.2	11.7	10.9	9.0
Years in firm with 100 to 499 employees	2.2	1.9	2.4	2.5	1.9	1.4	2.1	2.0
Years in firm with 25 to 99 employees	2.0	1.8	2.1	2.6	1.4	1.2	1.7	2.0
Years in firm with 1 to 24 employees	3.2	3.3	2.5	4.2	2.8	2.8	2.3	3.8
Years in high-wage industries	7.6	7.3	6.3	6.2	9.2	9.8	7.6	7.3
Years in mid-wage industries	5.9	5.7	6.1	7.0	4.6	4.5	4.9	4.8
Years in low-wage industries	4.2	4.1	5.1	4.4	3.5	2.8	4.3	4.6
				percent				
Some missing information on main employer[4]	7.0	10.9	8.6	7.8	6.7	8.3	7.5	8.2
				number				
Sample size	3,031	1,272	2,355	438,081	2,925	1,327	3,055	472,176

x suppressed to meet the confidentiality requirements of the *Statistics Act*

1. Measured in the 1996 or 2001 census year.

2. Among those who answered the activity limitations questions.

3. Twenty-year work histories spanning from 1995 to 2014 for the 1996 Census cohort and 2000 to 2019 for the 2001 Census cohort.

4. Main job characteristics are based on information drawn from the T4 information slip. For some person-year observations, positive earnings are reported on a T1 tax form, but no corresponding T4 information slip is found. Furthermore, even when a T4 information slip is present, information on firm size or industry may be missing.

Notes: STEM = science, technology, engineering, and mathematics. Percentages may not add up to 100% because of rounding.

Sources: Statistics Canada, Census of Population, 1996 and 2001; and Longitudinal Worker File, 1995 to 2019.

Of all differences in these observable dimensions, cross-group differences in education levels are perhaps the most striking. At least 50% of Chinese men and women had a bachelor's degree or higher education at the beginning of the observation period, with slightly lower shares observed among South Asian men and women. By contrast, at most 25% of Black and White men and women completed at least a bachelor's degree. Additionally, Chinese and South Asian men and women were at least twice as likely as their White and Black counterparts to have a bachelor's degree in a STEM field of study. Since higher education increases workers' earnings (Angrist & Krueger, 1991; Oreopoulos, 2006) and since graduates from STEM fields often earn relatively high earnings (Statistics Canada, 2017), these differences in education levels and fields of study are potentially an important driver of the earnings differences shown in Chart 2.

Sizable differences in workers' initial place of residence are also observed. Black individuals were almost 30 percentage points more likely than White individuals to live in Toronto—up to 40% of them did so—at the beginning of the observation period. Likewise, Chinese and South Asian individuals lived in Vancouver in far greater proportions than White individuals at the beginning of the observation period. If wages tend to be higher in Toronto and Vancouver than elsewhere, these differences in place of residence will tend to increase the cumulative earnings of Black, Chinese and South Asian individuals relative to those of their White counterparts.

Perhaps partly because of their lower education levels, Black and White individuals were more likely to have experienced at least one permanent layoff during the 20-year period than Chinese and South Asian individuals.[11] For example, at least 41% of Black and White men experienced job loss during that period, while no more than 32% of Chinese and South Asian men experienced the same. Since job loss often leads to persistent and substantial earnings losses (Jacobson et al., 1993; Morissette et al., 2013), these differences should be taken into consideration.

Partly because of differences in age and education levels, the average number of years of potential work experience at the beginning of the observation periods considered varied across population groups. It amounted to about 11 years among White individuals, about 9 years among Black individuals and about 7 years among South Asian individuals. Thus, some groups had more time than others to find better-paying jobs or get promotions by the start of the 20-year period over which their earnings were added up.

Differences in the propensity to be employed in high-wage industries or large firms may also have played a role. Chinese and South Asian individuals spent, on average, one to two more years employed in high-wage industries and two to three more years employed in large firms than White individuals. Since large firms pay higher wages than smaller firms for observationally equivalent workers, these patterns may underlie part of the differences in cumulative earnings shown in Chart 2.

In sum, cross-group differences in some observable dimensions documented in Table 1—education, potential labour market experience, place of residence, propensity to work in large firms and high-wage industries, and job loss—may explain part of the differences in average cumulative earnings shown in Chart 2.[12] The next section quantifies the contribution of these factors.

11. Morissette and Qiu (2020) show that, all else equal, Canadian men and women with a bachelor's degree or higher education were less likely to be laid off during the 2000s than their counterparts with a high school diploma or less education.
12. Other factors are unlikely to have played a major role. For example, Table 1 displays no sizable differences in the degree to which different groups reported activity limitations, experienced a permanent separation attributable to injury or illness, or used maternity or parental leaves.

Decomposing differences in cumulative earnings

To perform this exercise, the study uses Blinder–Oaxaca decompositions conducted on pairwise earnings comparisons of Chinese, South Asian and Black workers relative to White workers, by gender. For example, to analyze earnings differences between Chinese and White men, the study weighs the differences—between these two groups—in the average values of the observable dimensions listed in Table 1 by a vector of returns to these observable dimensions estimated for White men.[13] This quantifies the degree to which differences in the cumulative earnings of Chinese and White men can be accounted for by differences in observable factors. The results of these decompositions are shown in Table 2.

Table 2
Blinder–Oaxaca decompositions of population group differences in 20-year cumulative earnings

	Men						Women					
	Chinese		South Asian		Black		Chinese		South Asian		Black	
	dollars	percent	dollars	percent	dollars	percent	dollars	percent	dollars	percent	dollars	percent
Difference in cumulative earnings (population group minus White)	266,991	...	196,710	...	-249,461	...	338,704	...	263,507	...	14,653	...
Explained portion	438,930	164.4	318,756	162.0	55,809	-22.4	300,946	88.9	283,878	107.7	109,427	746.8
Portion explained by:												
Baseline characteristics												
Work experience (potential)	-51,759	-19.4	-88,693	-45.1	-23,067	9.2	-16,713	-4.9	-31,590	-12.0	-9,385	-64.0
Education level and STEM field of study	225,072	84.3	221,453	112.6	-10,599	4.2	126,634	37.4	131,000	49.7	10,194	69.6
Activity limitations	1,500	0.6	-1,288	-0.7	-2,912	1.2	1,508	0.4	261	0.1	-2,905	-19.8
Knowledge of official languages	-2,094	-0.8	-2,179	-1.1	-1,964	0.8	-2,307	-0.7	172	0.1	985	6.7
Geographic location	115,431	43.2	100,437	51.1	63,419	-25.4	52,690	15.6	52,620	20.0	38,903	265.5
Census cohort	3,167	1.2	11,820	6.0	6,965	-2.8	1,681	0.5	7,081	2.7	4,470	30.5
Work history characteristics												
Years in unionized job	31,038	11.6	23,524	12.0	-5,996	2.4	7,604	2.2	-11,999	-4.6	-1,501	-10.2
Years at job by firm size	60,730	22.7	29,708	15.1	78,248	-31.4	59,736	17.6	58,901	22.4	60,942	415.9
Years at job by industry wage level	12,320	4.6	-5,607	-2.9	-30,664	12.3	51,180	15.1	65,803	25.0	12,014	82.0
Main job information missing or incomplete	-159	-0.1	655	0.3	176	-0.1	-3	0.0	0	0.0	-1	0.0
Experienced permanent layoff(s)	41,672	15.6	28,868	14.7	-15,063	6.0	16,946	5.0	11,311	4.3	-4,547	-31.0
Experienced permanent job separation(s) attributable to illness or injury	4,437	1.7	2,122	1.1	-290	0.1	4,165	1.2	2,825	1.1	540	3.7
Number of maternity or parental leaves taken	-2,425	-0.9	-2,063	-1.0	-2,444	1.0	-2,176	-0.6	-2,507	-1.0	-284	-1.9
Unexplained portion	-171,939	-64.4	-122,047	-62.0	-305,270	122.4	37,759	11.1	-20,371	-7.7	-94,773	-646.8

... not applicable

Note: STEM = science, technology, engineering, and mathematics.

Sources: Statistics Canada, Census of Population, 1996 and 2001; and Longitudinal Worker File, 1995 to 2019.

A) Cumulative earnings of Chinese, South Asian and White men

The first two lines of Table 2 show that differences in observable factors account entirely for the fact that Chinese and South Asian men had higher cumulative earnings than White men during the observation period considered in this study. The fact that Chinese and South Asian men have higher education levels than White men and are more likely to be in STEM fields is the single most important factor explaining why these two groups have higher cumulative earnings than White men. It accounts for 84% of the

13. See Appendix Table A.1 for the returns to these observable dimensions.

difference in cumulative earnings between Chinese and White men and for more than the entire difference (113%) between South Asian and White men.[14] Differences in the initial place of residence explain 43% to 51% of the cumulative earnings differences between men in these two population groups and White men. The greater propensity of Chinese and South Asian men to work in large firms and their lower risk of job loss—relative to White men—each explains 30% to 38% of the earnings differences examined.

B) Cumulative earnings of Black and White men

Quite different patterns are found for Black men. Over the 20-year periods considered in the study, the average cumulative earnings of Black men were about $249,000 lower than those of White men. As the last row of Table 2 shows, the entire earnings gap remains after controlling for differences in sociodemographic characteristics, human capital, job characteristics and work histories. Although Black men's lower potential labour market experience, greater number of years spent working in low-wage industries and greater likelihood of being laid off collectively explain 28% of the $249,000 earnings difference, Black men's greater number of years spent working in large firms and different places of residence (most importantly, their overrepresentation in Toronto) have the opposite effect of greater magnitude.

C) Cumulative earnings of Chinese, South Asian and White women

The higher cumulative earnings of Chinese and South Asian women relative to White women can be explained—mostly or entirely—by cross-group differences in the observable factors listed in Table 1. For example, 89% of the differences in cumulative earnings observed between Chinese and White women can be accounted for by such cross-group differences.

As was the case for men, the fact that Chinese and South Asian women have relatively high education levels and are likely to study in STEM fields is the single most important factor explaining why these two groups have higher cumulative earnings than White women. It accounts for 37% of the difference in cumulative earnings between Chinese and White women and for half of the difference between South Asian and White women.

Differences in initial place of residence and the greater number of years women in these two groups spent working in large firms or in high-wage industries also matter. Taken together, they account for 48% to 67% of the cumulative earnings differences compared with White women.

D) Cumulative earnings of Black and White women

The cumulative earnings of Black women exceeded those of White women by a small margin ($14,700) that is not statistically different from zero. Cross-group differences in place of residence and in the number of years spent working in large firms accounted for more than this entire margin (roughly $100,000).

Robustness checks

Table 2 focused on differences in cumulative earnings from **paid employment**. Appendix Table A.2 replicates Table 2 but quantifies differences in 20-year cumulative employment income, which includes earnings from paid employment and net self-employment income, for the same sample of individuals.

14. The fourth row of Table 2 shows that over the 20 years considered in this study, this educational advantage of Chinese and South Asian men is associated with an increase in their cumulative earnings (relative to White men) of roughly $225,000.

In most comparisons, the employment income gaps are slightly larger but of the same sign as the gaps in earnings. The one exception is the gap in employment income between Black and White women, which becomes negative, small (-$4,600) and not statistically different from zero.

The decomposition results do not change substantially when the focus is on cumulative employment income. When an indicator for the number of years with non-zero net self-employment income is included in the models, this factor does not account for much of the gaps in employment income.[15]

A potential factor contributing to the differences in the cumulative earnings of Chinese and South Asian Canadian-born workers, on the one hand, and Black and White Canadian-born workers, on the other, is that a higher proportion of the Chinese and South Asian Canadian-born workers are children of immigrants (or the second generation). Children of immigrants in Canada have been shown to have on average higher levels of education than the third-and-higher generation. Furthermore, Chinese and South Asian children of immigrants have been shown to also have higher earnings on average compared with the third-and-higher generation (Chen & Hou, 2019). To test the role of generation status in explaining the observed differences in cumulative earnings, the decompositions in Table 2 were replicated with an indicator for the second generation added to the underlying models. This analysis was conducted on the 2001 Census cohort only, because information on the birthplace of parents was not available from the 1996 Census.[16]

Results not shown indicate that adding a control variable for second-generation status made essentially no difference to the results presented in Table 2. In particular, the degree to which group differences in education and STEM fields of study accounted for differences in cumulative earnings remained virtually unchanged after adding this control variable. Therefore, the main findings reported in this study hold, regardless of whether one controls for second-generation status.

Discussion

Table 2 identifies the factors that account for—or "explain"—the differences in cumulative earnings observed between Chinese, South Asian and Black individuals, on the one hand, and White individuals, on the other hand. It also shows that substantial earnings differences remain unaccounted for. This can be seen by noting that the unexplained component of the Blinder–Oaxaca decomposition shown in the last row of Table 2 is—except for Chinese women—always negative and often substantial. This finding suggests that, **conditional on the observable factors considered in this decomposition**, most population groups considered in this study earn less than White individuals.

Appendix Table A.3 confirms this view. It presents results from gender-specific regressions of cumulative earnings in which data from all four population groups are pooled. Along with population group indicators, these regressions include all regressors shown in Appendix Table A.1. The numbers indicate that—with the exception of Chinese women—men and women in all population groups had, all else equal, lower cumulative earnings than their White counterparts.[17] For example, even though Chinese men earned, on average, $267,000 more than White men over a 20-year period, Chinese men ended up having **lower** cumulative earnings (-$170,000) than White men after controlling for the set of regressors shown in

15. Decompositions were also conducted on discounted cumulative employment income, where a 3% discount rate was applied to annual real employment income. The main takeaways from the analysis remained unchanged.
16. Since the resulting sample size was small for the South Asian group, only the cumulative earnings of Chinese and Black workers (relative to White workers) were analyzed.
17. The difference in cumulative earnings between South Asian and White women is not statistically significant at conventional levels in these regressions.

Appendix Table A.1. Likewise, even though Black and White women had similar average unconditional cumulative earnings, Black women earned—after controlling for sociodemographic characteristics, human capital, job characteristics and work history events—$94,000 less than White women.

As is well known, these conditional cumulative earnings differences across population groups may reflect a wide variety of unmeasured factors, including—but not limited to—group differences in unobserved skills, social networks, job search methods and preferences for certain working conditions, as well as employer discrimination (Cahuc et al., 2014). Assessing the degree, if any, to which these unmeasured factors account for these conditional earnings differences is impossible without additional information.

Conclusion

Previous studies of earnings differences across groups of Canadian-born individuals have used cross-sectional data, leaving unanswered the important question of what earnings differences amount to when measured over workers' lifecycle. Using data from the LWF and the 1996 and 2001 censuses of population, this study fills this gap and quantifies cross-group earnings differences measured over a 20-year period.

The study shows that earnings differences measured with cross-sectional data are not necessarily informative of differences in cumulative earnings. This is the case when one compares earnings differences between Chinese and White women at the beginning of their career with their differences in cumulative earnings.

The study also shows that the unconditional relative earnings of Chinese and South Asian men increased substantially over the lifecycle, largely because these two population groups have higher education levels than White men and highly educated men have steeper age-earnings profiles than their less educated counterparts. By contrast, the unconditional and conditional relative earnings of Black men were fairly stable, indicating that Black men earned about 20% less than White men, regardless of the lifecycle segment considered.

As was the case in studies by Qiu and Schellenberg (2022a, 2022b), this study highlights the usefulness of disaggregating data for specific population groups. Importantly, the Blinder–Oaxaca decompositions used in this study show that the factors driving cross-group differences in cumulative earnings differ markedly depending on the population group selected for an earnings comparison with White individuals.

Appendix

Appendix Table A.1
Estimated coefficients from ordinary least squares regressions of cumulative earnings among White workers

	Men	Women
Work experience at baseline (potential)	58,632 ***	20,922 ***
Work experience squared	-2,074 ***	-764 ***
Highest completed education (reference category: bachelor's degree, non-STEM field)		
No high school	-668,504 ***	-377,120 ***
High school	-610,400 ***	-345,392 ***
Trades	-490,511 ***	-337,701 ***
Certificate or diploma below bachelor's degree	-453,415 ***	-254,067 ***
Bachelor's degree in STEM field	125,181 ***	85,965 ***
Postgraduate degree, certificate or diploma in STEM field	275,815 ***	223,220 ***
Postgraduate degree, certificate or diploma in non-STEM field	477,733 ***	178,641 ***
Activity limitations (reference category: no limitations)		
Some limitations	-257,338 ***	-115,784 ***
No information on activity limitations	-154,262 ***	-30,167 †
Official languages (reference category: English only)		
French only	18,245 †	-5,450
English and French	-907	42,316 ***
Location of residence (reference category: Ontario [except Toronto])		
Atlantic provinces	-151,981 ***	-81,983 ***
Quebec (except Montréal)	-96,562 ***	-40,285 ***
Manitoba	-96,154 ***	-65,575 ***
Saskatchewan	41,264 ***	-30,049 ***
Alberta	309,860 ***	54,724 ***
British Columbia (except Vancouver)	43,329 ***	-6,486 *
Territories	279,464 ***	238,851 ***
Montréal	-47,098 ***	-30,724 ***
Toronto	260,698 ***	134,376 ***
Vancouver	109,917 ***	34,321 ***
2001 Census	39,597 ***	26,784 ***
Years in unionized job	-28,596 ***	-17,342 ***
Number of years in firms by firm size (reference category: 1 to 24 employees)		
500 or more employees	46,795 ***	35,426 ***
100 to 499 employees	40,312 ***	28,716 ***
25 to 99 employees	38,711 ***	27,646 ***
Number of years in industries by average wages paid (reference category: low-wage)		
High-wage	38,047 ***	29,516 ***
Mid-wage	36,056 ***	24,281 ***
Some missing information on main employer	21,020 **	234
Experienced permanent layoff(s)	-319,861 ***	-160,553 ***
Experienced permanent job separation(s) attributable to illness or injury	-203,199 ***	-108,661 ***
Number of maternity or parental leaves taken	-112,343 ***	-7,516 ***
Constant	558,643 ***	297,778 ***

† significantly different from reference category ($p < 0.10$)
* significantly different from reference category ($p < 0.05$)
** significantly different from reference category ($p < 0.01$)
*** significantly different from reference category ($p < 0.001$)
Note: STEM = science, technology, engineering, and mathematics.
Sources: Statistics Canada, Census of Population, 1996 and 2001; and Longitudinal Worker File, 1995 to 2019.

Appendix Table A.2

Blinder–Oaxaca decompositions of population group differences in 20-year cumulative employment income

	Men						Women					
	Chinese		South Asian		Black		Chinese		South Asian		Black	
	dollars	percent	dollars	percent	dollars	percent	dollars	percent	dollars	percent	dollars	percent
Difference in cumulative earnings (population group minus White)	306,258	...	297,457	...	-278,454	...	371,040	...	314,211	...	-4,612	...
Explained portion	499,150	163.0	409,097	137.5	50,159	-18.0	331,304	89.3	331,224	105.4	109,810	-2381.0
Portion explained by:												
Baseline characteristics												
Work experience (potential)	-44,198	-14.4	-76,018	-25.6	-19,613	7.0	-8,980	-2.4	-17,089	-5.4	-5,031	109.1
Education level and STEM field of study	273,851	89.4	290,113	97.5	-14,644	5.3	154,801	41.7	171,768	54.7	10,621	-230.3
Activity limitations	1,760	0.6	-1,449	-0.5	-3,329	1.2	1,835	0.5	348	0.1	-3,505	76.0
Knowledge of official languages	-1,336	-0.4	-1,213	-0.4	-816	0.3	-436	-0.1	2,386	0.8	3,044	-66.0
Geographic location	125,236	40.9	111,142	37.4	72,412	-26.0	56,424	15.2	56,808	18.1	42,789	-927.8
Census cohort	2,391	0.8	8,926	3.0	5,260	-1.9	1,542	0.4	6,493	2.1	4,098	-88.9
Work history characteristics												
Years in unionized job	30,884	10.1	23,407	7.9	-5,966	2.1	7,743	2.1	-12,218	-3.9	-1,528	33.1
Years at job by firm size	49,351	16.1	25,222	8.5	62,946	-22.6	52,865	14.2	52,748	16.8	53,525	-1160.6
Years at job by industry wage level	12,087	3.9	-3,507	-1.2	-26,048	9.4	47,453	12.8	61,051	19.4	11,013	-238.8
Main job information missing or incomplete	-7	0.0	29	0.0	8	0.0	164	0.0	-8	0.0	70	-1.5
Experienced permanent layoff(s)	46,622	15.2	32,297	10.9	-16,852	6.1	19,100	5.1	12,749	4.1	-5,125	111.1
Experienced permanent job separation(s) attributable to illness or injury	5,338	1.7	2,554	0.9	-349	0.1	5,112	1.4	3,468	1.1	663	-14.4
Number of maternity or parental leaves taken	-2,829	-0.9	-2,407	-0.8	-2,850	1.0	-6,319	-1.7	-7,279	-2.3	-824	17.9
Unexplained portion	-192,891	-63.0	-111,640	-37.5	-328,613	118.0	39,736	10.7	-17,013	-5.4	-114,422	2481.0

... not applicable

Note: STEM = science, technology, engineering, and mathematics.

Sources: Statistics Canada, Census of Population, 1996 and 2001; and Longitudinal Worker File, 1995 to 2019.

Appendix Table A.3
Estimated coefficients from ordinary least squares regressions of cumulative earnings

	Men		Women	
	(a)	(b)	(a)	(b)
Chinese	266,991 ***	-170,241 ***	338,704 ***	37,553 *
South Asian	196,710 ***	-120,106 ***	263,507 ***	-20,784
Black	-249,461 ***	-302,871 ***	14,653	-94,400 ***
Work experience at baseline (potential)	...	58,692 ***	...	20,731 ***
Work experience squared	...	-2,077 ***	...	-756 ***
Highest completed education (reference category: bachelor's degree, non-STEM field)				
No high school	...	-670,927 ***	...	-376,546 ***
High school	...	-613,741 ***	...	-344,833 ***
Trades	...	-494,077 ***	...	-337,761 ***
Certificate or diploma below bachelor's degree	...	-456,756 ***	...	-254,588 ***
Bachelor's degree in STEM field	...	115,901 ***	...	83,430 ***
Postgraduate degree, certificate or diploma in STEM field	...	279,553 ***	...	226,209 ***
Postgraduate degree, certificate or diploma in non-STEM field	...	468,706 ***	...	179,073 ***
Activity limitations (reference category: no limitations)				
Some limitations	...	-255,942 ***	...	-115,959 ***
No information on activity limitations	...	-149,713 ***	...	-37,110 *
Official languages (reference category: English only)				
French only	...	18,134 †	...	-5,968
English and French	...	-943	...	41,410 ***
Location of residence (reference category: Ontario [except Toronto])				
Atlantic provinces	...	-151,920 ***	...	-82,236 ***
Quebec (except Montréal)	...	-97,319 ***	...	-39,843 ***
Manitoba	...	-96,565 ***	...	-66,195 ***
Saskatchewan	...	40,577 ***	...	-30,184 ***
Alberta	...	310,973 ***	...	55,065 ***
British Columbia (except Vancouver)	...	44,929 ***	...	-6,450 *
Territories	...	279,217 ***	...	238,028 ***
Montréal	...	-48,711 ***	...	-30,470 ***
Toronto	...	252,503 ***	...	131,849 ***
Vancouver	...	109,185 ***	...	35,425 ***
2001 Census	...	38,391 ***	...	27,290 ***
Years in unionized job	...	-28,638 ***	...	-17,398 ***
Number of years in firms by firm size (reference category: 1 to 24 employees)				
500 or more employees	...	46,822 ***	...	35,564 ***
100 to 499 employees	...	40,668 ***	...	28,854 ***
25 to 99 employees	...	38,880 ***	...	27,702 ***
Number of years in industries by average wages paid (reference category: low-wage)				
High-wage	...	38,021 ***	...	29,550 ***
Mid-wage	...	36,030 ***	...	24,333 ***
Some missing information on main employer	...	21,693 **	...	512
Experienced permanent layoff(s)	...	-321,514 ***	...	-160,322 ***
Experienced permanent job separation(s) attributable to illness or injury	...	-203,827 ***	...	-109,335 ***
Number of maternity or parental leaves taken	...	-111,705 ***	...	-7,474 ***
Constant	1,310,498 ***	562,759 ***	801,252 ***	297,118 ***

... not applicable

† significantly different from reference category ($p < 0.10$)

* significantly different from reference category ($p < 0.05$)

** significantly different from reference category ($p < 0.01$)

*** significantly different from reference category ($p < 0.001$)

Note: STEM = science, technology, engineering, and mathematics.

Sources: Statistics Canada, Census of Population, 1996 and 2001; and Longitudinal Worker File, 1995 to 2019.

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