



Structural Changes in Canadian Employment from 1997 to 2022

JRC Working Papers Series on
Labour, Education and Technology
2023/08

M. Willcox, B. Feor

LABOUR

EDUCATION

TECHNOLOGY

Joint
Research
Centre

This publication is part of a working paper series on Labour, Education and Technology by the Joint Research Centre (JRC). The JRC is the European Commission's science and knowledge service. It aims to provide evidence-based scientific support to the European policymaking process. The contents of this publication do not necessarily reflect the position or opinion of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use that might be made of this publication. For information on the methodology and quality underlying the data used in this publication for which the source is neither Eurostat nor other Commission services, users should contact the referenced source. The designations employed and the presentation of material on the maps do not imply the expression of any opinion whatsoever on the part of the European Union concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Contact information

Name: Sergio Torrejón Pérez

Address: Joint Research Centre, European Commission (Seville, Spain)

Email: sergio.torrejon-perez@ec.europa.eu

EU Science Hub

<https://joint-research-centre.ec.europa.eu>

JRC134714

Seville: European Commission, 2023

© European Union, 2023



The reuse policy of the European Commission is implemented by the Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents (OJ L 330, 14.12.2011, p. 39). Except otherwise noted, the reuse of this document is authorised under the Creative Commons Attribution 4.0 International (CC BY 4.0) licence (<https://creativecommons.org/licenses/by/4.0/>). This means that reuse is allowed provided appropriate credit is given and any changes are indicated. For any use or reproduction of photos or other material that is not owned by the EU, permission must be sought directly from the copyright holders.

All content © European Union 2023

How to cite this report: Willcox, M. and Feor, B., *Structural Changes in Canadian Employment from 1997 to 2022*, JRC Working Papers on Labour, Education and Technology 2023/08, European Commission, Seville, 2023, JRC134714.

Structural Changes in Canadian Employment from 1997 to 2022

Michael Willcox (Labour Market Information Council),

Brittany Feor (Labour Market Information Council)

Abstract

This paper uses the European Jobs Monitor (2017) 'jobs' approach to examine the structural changes in employment and wages in Canada between 1997 and 2022. Changes in employment and real wages reveals a long-term pattern of upgrading, particularly after the 2008 financial crisis. There is variation in these patterns within the 25-year period including a shift towards higher quality jobs after the financial crisis and evidence of wage polarisation between 2020 and 2022. Employment and wage trends by sector, sex and age were explored. Employment shifted away from manufacturing towards the healthcare and social assistance, professional, scientific, and technical services, and construction sectors since the late 1990s which accelerated after the global financial crisis. The wage gap and difference in employment shares between men and women has narrowed over time, despite recent widening following the pandemic. Canada's aging population has resulted in a growing share of mature workers in the labour market and in core-age workers becoming more concentrated in mid-to-high wage jobs.

Keywords: job polarisation; structural change; employment growth; real wage growth.

Joint Research Centre reference number: JRC134714

Related publications and reports:

Torrejon Perez, S., Hurley, J., Fernandez Macias, E. and Staffa, E., [*Employment shifts in Europe from 1997 to 2021: from job upgrading to polarisation*](#). JRC Working Papers Series on Labour, Education and Technology 2023/05, European Commission, 2023, JRC132678.

Gimpelson V. and Kapeliushnikov R., [*Shifts in the Composition of Jobs: The Case of Russia \(2000-2019\)*](#), JRC Working Papers on Labour, Education and Technology 2023/03, European Commission, Seville, 2023, JRC132708.

Rodrigues-Silveira, R., [*Structural Changes in Brazilian Employment \(2002-2021\)*](#), JRC Working Papers on Labour, Education and Technology 2023/01, European Commission, Seville, 2023, JRC132269.

Acknowledgements

Thank you to Anne-Lore Fraikin, Tony Bonen, Steven Tobin, and Sergio Torrejón Pérez for providing valuable feedback and comments.

Contents

Executive summary	1
1 Introduction	2
2 Literature Review	2
2.1 Technology change and the shifting employment and wage structures.....	3
2.2 Evidence of job polarization across Canada, United States and Europe	4
3 Methodology.....	4
4 Descriptive Statistics	8
5 Analysis: recent wage and employment developments in Canada	10
5.1 Employment shifts by quintile	11
5.2 Wage profiles by quintile	12
6 Analysis: Employment and wage trends by sector, sex and age group	14
6.1 Employment in the services sector climbs due to gains in low-skill and high-skill services jobs	15
6.2 Job upgrading for women concentrated in the fourth quintile	19
6.3 Canada's aging population.....	21
7 Robustness test: Quintiles fixed to 1997 wage distribution	24
8 Conclusions	26
References.....	28
List of figures	31
List of tables.....	32
Appendix.....	33

Executive summary

Canada saw a trend of employment upgrading between 1997 and 2022, particularly following the 2008-2009 recession and the COVID-19 pandemic. During this time, employment growth has been concentrated in mid to high wage jobs, notably in public services and goods-producing sectors.

The upgrading of employment can be attributed to the sustained growth in sectors that mainly offer high wage jobs, such as public services and goods-producing sectors, including construction and health care and social services. Additionally, private services have shifted their growth towards higher-wage jobs, with industries like professional, scientific, and technical services experiencing considerable expansion and a concentration in mid-to-high wage jobs. Public services have experienced the strongest continuous growth compared to other sectors since 2008. Goods-producing sectors, including mining, quarrying, oil, and gas, as well as construction, have exhibited significant growth post-pandemic.

Women have historically been and continue to be overrepresented in low wage jobs and underrepresented in high wage jobs. Nevertheless, there has been a positive trend towards greater equality over time. However, the pandemic has had a significant impact on gender distribution in the workforce, with women being overrepresented in the early pandemic-related employment losses.

The aging population has resulted in a growing share of mature workers. The share of core-age workers has decreased over time but has also resulted in core-age workers becoming more concentrated in mid-to-high wage jobs. The employment share of young workers has remained stable.

Wage trends have also exhibited upgrading over time, with high wage jobs experiencing significant gains between 1997 and 2008. However, after the 2008-2009 recession, low wage jobs saw more substantial gains. In the most recent period, wage gains have been more evenly distributed between high and low wage jobs, albeit slightly polarized and negative when accounting for inflation.

There has been a positive trend of narrowing the wage gap between genders over time, indicating progress in gender equality. However, following the pandemic, the wage gap increased slightly, suggesting potential setbacks in this area.

Canada has seen a consistent pattern of employment upgrading, with notable growth in mid to high wage jobs. However recent movement in the labour market highlights the need for ongoing efforts to achieve greater gender equality in the workforce. Moreover, the impact of the COVID-19 pandemic on workforce distribution and wage trends necessitates continued monitoring and attention to address emerging challenges.

Policy context

1. **Promoting Gender Equality:** To address the historical overrepresentation of women in low wage jobs and underrepresentation in high wage jobs, policies that promote gender equality in the workplace are essential. This can include measures to address pay gaps, encourage women's participation in male-dominated industries, and support work-life balance.
2. **Aging Workforce Support:** With a growing share of mature workers in the labor market, policies should be designed to support this demographic. Encouraging training opportunities

and flexible work arrangements can help mature workers remain engaged and contribute to mid-to-high wage job sectors.

1 Introduction

This report examines Canada's employment structure over 25 years; looking at the wage distribution of jobs, employment within those jobs, and how that distribution has changed over time. The evolving distribution reveals the changes in the quality of employment in the Canadian labour market. The distribution of employment and the patterns of labour market transformation (upgrading, downgrading, polarization) have major economic and social consequences for Canadians. Job quality is not only a critical factor in determining the well-being of workers but is also an important indicator of health for the labour market.

The Canadian labor market has undergone significant transformations over the past few decades, driven by factors such as globalization, trade, technological advancements, consumption, and demographic shifts. These transformations have impacted the jobs available, skills required, and the wages and benefits that workers can expect. As a result, there are concerns about the impact of these transformations on the quality of jobs in Canada. Many workers face precarious employment, characterized by low wages, and little job security. Additionally, some groups, such as women, and racialized communities, experience higher rates of unemployment and underemployment.

We contribute to the existing literature around job and wage structures in Canada, exploring the dynamics of the labour market and job quality up to 2022 using the European Jobs Monitor's job-based approach¹, in which employment is observed in terms of jobs; defined as occupations within sectors (e.g., sales representative in wholesale trade). Our analysis aligns with earlier findings in the Canadian literature such as Green and Sand, despite using different methodologies.

We find evidence of upgrading in wages and employment between 1997 and 2022, although there is some variability across sub-periods. More precisely, our analysis looks at a set of 5 sub-periods between 1997 and 2022 and finds that following the financial crisis of 2008-09 there was a shift in employment growth moving towards higher quality jobs (i.e., jobs at the top of the wage distribution).

The paper continues as follows: literature review, data, methodology, analysis of wage and employment trends and conclusion. The analysis section looks at the evolution of both mean hourly wage and employment by quintile from 1997 to 2022 and four sub-periods: 1997 – 2008, 2008 – 2009, 2009 – 2020 and 2020 - 2022. We decompose the employment and wage trends by gender, age and sector and compare trends using constant and shifting job distributions.

2 Literature Review

Measuring job quality typically relies on a mix of quantitative and qualitative indicators across multiple dimensions. For example, the OECD framework presented by Cazes et. al (2015) and the Canada-specific analysis by Chen and Mehdi (2019) have significant overlap in their job quality methodology, built on three pillars: compensation, job security, and quality of work environment. Other dimensions that have been used in frameworks include job stability, benefits, career progression, development opportunities, physical and psychological risks, flexibility, autonomy, and skills (Muñoz de Bustillo et al., 2011). Still, it can be difficult to measure job quality with detailed multidimensional frameworks because many indicators are subjective. Individual preferences vary so two people employed at the same job with the same characteristics will differ in their perceived job quality. Van Ootegem (2009) addresses subjectivity by specifying a model that captured both the job-to-job comparison and

¹ Based off work by Stiglitz and Wright & Dwyer.

interindividual preferences without allowing for bias created by aspirational preferences and still found the subjective part of job quality is specific to the individual.

Comprehensive and multidimensional job quality measures are ideal but generally impractical because of limitations on data availability. Researchers often rely on unidimensional indicators as proxies of job quality. Although not as rigorous as a multidimensional measure, wage is a common proxy since wage data is widely available. Fernández-Macías et al (2017) associate higher wage with higher job quality assuming workers prefer higher paying jobs so this measure is focussed on one objective measure of job quality. They use the wage distribution of jobs, which are occupation-sector pairs, to investigate the shifting employment structure in Europe. Specifically, they look for patterns of polarization and a shrinking middle class. Using wage as a proxy for job quality means that low-wage jobs are also understood to be low-skill and lower quality.

Job polarisation is characterized by a declining share of employment in the middle of the wage distribution, a hollowing out, and relatively slower wage growth while employment and/or wage growth in the top and bottom of the distribution is relatively higher. Workers in the bottom have a harder time moving up since there are fewer jobs in the middle and workers in the middle are at risk of falling towards the bottom as demand for jobs in the middle declines. This greatly impacts the earnings and job quality of workers that are not able to realize the same level of employment they might have in the previous labour market given the same skill profile or occupation. Job polarization should be a concern for policymakers trying to understand and improve job quality.

2.1 Technology change and the shifting employment and wage structures

Autor and Dorn (2010) demonstrate how routinization caused by technology change leads to job polarization. For example, the computerization of routine tasks decreased demand for workers in routine-intensive middle-skill occupations. Routinization can also increase demand for low-skill workers as non-routine tasks previously performed in middle-skill jobs are off loaded to low-skill workers (Goos et al., 2014). Employment shifts away from middle-skill jobs and the employment share of high-skill and low-skill jobs increases (Goos et al., 2014). The result is a U-shaped distribution of employment characteristics of job polarization.

Skills-biased technology change (SBTC) predicts that labour demand shifts towards skills that are augmented by the technology change (Acemoglu and Autor, 2010). The result is job upgrading which means employment is shifting toward high-skill jobs and the demand for middle-skill jobs lags. The associated wage upgrading increases demand for services and consumption goods that then increases demand for low-skill workers (Autor and Dorn, 2010; Bárány and Siegel, 2018). Katz and Autor (1999) argue that SBTC is driver of wage inequality in the United States up to the 1990s. Computerization increases the value of high-skill workers while post-secondary education becomes more common which shifts the labour supply and demand towards workers skilled in non-routine cognitive tasks, high-skill. The impacts of what Katz and Autor (1999) refer to as computerization have spilled over into nearly all jobs and Beaudry et. al (2013) find that demand for cognitive skills and oversupply of highly educated workers has shifted the type of skills that are in-demand at low-skill jobs post-financial crisis.

Bárány and Siegel (2018) identify job polarization in the United States as early as 1950, before the information, communication, and technology boom. Bárány and Siegel (2018) hypothesize that uneven technological change will lead to employment declines and slower wage growth in the highest productivity sector. They find that, compared to the services sector, productivity growth was high in the manufacturing sectors. As predicted by the model Bárány and Siegel (2018), employment declined, and wage growth slowed in the highest productivity sectors and that the most heavily used occupations in that sector were most affected. Bárány and Siegel (2018; 2019) find that as wage growth accelerates for in demand jobs there is a feedback loop that drives up labour supply for the high wage jobs and growing incomes fuel demand for low-skill jobs that are not easily replaced by

technology, specifically in service occupations, employment and wages in the middle-skill occupations do not accelerate.

2.2 Evidence of job polarization across Canada, United States and Europe

Job polarization in the United States, Europe and Canada has been identified in various papers (Autor and Dorn (2013); Autor, Katz and Kearney (2006); Autor (2015); Cortes, (2016); Dwyer and Wright (2019); Goos and Manning (2007); Goos et al. (2009; 2014); Salvatori, (2018); Wright and Dwyer (2003), Acemoglu and Autor (2011), Autor and Dorn (2013), Juhn (1994), Foster and Wolfson (2010), Green and Sand (2015), Firap et al. (2011), Fortin and Lemieux (2014)). Some papers find evidence of job polarization throughout Europe, Canada and the US but extreme wage polarization, wage inequality, is specific to the US (Dustmann et. al (2009), Kampelmann and Rycx (2011), Antonczyk et. al (2010), Autor and Dorn (2010)).

Green and Sand (2015) find job polarization in Canada in the 1980s and 1990s but they only find wage polarization in the 1990s. Corresponding with the findings from Beach (2017) that share of middle-class earners fell during this period while high-earner capture an increasing share of total earnings. They do not find job or wage polarization in the 2000s. Both Fortin and Lemieux (2014) and Green and Sand (2015) find regional variation in employment shifts in Canada are significant. Both papers show wage polarization in Alberta but not in Ontario in the early 2000s and, recall, Green and Sand (2015) do not observe job polarization at the national level. Green and Sand (2015) also argue that hypotheses that hinge on technology-bias such as the SBTC, are too US-oriented and do not fit Canada and that resource booms are important in Canada and could drive the regional variations they observed.

Oesch and Menés (2019) find job upgrading in Britain, Germany, Spain and Switzerland between 1990 and 2008. Employment increases in high-skill occupations were concentrated in management and professional occupations as employment shifted away from middle-skill jobs like clerks and production. Torrejón et al. (2023) also find that job upgrading is the most commonly found pattern of employment change in Europe, although they show there is a diversity of patterns across countries and periods. Oesch and Menés (2019) also find that country level differences in policy choices, such as wage-setting institutions, affect how technology change will shift employment. Violante (2008) argues that rigid labour institution that keep minimum wages high despite reductions in productivity incentivize firms to seek out labor-saving technologies. In fact, Maarek and Moiteaux (2021) find that job polarization reduces employment and participation rates in high minimum wage countries.

More broadly, Goos et al. (2014) find evidence that task-biased technological progress is a cause of job polarization in 16 European Countries. Their hypothesis is that recent technological advancements reduces the labour demand for routine tasks which can be off-shoring or replaced with technology. These trends combine to decrease employment demand in middle-skill jobs with greater intensity of routine-tasks. Berman et al. (1998) find strong evidence for pervasive SBTC (skill-biased technical change) in developed countries. Most industries increased the proportion of skilled workers despite generally rising or stable relative wages. Many developing countries also show increased skill premiums, a pattern consistent with SBTC.

3 Methodology

The methodology is based on Fernández-Macías, Hurley, and Arranz-Muñoz (2017) to track structural changes in the European labour market. They measure changes in employment by quintile where quintiles reflect the wage distribution of jobs, which are occupation-sector pairs. Bárány and Siegel (2019) also use the combination of sector and occupation because occupation skills are not sector specific so jobs with similar occupation skill profiles can be subject to different demand pressures.

The dataset for this paper contains hourly wage, occupation and sector data from the Labour Force Survey (LFS) between 1997 and 2022. The LFS is the primary source of labour market data in Canada and is published monthly by Statistics Canada. The LFS began in 1976 but earnings data is only available

starting in 1997 and the methodology and analysis in this paper uses hourly wage. The unit of analysis is a job which is defined as an occupation in a sector using the 2-digit National Occupational Classification (NOC) 2016 v1.3 and 2-digit North American Industry Classification System (NAICS) 2017 v3. Statistics Canada has assigned the current version of each classification system retroactively to the micro data. This means that our data has consistent occupation and sector classifications over time, and we do not need to map the current classification systems onto historical data.

The NOC system is an occupational hierarchy with four levels: unit group, minor group, major group, broad occupational group. Since the NOC codes are a hierarchy, each 4-digit NOC code rolls into the minor group (3-digit), major group (2-digit) and broad occupational group (1-digit). For example, *Opticians* (NOC 3231) rolls into *Other technical occupations in health care* (NOC 323), *Technical occupations in health* (NOC 32) and, ultimately, *Health Occupations* (NOC 3). In this paper we use the 40 unique major occupation groups at the 2-digit level. Table 1 lists the 40 major occupation groups according to the associated broad occupational groups.

Table 1: List of major occupations used in the analysis by broad occupational group.

Broad occupational group	Major occupation group
NOC 1-digit	NOC 2-digit
(0) Management occupations	(00) Senior management occupations, (01-05) Specialized middle management occupations, (06) Middle management occupations in retail and wholesale trade and customer services, (07-09) Middle management occupations in trades, transportation, production and utilities
(1) Business, finance and administration occupations	(11) Professional occupations in business and finance, (12) Administrative and financial supervisors and administrative occupations, (13) Finance, insurance and related business administrative occupations, (14) Office support occupations, (15) Distribution, tracking and scheduling co-ordination occupations
(2) Natural and applied sciences and related occupations	(21) Professional occupations in natural and applied sciences, (22) Technical occupations related to natural and applied sciences
(3) Health Occupations	(30) Professional occupations in nursing, (31) Professional occupations in health (except nursing), (32) Technical occupations in health, (34) Assisting occupations in support of health services
(4) Occupations in education, law and social, community and government services	(40) Professional occupations in education services, (41) Professional occupations in law and social, community and government services, (42) Paraprofessional occupations in legal, social, community and education services, (43) Occupations in front-line public protection services, (44) Care providers and educational, legal and public protection support occupations
(5) Occupations in art, culture, recreation and sport	(51) Professional occupations in art and culture, (52) Technical occupations in art, culture, recreation and sport
(6) Sales and service occupations	(62) Retail sales supervisors and specialized sales occupations, (63) Service supervisors and specialized service occupations, (64) Sales representatives and salespersons - wholesale and retail trade, (65) Service representatives and other customer and personal services occupations, (66) Sales support occupations,

	(67) Service support and other service occupations, n.e.c.
(7) Trades, transport and equipment operators and related occupations	(72) Industrial, electrical and construction trades, (73) Maintenance and equipment operation trades, (74) Other installers, repairers and servicers and material handlers , (75) Transport and heavy equipment operation and related maintenance occupations, (76) Trades helpers, construction labourers and related occupations
(8) Natural resources, agriculture and related production occupations	(82) Supervisors and technical occupations in natural resources, agriculture and related production, (84) Workers in natural resources, agriculture and related production, (86) Harvesting, landscaping and natural resources labourers
(9) Occupations in manufacturing and utilities	(92) Processing, manufacturing and utilities supervisors and central control operators, (94) Processing and manufacturing machine operators and related production workers, (95) Assemblers in manufacturing, (96) Labourers in processing, manufacturing and utilities

1) As of January 2023 Statistics Canada has implemented the NOC 2021 and revised historical data. At the time of analysis data were only available according to the NOC 2016. Source: Labour Force Survey, Statistics Canada.

NAICS is hierarchical with 20 unique 2-digit codes at the top level. The job units used in this analysis are constructed from the 20 unique sectors presented in Table 2. Crossing the 40 occupations in Table 1 and 20 sectors in Table 2 generates 800 unique jobs. However, not all 800 occupation-sector combinations have non-zero employment. For example, there is no employment recorded in the base year of 1997, 2008, 2009 or 2020 in the information and cultural industries sector for three occupations: Professional occupations in health (except nursing), Occupations in front-line public protection services, Harvesting, landscaping and natural resources labourers. There are between 636 and 736 jobs included for each period in the analysis. Jobs are assigned to quintiles on a period-by-period basis using the mean hourly wage in the base year (1997, 2008, 2009 or 2020).

Table 2: NAICS 2017 v3 sectors used to construct job units

NAICS 2-digit	Sector
11	Agriculture, forestry, fishing and hunting
21	Mining, quarrying, and oil and gas extraction
22	Utilities
23	Construction
31-33	Manufacturing
41	Wholesale trade
44-45	Retail trade
48-49	Transportation and warehousing
51	Information and cultural industries
52	Finance and insurance
53	Real estate and rental and leasing
54	Professional, scientific and technical services
55	Management of companies and enterprises
56	Administrative and support, waste management and remediation services

61	Educational services
62	Health care and social assistance
71	Arts, entertainment and recreation
72	Accommodation and food services
81	Other services (except public administration)
91	Public administration

Source: Labour Force Survey, Statistics Canada.

Jobs are sorted into quintiles using the mean wage of workers in the occupation-sector pairing such that each quintile contains around 20% of employment. Rounding is done at the point of access such that mean hourly wages of 20\$ or more are rounded to the nearest dollar and mean wages less than 20\$ are rounded to the nearest 10 cents. Rounding to the nearest dollar creates clustering around the quintile boundaries and arbitrary sorting of jobs with the same mean hourly wage into different quintiles. Manual adjustments are made around the boundaries to keep jobs with the same wage in the same quintile while maintaining employment shares as close to 20% per quintile as possible. Table 3 shows the number of jobs and employment share of each quintile by period.

Table 3: Number of jobs by quintile in each period

	January 1997 to October 2008	November 2008 to May 2009	June 2009 to January 2020	February 2020 to December 2022
1	131	89	83	83
2	128	129	149	124
3	136	141	147	169
4	180	174	176	138
5	161	137	127	122
Total	736	670	682	636

Source: Labour Force Survey, Statistics Canada.

The data set includes January 1997 to December 2022 which is disaggregated into four periods: (1) January 1997 to October 2008, (2) November 2008 to May 2009, (3) June 2009 to January 2020 and (4) February 2020 to December 2022. In each period jobs are assigned to quintiles based on the wage distribution of jobs in the first year of the period. Disaggregating the data into four periods lets the wage distribution of jobs adjust at points in the business cycle in Canada with labour market disruptions, specifically, the global financial crisis in 2008 and the COVID-19 pandemic starting in 2020². In the robustness exercise the quintiles are not adjusted so the quintiles are fixed to the wage distribution of jobs in 1997. This exercise shows that the choice to fix the quintiles changes the employment and wage profiles in the most recent period, 2020 to 2022.

In addition to employment and wage patterns across the quintiles there is also a discussion of trends by sector, sex and age. First, a broad sector analysis (goods-producing, private services, public services) of employment and wage trends is important given the shift away from manufacturing towards services and technical occupations which accelerated after the global financial crisis. Second, differences in labour market outcomes between women and men continues to be a policy issue, from accessible child-care, wage equality, and gender-based occupation sorting. The discussion covers the

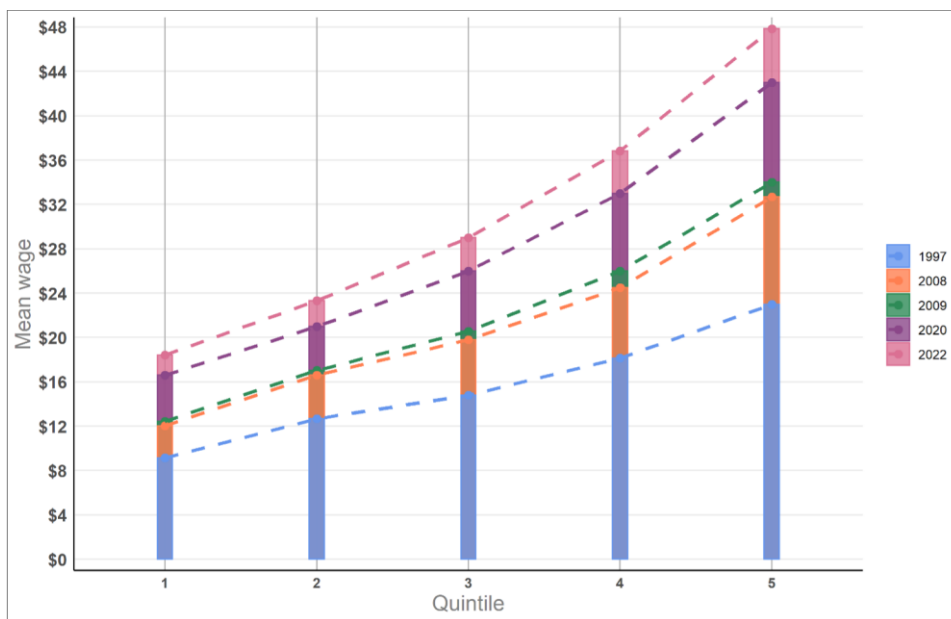
² February 2020 is the most appropriate start date for analysing the impacts of COVID-19 on the Canadian labour market using the LFS. The LFS for March was in the process of being administered when public health measures that required closing of non-essential businesses was announced. Some part of the effect of COVID-19 measures is captured in the March 2020 results.

wage gap by quintile and shifting employment patterns over the quintiles for men compared to women. Finally, the aging population is a crucial topic for Canada beyond 2022, the share of Canadians aging out of the labour force has been increasing at the same time as vacancies reach record highs and unemployment is historically low.

4 Descriptive Statistics

Data in this paper are constructed using Statistics Canada’s Labour Force Survey (LFS). The quintiles are based on the wage distribution of jobs which are a cross of an occupation and sector. As a result, this section will present some important trends in employment by sector and occupation in Canada since 1997. Wages are doubly important to this analysis since the quintile assignments are based on the wage distribution of jobs and we analyse the change in wages by quintile for each period since employment and wages are predicted to move together.

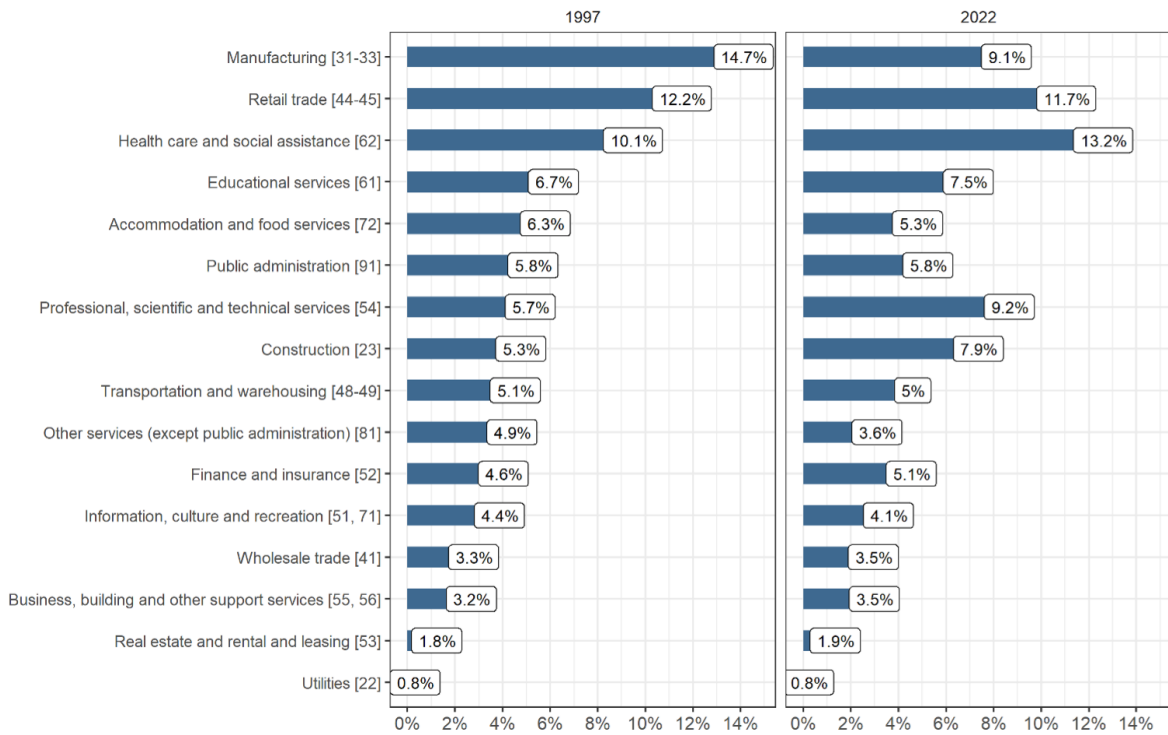
Figure 1: Average nominal hourly wage in 1997, 2008, 2009, 2020 and 2022 by quintile



Source: Labour Force Survey, Statistics Canada.

In Figure 1 the pink line has a steeper slope on the right-hand side compared to the blue line, because wages increased more for the set of jobs in the top two quintiles compared to the rest of the distribution. The difference between mean wage in the first and fifth quintiles is \$13.84 in 1997 and has increased to \$29.40 in 2022. At the same time, the mean wage increased 101.1% in the first quintile and 108.0% in the fifth quintile between 1997 and 2022. The spread between mean wage in the top and bottom quintiles increased most rapidly between 2020 and 2022, up \$3.00 compared to an increase of \$4.83 between 2009 and 2020. The distance between the mean wage in the top quintile and bottom quintile has increased or the wage spread has increased.

Figure 2: Share of total employment for each sector in 1997 and 2022

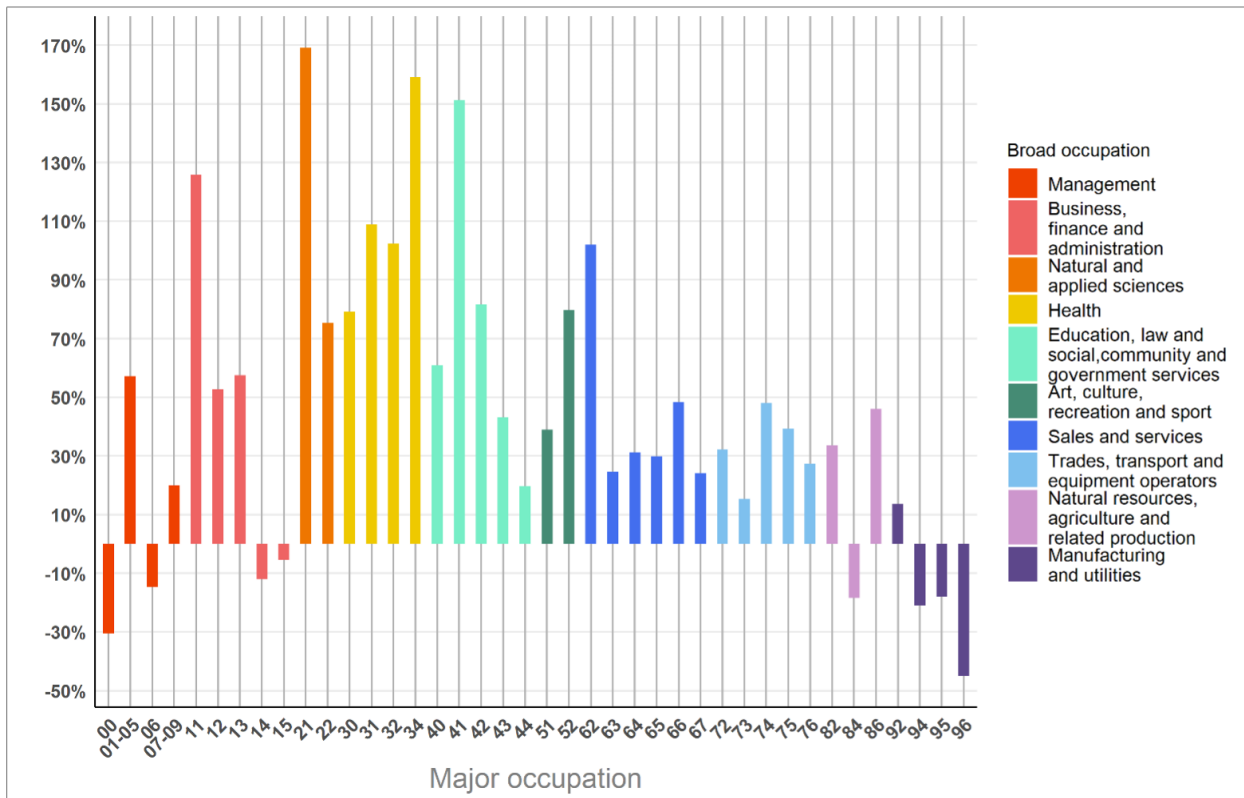


Source: Statistics Canada Table 14-10-0023.

Figure 2 shows the shift in the distribution of employment across sectors between 1997 and 2022. The sectors are ordered according to the share of employment in 1997 with manufacturing capturing the largest share at 14.7%. In 2022, manufacturing falls to the fourth spot with a decline in employment share of 5.6 percentage points to 9.1%. Among the three sectors with the highest share of employment in 1997, retail trade lost 0.4 percentage points but still has the second largest share at 11.7% in 2022. Health care and social assistance has the largest share of employment in 2022 at 13.2%, an increase of 3.1 percentage points since 1997.

Professional, scientific and technical services is the sector that overtook manufacturing to have the third highest employment share in 2022 at 9.1%, which is an increase of 3.5 percentage points. Among the remaining sectors, construction accounts for an increased share of employment in 2022, 5.3% in 1997 compared to 7.6% in 2022. Other services and accommodation and food services have a lower share of employment in 2022 than in 1997. However, these are two of the sectors most affected by the public health measures during the pandemic and employment recovery in these sectors has been slow and is still well below pre-pandemic levels in accommodation and food services.

Figure 3: Change in employment by major occupation between 1997 and 2022



Source: Statistics Canada Table 14-10-0335.

Figure 3 is the change in employment by 2-digit NOC from 1997 to 2022 colour coded to the broad occupational group. On the x-axis are listed the 40 major occupations that are used to create jobs in our analysis. Each of these 40 occupations rolls up into a broad occupational group (see Table 1). Since 1997, employment has only fallen in 3 of 4 manufacturing and utilities occupations (NOC 9) and this aligns with the declines observed in the manufacturing sector over this period seen in Figure 1. Despite some major occupation declines in management (NOC 0); business, finance and administration (NOC 1); and natural resources, agriculture and related production (NOC 8), only manufacturing and utilities (NOC 9) has a net loss. The largest gains are in health (NOC 3); natural and applied sciences (NOC 2); and occupations in education, law and social and community and government services (NOC 4). Again, these outcomes align with the changes in employment share by sector observed in Figure 1. The health sector and health occupations show the greatest relative increases over this 25-year period.

5 Analysis: recent wage and employment developments in Canada

This section examines the employment and wage profiles in Canada over the past 25 years for both long-term and during specific business cycles; January 1997 to October 2008, November 2008 to May 2009, June 2009 to January 2020, and February 2020 to December 2022. Following this, are discussions about the employment levels and wage changes for the occupation-sector specific jobs aggregated by sector, by sex, and by age group.

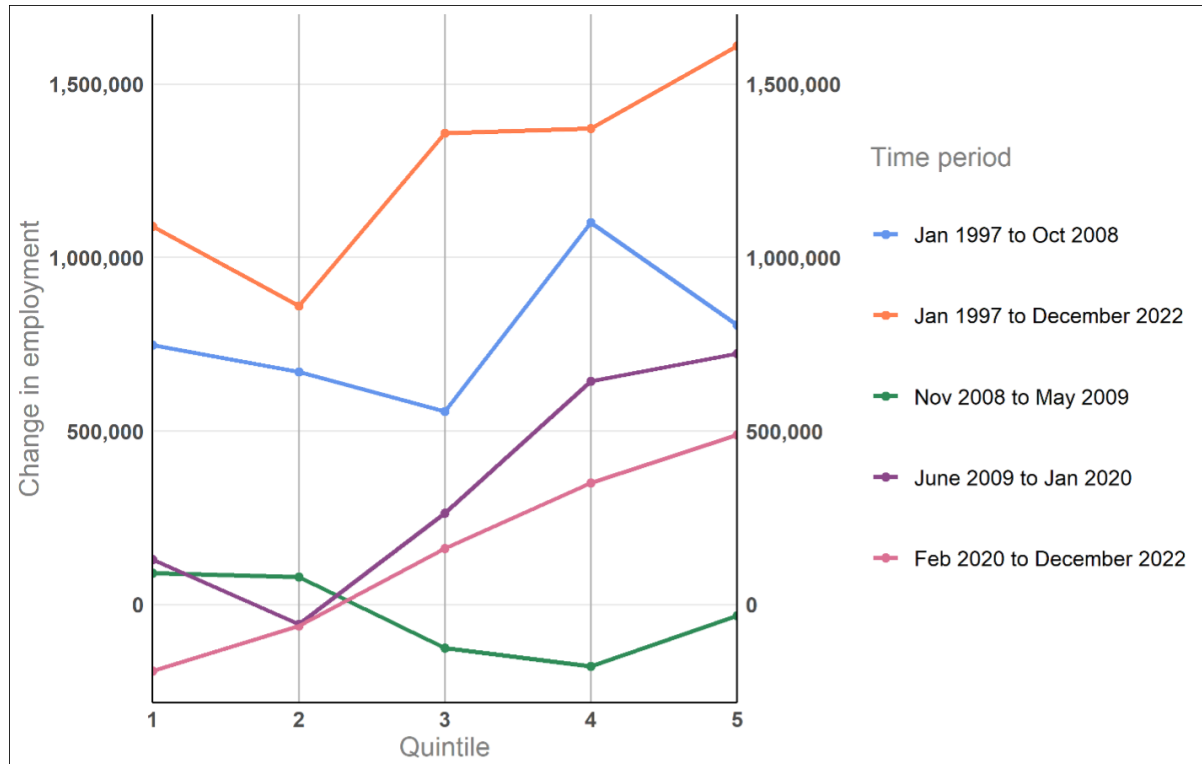
The analysis in this section relies on employment and wage profiles for identifying polarization, upgrading or downgrading. A profile refers to the curve shape where the quintiles are on the x-axis and the value change, either employment or wages, is on the y-axis. Polarization is relatively larger gains in the first and last quintile which results in a U-shaped profile. Upgrading appears as a J-shape because the relative gains increase with the quintile and downgrading has the opposite trend, gains decrease with the quintile. Finally, there are instances of W-shaped profile where the first, third and

fifth quintiles have relatively higher gains. Lastly, polarization does not necessitate a decline in the middle of the job distribution. Polarization means the top and the bottom of the job distribution grow relatively faster than the middle of the distribution.

5.1 Employment shifts by quintile

We first turn to look at the employment patterns of the Canadian labour market and how the structure has changed over time. Starting with the examination of employment patterns by quintile comparing employment in 1997 to 2022 reveals that most employment gains have been at the top and middle of the wage distribution, although there has been growth across all wage levels, as Figure 4 indicates.

Figure 4: Changes in employment by quintile



Source: Labour Force Survey, Statistics Canada.

Employment in the Canadian labour market has grown by 6 million since 1997. 1.6 million – more than a quarter – has been in high-wage jobs, and nearly three quarters of total growth has been in the top 3 quintiles. In short, there has been more employment growth in jobs of higher quality, meaning that Canada has experienced a pattern of job upgrading over time.

However, this pattern of upgrading has not been a consistent trend across all business cycles. Between 1997 and 2008 – the fastest growing period between 1997 and 2022 – employment gains were more concentrated in low and high wage jobs, resulting in a polarized labour market.

During the 2008-2009 recession there were net losses in employment – borne entirely from losses in the in the top 3 quintiles, resulting in a decline in the share of employment in higher quality jobs.

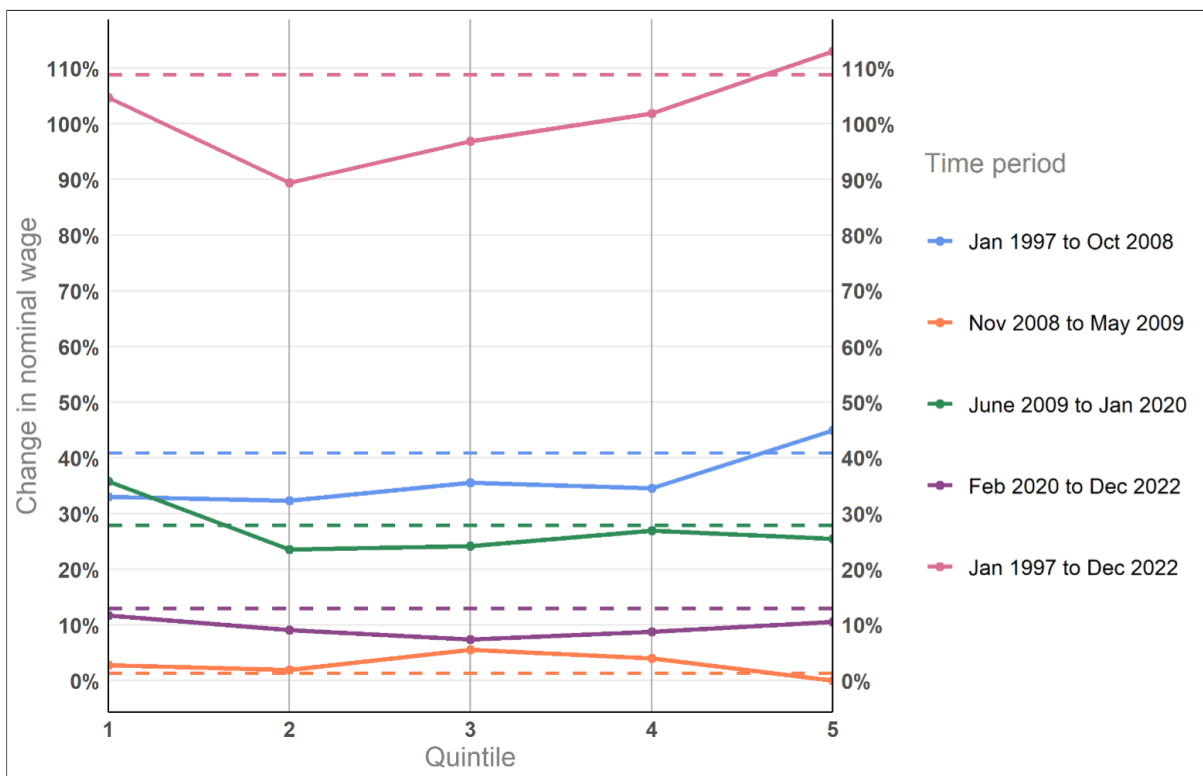
Following the 2008-2009 recession, Canada has experienced a growing share of employment in higher quality jobs – between 2009-2020 and since the onset of the COVID-19 pandemic – both from growth at the middle and top of the wage distribution and from declines at the bottom. Employment losses were concentrated at the bottom of the wage distribution since the onset of the pandemic, primarily in service sector jobs – a handful of which have still not recovered. As a result, virtually all job gains since the onset of the pandemic have been in in mid or high paying jobs. Furthermore, following the

massive losses of employment in March and April 2020, growth has exploded approaching rates not seen since 1997-2008.

5.2 Wage profiles by quintile

The wage profiles for each of the five periods based on nominal wages are shown in Figure 5 and Figure 7 shows the wage profiles based on real wages. The wage profiles here are the curves generated by plotting change in the log of the three-month moving average of mean hourly wage between the start and end of the period (y-axis) by quintile in ascending order (x-axis). Both figures have one dotted line and one solid line for each of the five periods. The wage profile for each period is a solid line and the corresponding period-specific dotted line is the change in the log of mean hourly wages in Canada. The Canada line augments the wage profile visualization by adding a reference point for placing the wage profile high and low points in the broader context of wage changes in Canada during that period.

Figure 5: Nominal wage profiles (solid) compared to average wage growth in Canada (dotted)



Source: Statistics Canada Labour Force Survey and Table 14-10-0063. *Nominal wage change is the difference between the log of the three-month moving of hourly wage between the first month and last month in the period

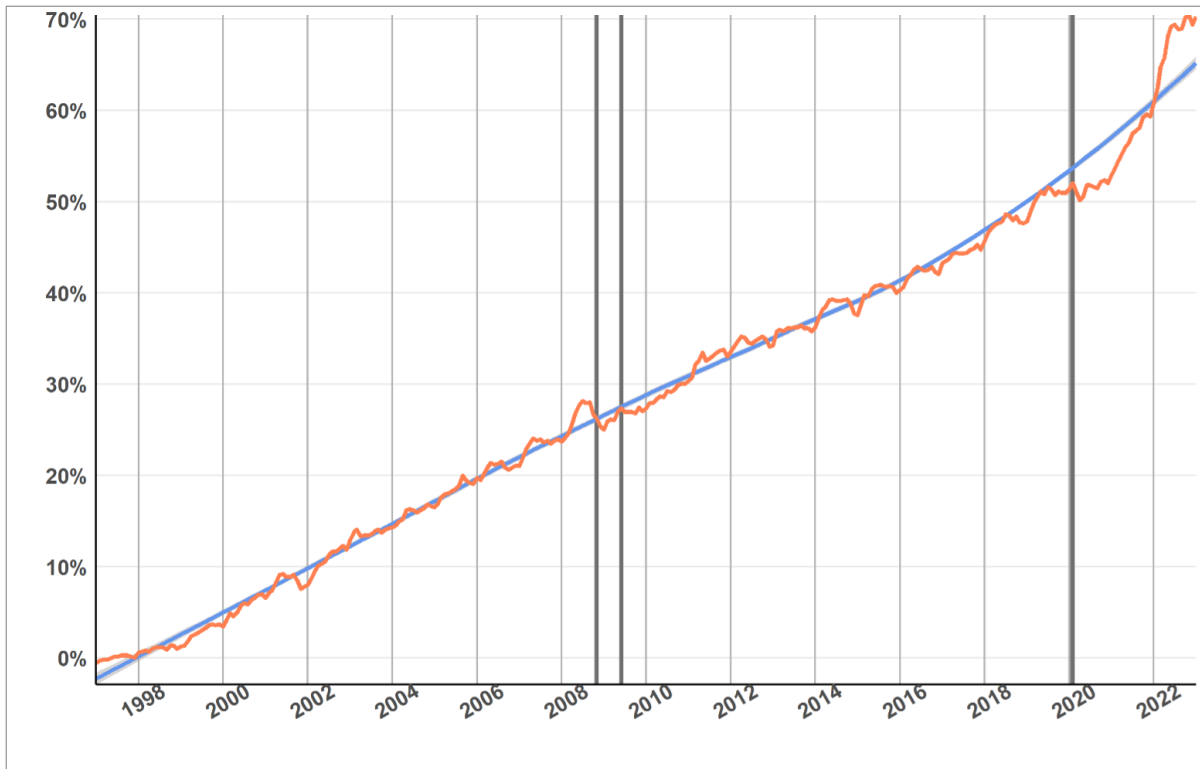
The nominal wage profiles in Figure 5 are the change in log values, labelled as percentages. The 25-year wage profile, in pink, has a J-shape which indicates wage upgrading between 1997 and 2022. The 25-year wage profile has a low at Q2 with increasing consistently through Q5. Falling short of the growth at Q5, Q1 exceeds growth in Q2 through Q4, creating a J-shape. This finding aligns with employment growth during this time which was relatively higher in the top and bottom of the distribution. Overall, there is evidence of job and wage upgrading in Canada between 1997 and 2022.

The 25-year wage profile reflects cumulative changes which can be broken out into the four remaining wage profiles in Figure 5. Breaking out the four periods of interest has several benefits; reveal patterns that are obscured in the cumulative, compare growth rates by period, or identify any quintile-period specific changes large enough to influence the cumulative wage profile. Starting on the left-hand side, Q1, the uptick observed in the 25-year profile comes from relatively higher growth in the 2009-2020 which continues, modestly, through 2022. Similarly, the right-hand side shows that the driving force between relatively high growth in Q5 is the first period, 1997 – 2008. Within the middle of the profile

there are small differences between the growth in Q2 to Q4 that aggregate into the upgrading trend in the 25-year profile.

Since average inflation varies significantly by period there is value in also looking at real wage profiles. According to Statistics Canada’s Consumer Price Index, annual average inflation in 2022 was 6.8% compared to 3.4% in 2021 and 0.7% in 2020. Figure 6 shows the annual average CPI from 1997 to 2022 relative to the base year 1997. Of course, we see an upward trend in CPI since 1997 but the recent spike is a deviation from the trend line. Inflation during the 2020 to 2022 period reached historic highs not seen in Canada since the high inflationary years between 1973 and 1982. Real wage profiles might give better insights on the labour market transformation post-pandemic.

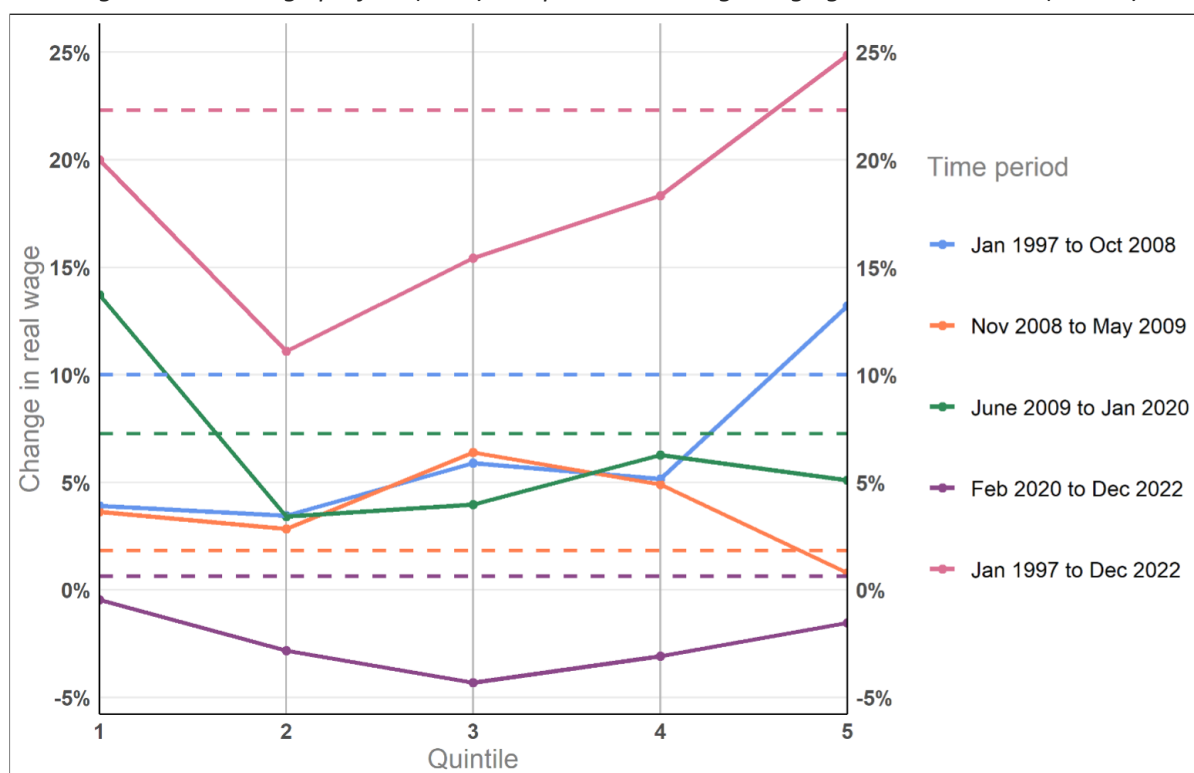
Figure 6: CPI from 1997 to 2022 relative to mean CPI in 1997



Source: Statistics Canada Table 18-10-0004. Vertical lines where the next period of analysis starts: November 2008, June 2009 and February 2020.

The real wage profiles indexed to mean CPI in 1997 are in Figure 7. As expected, the most noticeable change between Figure 5 and Figure 7 is for the February 2020 to December 2022 period. The real wage profile is more concave than the nominal wage profile and the real wage profile now exhibits a clear U-shape. After accounting for inflation there is evidence of wage polarization since February 2020. The post-global financial crisis period also has a stronger U-profile. Meanwhile the pre-global financial crisis period has a J-shaped wage profile that is more pronounced when using real wages. The J-shaped wage profile could be evidence of job upgrading pre-global financial crisis. There is also a J-shaped wage profile from 1997 to 2022 so the pre-global financial crisis upgrading trend had a strong influence on the overall wage trends.

Figure 7: Real wage profiles (solid) compared to average wage growth in Canada (dotted)



*Source: Statistics Canada Labour Force Survey and Table 14-10-0063. *Real wage change is the difference between the log of the three-month moving of hourly wage between the first month and last month in the period. Wages are adjusting use the average CPI in 1997.*

The real wage profiles in Figure 7 are noticeably different from the nominal wage profiles in Figure 5 but the overall trend of wage upgrading between 1997 to 2022 is consistent across both. After adjusting for inflation, the scale of real wage growth is around a fifth of the nominal wage growth. In addition, real wage losses since February 2020 push down the real wage profile for 2020 to 2022 and the 25-year profile. Real wage losses are unique to the most recent period are not large enough to erase the gains between 1997 and 2020. The 2020 to 2022 period is also unique because it is the only U-shaped wage profile meaning that in real wage terms there is a new pattern of wage polarization emerging.

Meanwhile the period of the global financial crisis, November 2008 and May 2009, has the reverse of a U-shape. Both the COVID-19 pandemic and the global financial crisis led to recessions and significant employment losses but with mirrored wage profiles. The wage profiles for the longer periods, pre-global financial crisis and post-global financial crisis to pre-pandemic also exhibit some mirroring. Before the global financial crisis wage gains were concentrated at the top of the jobs distribution but the pattern reverses after the global financial crisis and before the pandemic as the wage growth at the bottom of the distribution accelerates. These two long-term trends combine to create the J-shape observed for the 25-year wage profile.

6 Analysis: Employment and wage trends by sector, sex and age group

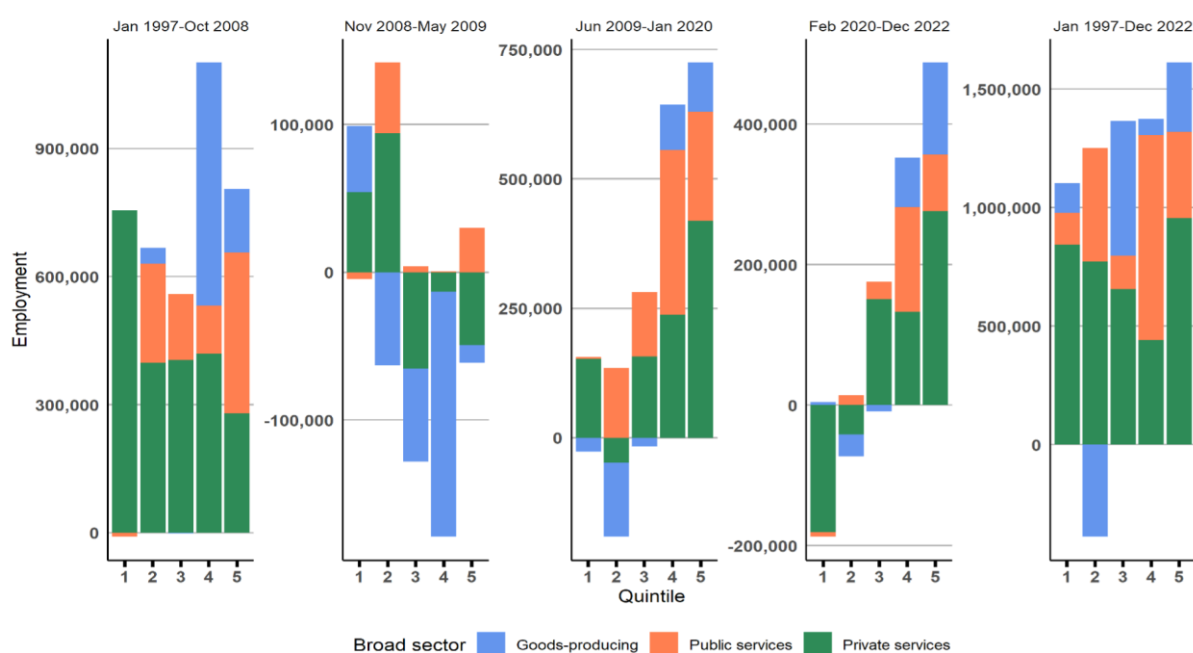
Policy makers in Canada face a variety of pressing labour market issues exacerbated by a rising cost of living. Historically high unemployment in 2020 highlighted the income and employment precarity of low-wage – especially minimum wage – jobs in the private services sector. The pressure of an ageing population on the labour force participation and increased demand for health care has contributed to skilled labour shortages. Finally, policy makers should be aware that achieving wage equality goes beyond equal pay for equal work because men and women make labour market decisions that feed

back to wage equality such as women taking parental leave at higher rates than men, women sorting into lower paying jobs in the care economy such as teachers and early childhood educators whereas more men sort into higher paying trades jobs such as electricians. The next three sections investigate employment and wage patterns for broad sectors, sex and age.

6.1 Employment in the services sector climbs due to gains in low-skill and high-skill services jobs

To understand the underlying dynamics of the employment changes we've seen in the Canadian labour market we looked at each of the 20 Canadian sectors in NAICS as well as aggregated groups of these sectors – referred to as broad sectors: 1) goods-producing³ 2) public services⁴ and 3) private services⁵. Figure 8 highlights the changes in employment for each of the broad sectors across the business cycles and between 1997 and 2022.

Figure 8: Employment change by broad sector



Source: Labour Force Survey, Statistics Canada.

Each of the broad sectors have grown between 1997 and 2022, however, the service sectors have done so considerably faster – with public services growing over three times faster (65%) than the goods producing sectors (20%) and private services (54%) just under. As a result, the total share of employment for public and private services has grown while good-producing sectors have declined.

Table 5 highlights the employment changes for Canadian broad sectors. Private services grew fastest between 1997 and 2008, while all three sector groups experienced strong growth overall. The 2008-2009 recession was hardest on goods-producing sectors. Public services performed better than private services – but both managed to add jobs throughout this period. Post-recession up to the pandemic (2009-2020), public services continued to experience high growth. Private services grew about half as

³ Agriculture, forestry, fishing and hunting; Mining, quarrying, and oil and gas extraction; Utilities; Construction and Manufacturing.

⁴ Healthcare and social assistance; Educational services and Public administration.

⁵ Wholesale trade; Retail trade; Transportation and warehousing; Information and cultural industries; Finance and insurance; Real estate and rental and leasing; Professional, scientific and technical services; Management of companies and enterprises; Administrative and support, waste management and remediation services; Arts, entertainment and recreation; Accommodation and food services and Other services.

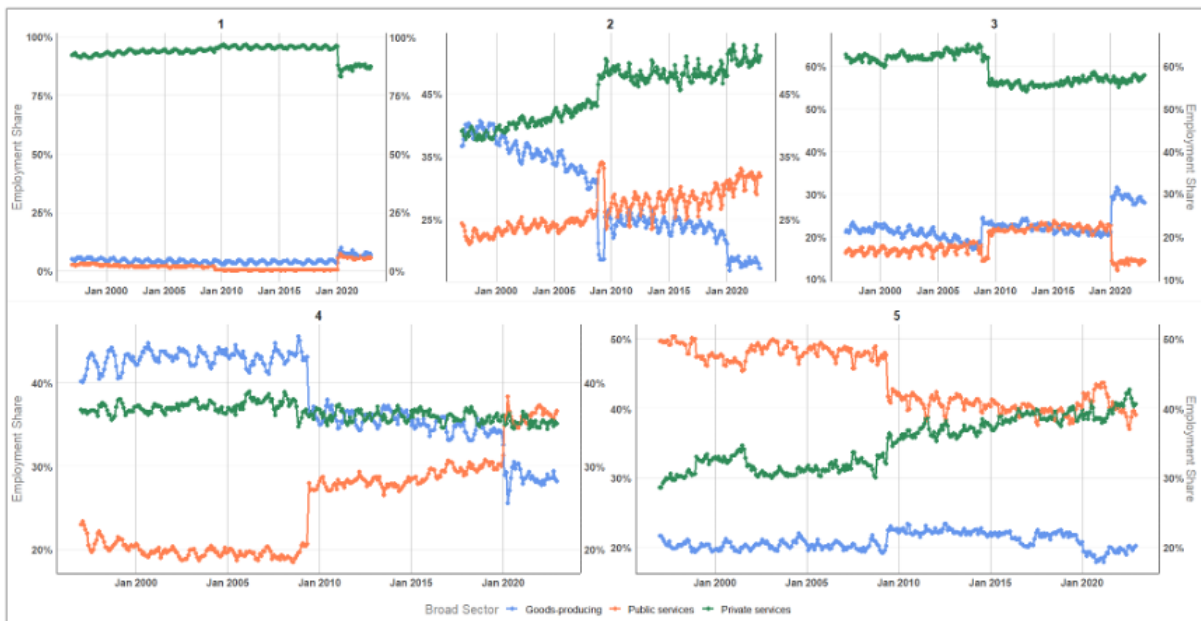
fast as public services but still gained close to 1 million jobs. The goods-producing sectors saw minimal but net job losses throughout this period. Since the onset of the pandemic the goods-producing sectors has been adding jobs – growing quicker than private services. Public services, however, have been the most robust stemming from the strong growth in public administration.

The fastest growing sectors have been professional, scientific, and technical services (148%), construction (140%), and healthcare and social assistance (90%), with employment gains of 1.1, 0.9 and 1.2 million respectively. The biggest declines were seen in agriculture, forestry, fishing and hunting (-39%) and manufacturing (-8%), with losses of 190k and 158k respectively. The sector gains and losses, however, are not spread evenly across quintiles. For the most part they are concentrated in one or two quintiles.

Healthcare and social assistance gains are concentrated in quintile 4 (+716k). Professional, scientific and technical services in quintile 5 (+611k) and quintile 3 (+350k). Construction saw large gains across quintile 3, 4 and 5. Public administration is concentrated in quintile 4 and 5. Retail trade was concentrated in quintile 1 (+460k). Transportation and warehousing saw a trade-off with losses in quintile 3 (-307k) being offset with gains in quintile 2 (+613k) – an example of sectoral downgrading. Manufacturing also experienced sectoral downgrading with the biggest losses coming from quintile 4, as well as net losses overall. Agriculture on the other hand experienced net losses – but with gains in higher quintiles, revealing a trend of sectoral upgrading.

Figure 9 highlights the employment shares of broad sectors by quintile.

Figure 9: Broad sector employment share by quintile



Source: Labour Force Survey, Statistics Canada.

Employment in low-wage jobs (quintile 1) is heavily concentrated in private services. The share of low-to-mid-wage jobs (quintile 2) is more evenly spread across the 3 broad sectors, but still concentrated in private services. In 1997 goods-producing sectors had the largest share of low-to-mid- wage employment but that steadily declined over time to the smallest share. Mid-wage jobs (quintile 3) are concentrated in private services as well. Mid-to-high wage (quintile 4) employment which has been well-represented in the goods-producing sectors in the past, followed by private and public services, has now become much more evenly spread across all 3 broad sectors. Public services have seen their share grow at the expense of goods-producing sectors. High-wage (quintile 5) employment was concentrated in public services between 1997 to 2008 but saw a drop during the 2008-2009 recession. Private services has seen gains over time in high-wage employment and splits a roughly equal share of

employment with public services now (40% and 40%). The share of high-wage jobs in goods-producing sectors has stayed steady over time.

Overall, employment at the bottom of the wage distribution is concentrated in private services, whereas employment at the top is more evenly distributed between the broad sectors. Public services and goods-producing sectors are concentrated in high-wage jobs while private services are concentrated in low-wage jobs. However, these job-sector-wage dynamics are evolving over time. While the employment changes for goods-producing and public services have been in mid-high wage job gains across all business cycles (except for 2008-09 recession), private services saw employment changes concentrated in low-wage job gains early on (1997-2008) but have since shifted to being concentrated in the middle and high-wage jobs as well.

Consequently, the job upgrading experienced over time in Canada's labour market is a product of these converging sector forces. Public services and goods-producing sectors are concentrated in high wage jobs – and their growth, along with the more recent trend of high-wage job growth from private services sectors has resulted in the job upgrading seen overall.

Table 4: Employment change and growth by sector.

	January 1997 to October 2008		November 2008 to May 2009		June 2009 to January 2020		February 2020 to December 2022		January 1997 to December 2022	
	Δ	%	Δ	%	Δ	%	Δ	%	Δ	%
Agriculture, forestry, fishing and hunting	-72000	-14.7%	26000	6.9%	-92750	-21.8%	-34500	-10.3%	-190250	-38.9%
Mining, quarrying, and oil and gas extraction	101250	57.9%	-30000	-11.1%	6250	2.6%	30750	12.3%	104750	59.9%
Utilities	23750	19.9%	3250	2.3%	-9500	-6.6%	2250	1.6%	22500	18.9%
Construction	678000	107.3%	-119500	-9.2%	160000	13.0%	131500	9.5%	884750	140.0%
Manufacturing	22750	1.2%	-138750	-7.3%	-68500	-3.9%	35500	2.1%	-158500	-8.3%
Goods- producing	753750	22.7%	-259000	-6.5%	-4500	-0.1%	165500	4.3%	663250	20.0%
Educational services	178500	19.8%	-10250	-0.9%	195750	18.2%	33750	2.7%	391250	43.4%
Healthcare and social assistance	536750	39.5%	37500	2.0%	562750	28.9%	71250	2.8%	1230000	90.4%
Public administration	150750	19.4%	50500	5.7%	33250	3.5%	156250	15.8%	363250	46.6%
Public services	866000	28.5%	77750	2.0%	791750	19.9%	261250	5.5%	1984500	65.3%
Wholesale trade	179750	40.9%	2500	0.4%	-14750	-2.4%	44250	7.2%	215500	49.0%
Retail trade	393750	24.1%	-38000	-1.9%	206000	10.3%	12250	0.6%	599250	36.6%
Transportation and warehousing	201750	30.3%	-25250	-3.0%	191250	23.0%	-8500	-0.8%	348500	52.4%
Information and cultural industries	31500	9.4%	9000	2.4%	-60500	-15.7%	40250	12.2%	34250	10.2%
Finance and Insurance	155750	25.4%	-29500	-3.9%	128000	17.2%	97750	11.0%	371500	60.6%
Real estate and rental leasing	29750	11.9%	24500	8.4%	27250	8.3%	25500	7.3%	124000	49.7%
Professional, scientific and technical services	436250	59.3%	-26750	-2.3%	367000	31.3%	300500	19.7%	1090500	148.2%

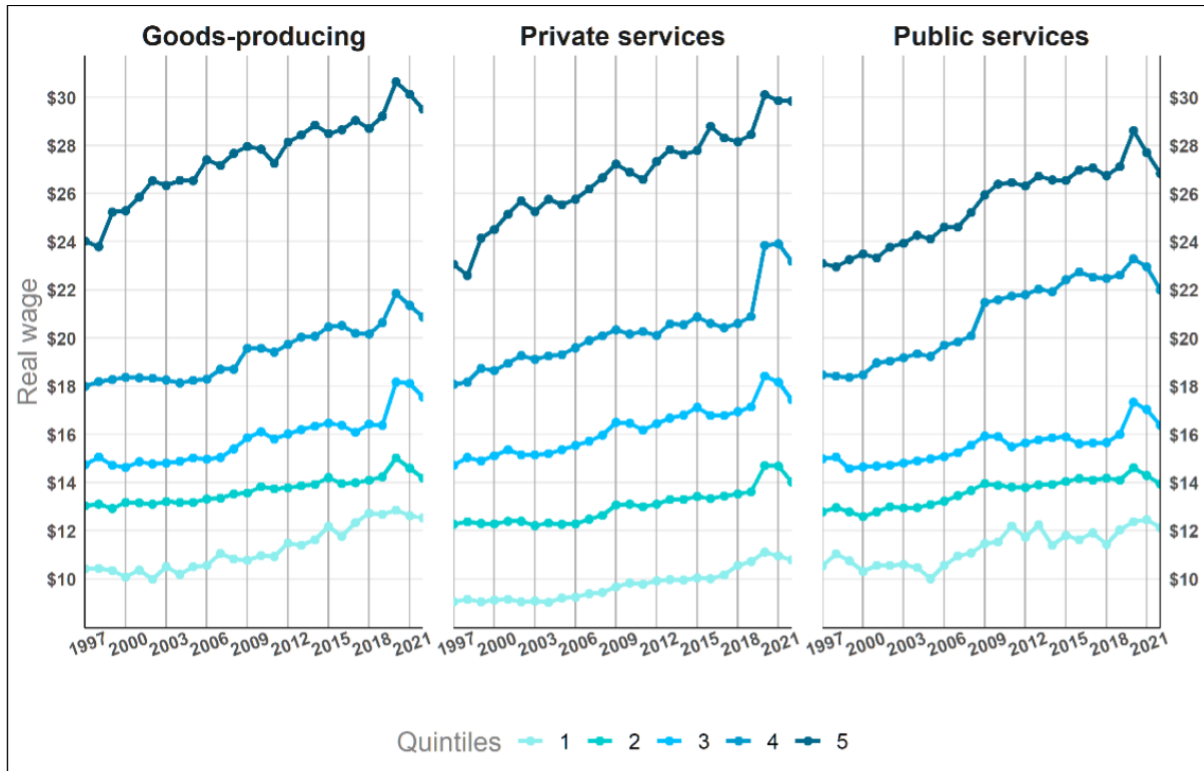
Structural Changes in Canadian Employment from 1997 to 2022

Administrative and support, waste management and remediation services	295250	72.2%	24500	3.6%	-2250	-0.3%	-47500	-6.5%	278500	68.1%
Arts, entertainment and recreation	136000	61.4%	38250	11.4%	3500	0.9%	13250	3.2%	202500	91.4%
Accommodation and food services	269000	33.4%	19500	1.8%	71250	6.3%	-94750	-8.0%	283250	35.2%
Other services	129250	20.3%	21500	2.8%	1250	0.2%	-45250	-5.6%	119250	18.7%
Private services	2258000	33.5%	20250	0.2%	918000	10.1%	337745	3.4%	3667000	54.3%

Source: Labour Force Survey, Statistics Canada.

Figure 10 shows the trends for average real wage by year from 1997 to 2022 by quintile in each broad sectors. The jump in average real wage in 2020 and subsequent drop in most quintiles across the broad sectors in Figure 10 captures two effects. First, initial job losses in 2020 are concentrated in low-income occupations, hard-hit sectors (e. g. retail trade) and specific occupation-sector combinations such as casino managers and airport counter attendants. Second, from early 2021 through 2022 strong nominal wage growth struggled to keep pace with high inflation stifling real wage growth. Except for construction, the most affected sectors in 2020 fall under private services and low-income jobs are concentrated in the private services. At the same time, the fastest growing sector in the private services is professional, scientific and technical services which skews towards high-income jobs. In the middle panel of Figure 10, wages climb in the top two quintiles for private services and sustains real wage gains over 2019. The employment share of private services has been increasing in high-wage jobs post-global financial crisis so there is a trend of both job and wage upgrading in the private services.

Figure 10: Average real wage by year for broad sectors



Source: Labour Force Survey, Statistics Canada.

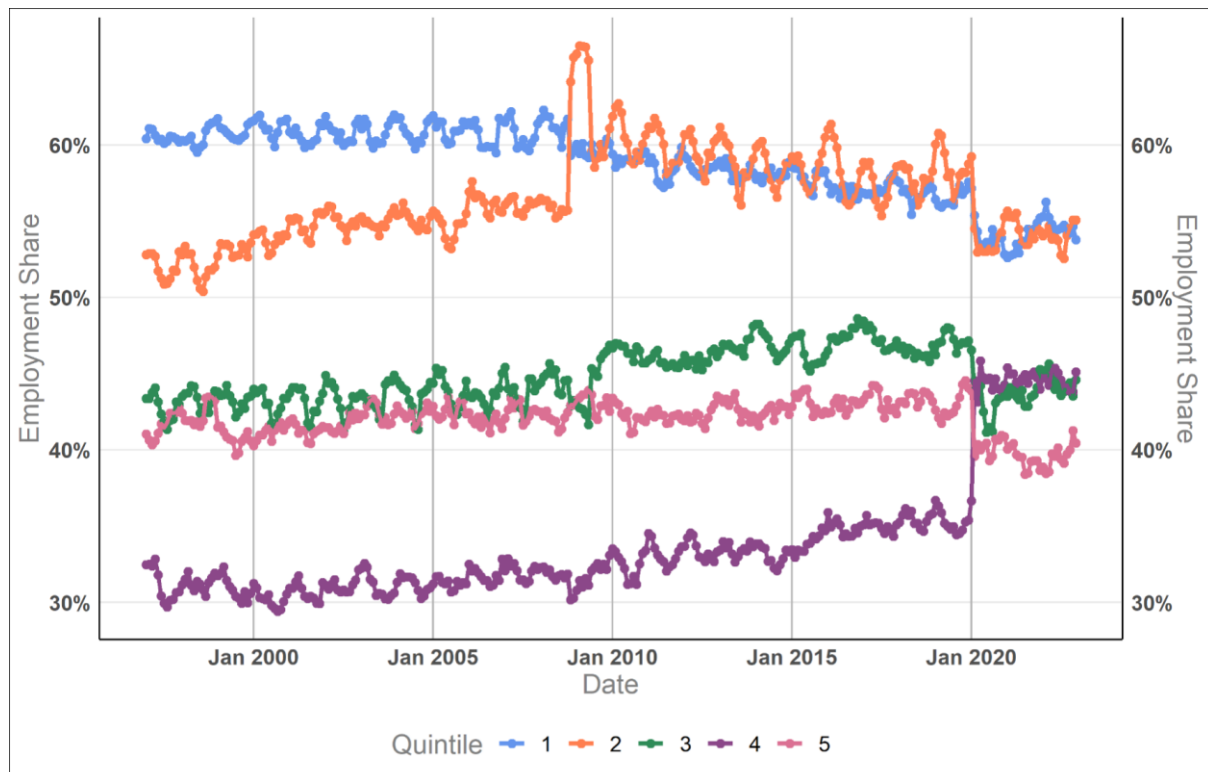
Construction and manufacturing are the two largest goods-producing sectors and, as shown in Figure 2, the employment share of manufacturing fell between 1997 and 2022. Since the global financial crisis, the employment share for the goods-producing sector decreased for Q1 to Q3. However, the number of manufacturing jobs in the bottom 2 quintiles has increased due to relatively small wage growth in low-skill occupations such as labourers (manufacturing, trades helpers, harvesters) and in sales (representatives, customer service, support occupations and supervisors). At the same time, the left most panel in Figure 10 shows higher wage growth post financial crisis and pre-pandemic in Q1 in the goods-producing sector compared to the services but this occurs because the manufacturing jobs falling into Q1 have higher wages than existing set of jobs, pulling up the wage.

In the growing construction sector, there is wage upgrading as accelerated wage growth pushed middle-skill construction jobs in business, finance and administration from Q2 to Q3 and customer service and sales representative (wholesale trade excluding retail and supervisors) from Q1 to Q3. In the 2020 to 2022 period there are no construction jobs in the bottom quintile and at the top jobs in management or technical occupations are in Q5 and trades occupations in construction have been assigned to Q4 since 1997.

6.2 Job upgrading for women concentrated in the fourth quintile

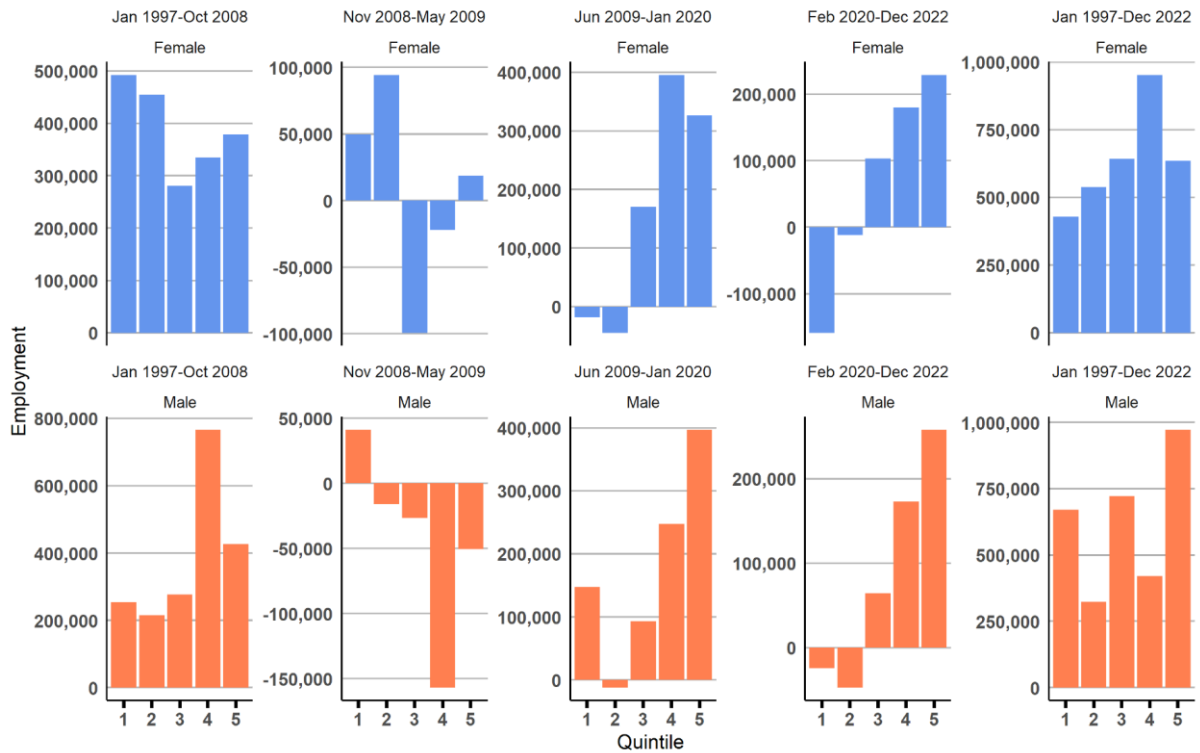
Figure 11 shows the women’s employment share by quintile, which have been trending closer to an equal share with men over time. Quintile 1 employment is spread much more evenly between men and women in 2022 compared to 1997. Quintile 2 employment has also been consistently trending towards 50% since 2009 but remains elevated. The quintile 4 employment share has jumped up since 2020. Overall, women are slightly overrepresented in quintile 1 and 2 (53-55%), underrepresented in quintile 3 and 4 (45%) and even more underrepresented in quintile 5 (40%). There has been some rapid movement in shares since the onset of the pandemic, with employment shares in all quintiles except the 4th dropping suddenly. As a result, quintile 1, 2 and 4 have trended towards 50% while quintile 3 and 5 have trended away.

Figure 11: Employment share of women by quintile, 1997 - 2022



Source: Labour Force Survey, Statistics Canada.

Figure 12: Employment change in job-wage quintiles by sex

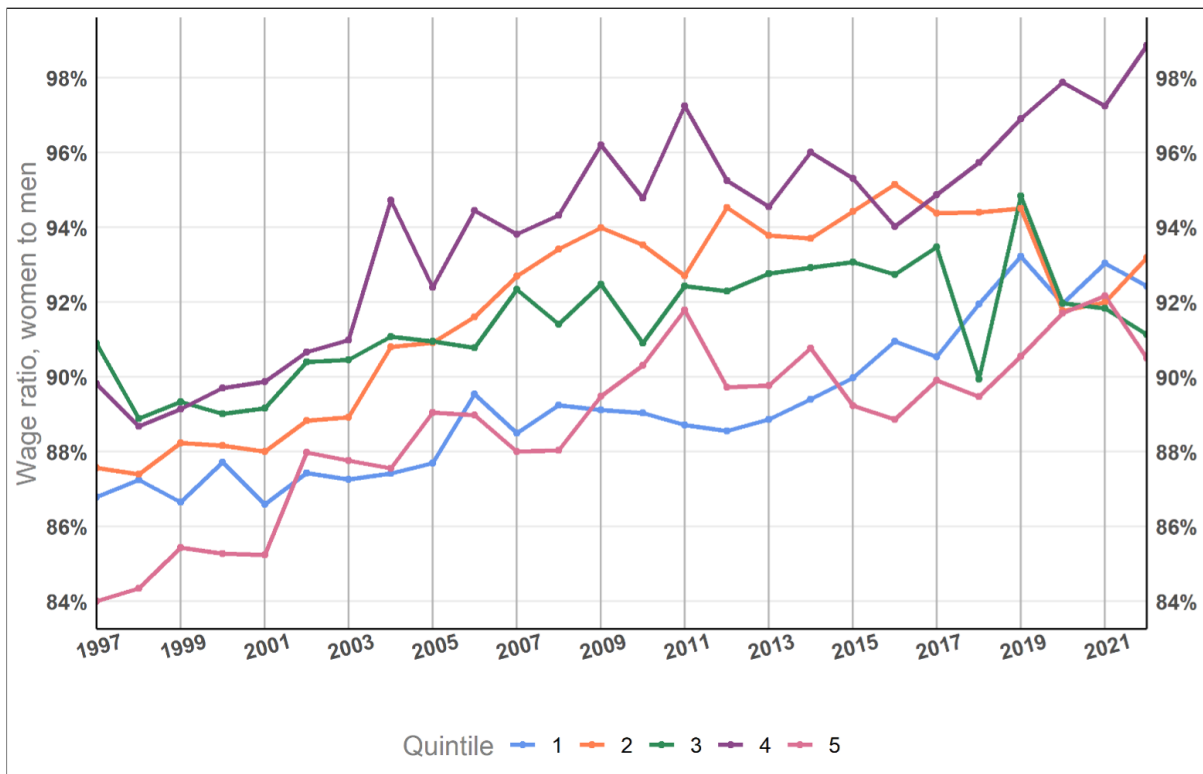


Source: Labour Force Survey, Statistics Canada.

Figure 12 shows the employment changes by sex. Between 1997 and 2022, women saw a trend of upgrading with the biggest gains in quintile 4 accompanying gains across the entire wage distribution. The employment trend for men is w-shaped, with highest gains at quintile 5, 3 and 1 respectively. Between 1997 and 2008 women saw employment gains across the board but with gains concentrated at the bottom – a downgrading in the quality of women’s employment. Men saw more of an upgrading with gains concentrated in quintile 4 during this period. The 2008-2009 recession resulted in downgrading for both men and women, with men seeing losses more concentrated at the top. Between 2009-2020 and 2020-2022 men and women saw similar trends of upgrading, but with women seeing larger gains in quintile 4 and larger losses in quintile 1 and 2.

Any policy discussion about the wage gap between men and women needs to consider the interaction between the employment distribution and wages. If the wage gap were to close across all the quintiles there could still be under-representation of women in high-paying jobs and over-representation in low-paying jobs. Baker and Fortin (2001) found evidence of what they refer to as “swimming upstream” where the narrowing wage gap also encourages more women to seek employment in these jobs. In theory, if women have the expectation that they will earn the same wage as male counterparts in a high-skill job, they are more likely to pursue the required education and seek employment in that field so a narrowing wage gap will lead to greater equality in representation.

Figure 13: Average wage of women over average wage of men by quintile, 1997 to 2022.



Source: Labour Force Survey, Statistics Canada.

Figure 13 shows the ratio of mean wage of women to men in each quintile by year. According to Figure 13 the wage gap between men and women has decreased across all quintiles since 1997 with most of the narrowing happening between 1997 and the early 2010s. Between 1997 and 2022 the wage gap between men and women is largest in Q1 and Q5 and smallest in Q4, where job upgrading for women is concentrated. Post-pandemic there is job upgrading for both men and women yet the wage gap increased in all but Q4.

6.3 Canada’s aging population

Overall, the total employment share of core-age workers (25-54) is shrinking, and the share of mature workers (55+) is growing. The young worker (15-24) share has remained stable over time. The decline in the share of core-age workers and growth in the share of mature workers has been steady over time and consistent across quintiles.

Core-age workers still hold majority shares across all quintiles, between 65% and 80% with the exception of low-wage jobs where the shares are more evenly distributed between young and core-age workers.

Figure 14 highlights the employment changes for young, core-age and mature workers. Employment changes from 1997-2022 for core-age workers have been concentrated in mid to high-wage employment with gains after 2009 coming solely from quintile 3, 4 and 5. Mature workers saw relatively equal job gains across quintiles but with the biggest gains in mid-wage and high-wage employment. This employment pattern for mature workers has been more consistent over time, however, since the onset of the pandemic their employment gains have also come solely from the top of the wage distribution. Overall, the dynamics of an aging population have resulted in mature workers accounting for a growing share of total employment, while core-age workers declining share becomes more concentrated in mid and high-wage jobs.

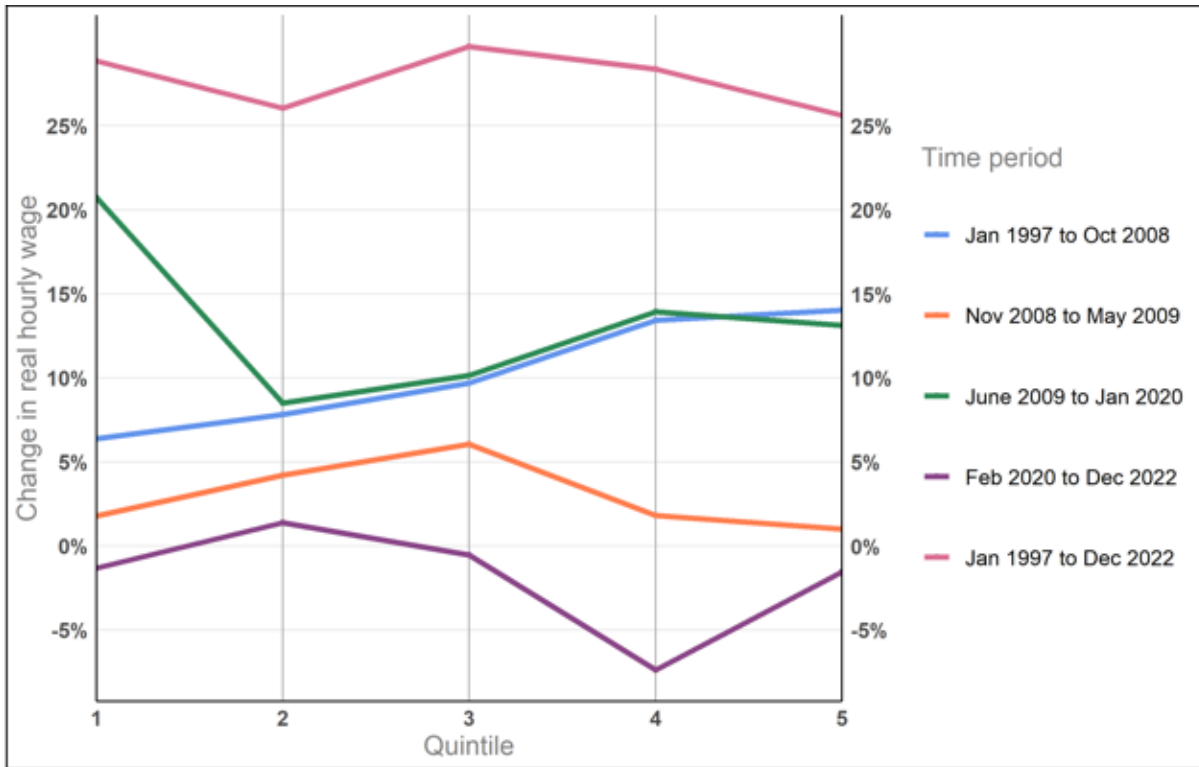
Figure 14: Employment change in job-wage quintile by age



Source: Labour Force Survey, Statistics Canada.

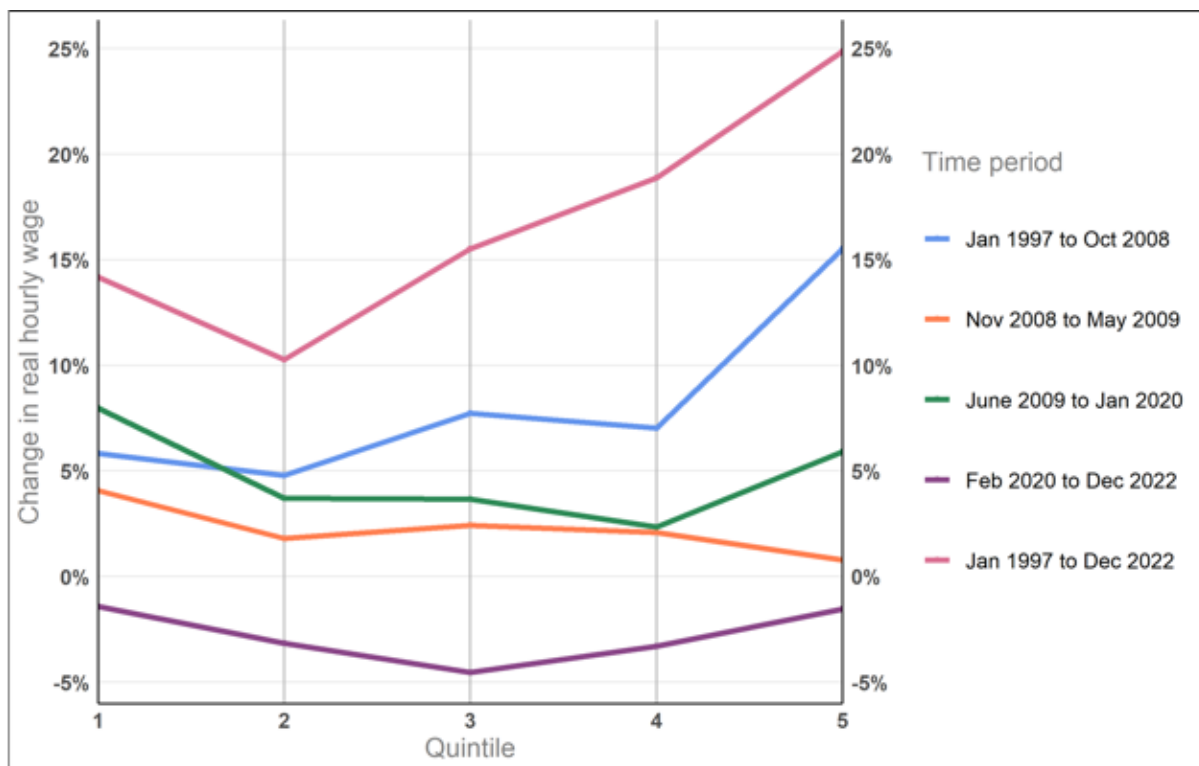
Below are the wage profiles for youth (Figure 15), core-age workers (Figure 16), and mature workers (Figure 17). Keep in mind that each figure does not represent an equitable share of the labour market nor is each age group distributed along the distribution evenly. In general, core-age workers account for upwards of 65% of employment in the top 80% of jobs so the wage profiles of core-age workers heavily influence the overall wage profiles in Figure 4 and Figure 6, especially for mid-wage and high-wage jobs. This is evident in Figure 16 since the core-age wage profiles are very similar to the aggregate trends in Figure 6. The 25-year profile for core-age workers has a J-shape indicating job upgrading and the 2020 to 2022 core-age wage profile exhibits polarization.

Figure 15: Change in real wages by quintile for youth (15 to 24 years)



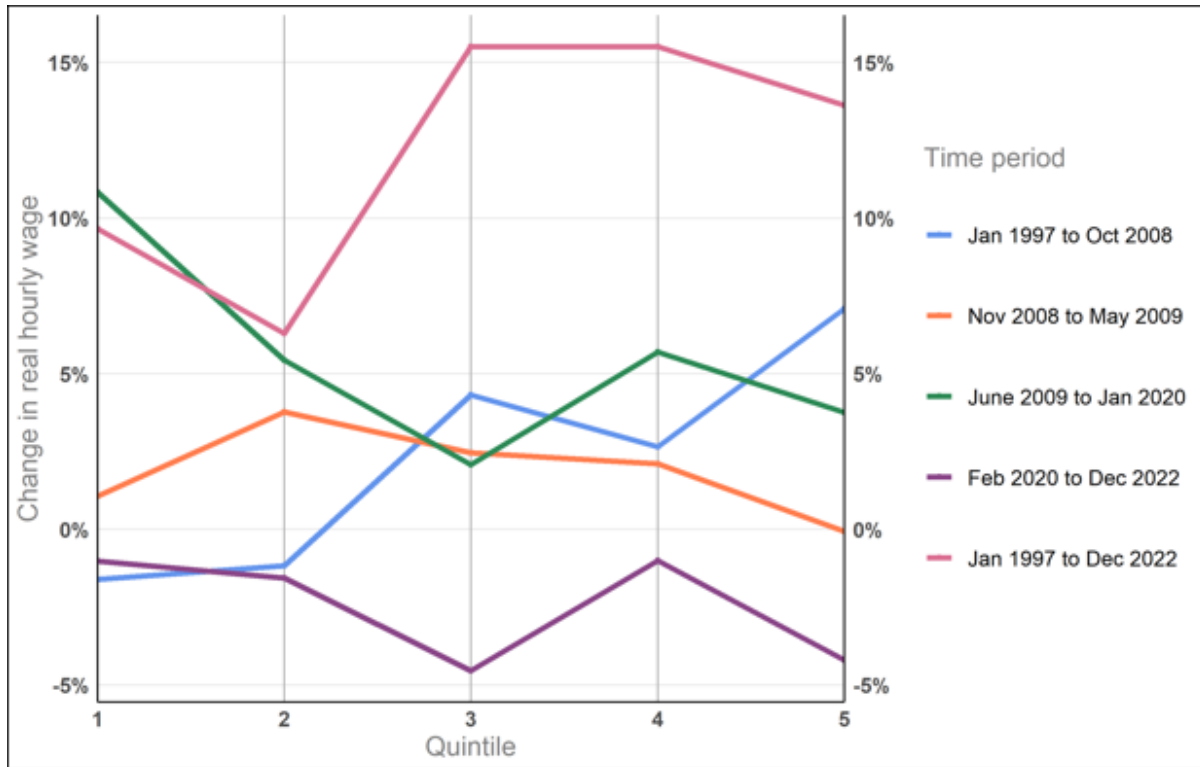
Source: Labour Force Survey, Statistics Canada.

Figure 16: Change in real wages by quintile for core-age workers (25 to 54 years)



Source: Labour Force Survey, Statistics Canada.

Figure 17: Change in real wages by quintile for mature workers (55 years and over)



Source: Labour Force Survey, Statistics Canada.

Neither the youth (Figure 15) or mature (Figure 17) wage profiles exhibit job upgrading or wage polarization patterns that match Figure 7. However, youth workers account for nearly half of employment in the first quintile and consistently earn the lowest wages (see Table 5 in appendix) so the youth wage profiles are more likely to reflect the left hand side of the profiles in Figure 7 but this is only the case during the 2009 to 2020 period. Finally, the wage profiles of mature workers differ significantly from the aggregate trends. The 25-year profile is flat between Q3 and Q4 with a slight dip into Q5. After 2008, each period has slower growth in Q5 than Q4. As Canada's population continues to age and the cost of living continues to rise the employment and wage profiles for mature workers are increasingly important.

7 Robustness test: Quintiles fixed to 1997 wage distribution

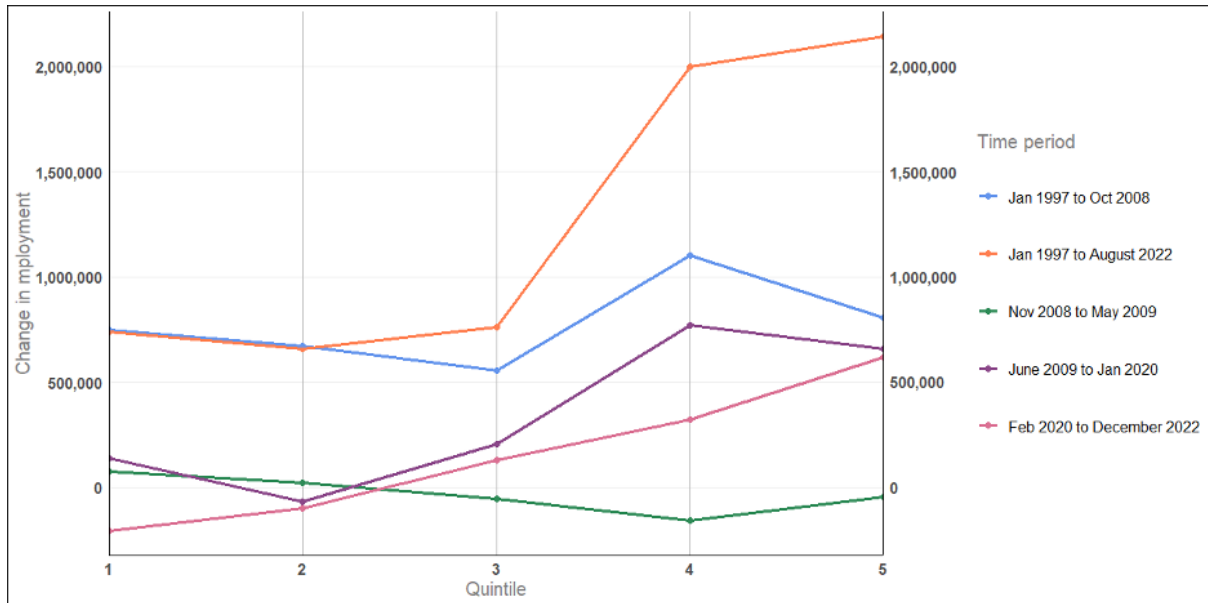
Here we perform a robustness test where the quintiles are fixed to the 1997 wage distribution rather than adjusted at the start of each period. There are two important impacts of fixing the quintiles on the analysis. First, adjusting the wage distribution of jobs at the start of each period ensures that each quintile has a 20% share of employment at the start of the period and second, ensures correct representation of the low-, mid-, or high-wage jobs at the start of each period and not a previous period. Fixing quintiles to the 1997 distribution of jobs means that quintiles have equal employment shares only in 1997 and the low-, mid-, high-pay jobs sets represent the 1997 labour market. The 25-year employment and wage profiles shown throughout this paper compare the change in employment between 1997 and 2022 using quintiles from those periods (Figures 4 and 7) but the figures shown in this section (Figures 18 and 19) compare the change in employment or wages from 1997 and 2022 for the same set of quintiles – the 1997 base year.

Using fixed groups of quintiles across periods is the most common practice in the job quality literature, however this analysis relies on the assumption that jobs are relatively stable within the wage distribution (Wright and Dwyer 2003; Stehrer, Ward and Macias 2009). This assumption is tested here, by comparing the employment changes from fixed and floating quintiles – highlighted by Figure 4 and Figure 18. The employment patterns are largely unchanged between the two. Figure 18 also shows

modest polarization between 1997 and 2008, a downgrading of job quality throughout the financial crisis followed by an upgrading of job quality between 2009 and 2020 and since the onset of the pandemic. Overall, between 1997 and 2022 the trend of job upgrading is clear for fixed quintiles as well but with larger gains in quintiles 4 and 5 and more modest gains in quintiles 1, 2 and 3.

The higher concentration of gains at the top of the wage distribution for the fixed groupings indicates there has been movement in jobs along the wage hierarchy over time. Although the broad employment patterns remained the same the differences between figures 4 and 18 highlight the impact this kind of job movement can have on this analysis.

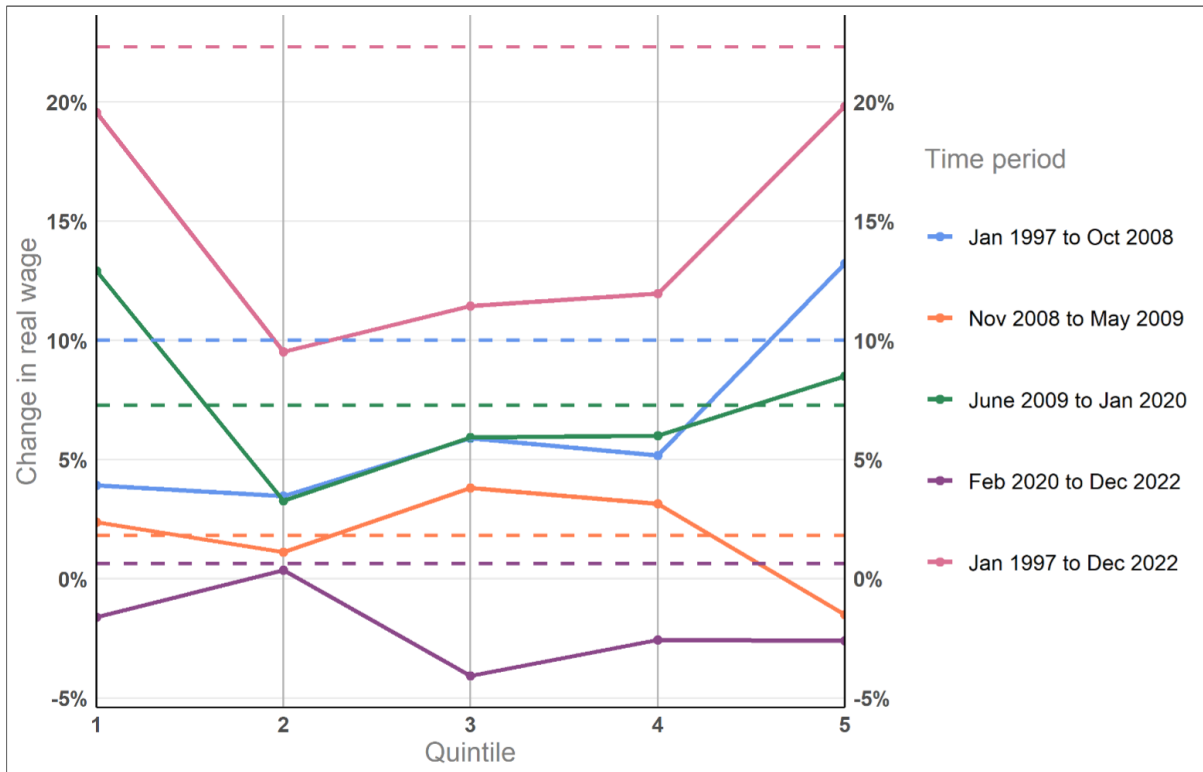
Figure 18: Change in employment fixed quintiles



Source: Labour Force Survey, Statistics Canada.

The real wage profiles in Figure 19 are based on the fixed-quintiles derived from the 1997 wage distribution of jobs. The difference between Figure 19 and Figure 7 is that the real wage profiles in Figure 7 each use a different set of quintiles and in Figure 19 the same set of quintiles are used in each period. Most importantly, the 25-year wage profile in Figure 19 is comparing the same set of quintiles in 1997 and 2022 whereas in Figure 7 the 25-year wage profile captures wage growth in quintiles that contain a different set of jobs in 1997 and 2022. Previously, there was a pattern of job upgrading between 1997 and 2022 as shown by a J-shape wage profile in Figure 7. On the other hand, Figure 19 shows the 25-year wage profile has a U-shape. This means that holding the quintiles fixed increases the degree of wage polarization observed between January 1997 and December 2022.

Figure 19: Real wage profiles (solid) compared to average wage growth in Canada (dotted)



Source: Statistics Canada Labour Force Survey and Table 14-10-0063.

The shift in wage profiles since 2009 reflects changes in the underlying wage distribution. At the top and bottom of the distribution letting the quintiles vary over time implies that the highest and lowest earning jobs will be in the top and bottom quintiles. Fixing the quintiles to 1997 means that the lowest paying jobs from 1997 are in the lowest quintile, regardless of the current wage. The mean wage of the quintile is just the weighted mean of the mean wages of the jobs in the quintile where the weight is the employment share. As jobs are shifted between quintiles both the employment share and change in mean wage over time will impact the result.

We find that in the long run both fixing the quintiles or allowing them to vary over time generates a U-shaped wage profile. In the short run, the choice of quintiles matters both for understanding the wage profile by quintile within periods of interest but also for understanding how the cumulative effects of wage changes contribute to the long run wage polarization. We find that the choice of quintiles affected the wage changes observed in later periods from June 2009 onwards excluding the peak of the pandemic’s impact on the Canadian labour market, February 2020 to April 2020. The labour market in Canada has historically low unemployment, at 5% in December 2022, and climbing vacancy rates. The pressure of a tight labour market could drive up wages in affected sectors which might change the wage profile observed for the most recent period.

8 Conclusions

Using the European Jobs Monitor’s job-based approach⁶ this paper analyses the employment distribution and real wage growth for low, middle and high-wage jobs for indications of job polarization. We find that the employment and real wage profiles have a J-shape between 1997 and 2022 which means larger relative growth at the top of the job distribution. These patterns hold in the robustness exercise with fixed quintiles. These findings indicate that the Canadian labour market has

⁶ Based off work by Stiglitz and Wright & Dwyer.

experienced a pattern of job upgrading between 1997 and 2022 with more employment growth in higher-income or high-quality jobs.

Within the pattern of job upgrading there are several other key takeaways. First, since the late 1990s the composition of employment by sector has shifted away from manufacturing while the employment in health care and social assistance has grown. This sectoral shift has led to a decline in employment in a male-dominated sector with rising employment in a female dominated sector including the most common occupation for women in 2022, registered nurses and psychiatric nurses. Sustained growth in sectors that mainly offer mid to high wage jobs, such as health care and social assistance and a transition in private services growth towards higher-wage jobs has contributed to the pattern of upgrading.

Second, women experienced job upgrading post-global financial crisis with gains concentrated in Q4 which is the only quintile where the wage gap continues to close into 2022. At the same time, the employment rate and labour force participation rates of women have increased, in some cases to the highest levels on record. Unfortunately, women were disproportionately impacted by job losses during the pandemic because they were overrepresented in low-wage occupations in private services which included some of the hardest hit sectors.

Finally, the aging population in Canada has and will play an important role in the employment and wage patterns. A growing share of mature workers means the labour force supply is becoming more affected by the retirement choices of these workers. Furthermore, the aging population in Canada will also lead to increased demand in the healthcare sector, which is already facing a significant shortage of skilled workers.

Despite the pattern of job upgrading, policymakers should be cautious given the unique labour market conditions in the most recent period. During the short 2-year period, February 2020 to December 2022 has been defined by the unprecedented economic impact of a pandemic, the highest inflation rates in 50 years, a tight labour market with skilled labour shortages and a possible recession in the near future. The long-term employment and wage trends related to the recent shocks have yet to be realized.

References

- Acemoglu, D. and Autor, D., *Chapter 12 - Skills, tasks and technologies: implications for employment and earnings: Handbook of Labour Economics*, Vol. 4, Part B, edited by Card, D. and Ashenfelter, O., Elsevier, 2011, pp. 1043-1171, doi.org/10.1016/S0169-7218(11)02410-5.
- Antonczyk, D., DeLeire, T. and Fitzenberger, B., *Polarization and Rising Wage Inequality: Comparing the U.S. and Germany*, IZA Discussion Paper 4842, Institute of Labor Economics (IZA), 2010, doi:10.2139/ssrn.1589537.
- Autor, D.H., 'Why are there still so many jobs? The history and future of workplace automation', *Journal of Economic Perspectives*, Vol. 29, No 3, 2015, pp. 3-30, doi: 10.1257/jep.29.3.3.
- Autor, D.H. and Dorn, D., 'The Growth of Low Skill Service Jobs and the Polarization of the U.S. Labor Market', *American Economic Review*, Vol. 103, No 5, 2013, pp. 1553-1597, doi: 10.1257/aer.103.5.1553.
- Autor, D.H., Katz, L.F., and Kearney, M.S., 'The polarization of the US labor market', *American Economic Review*, Vol. 96, No 2, 2006, pp. 189-194, doi: 10.3386/w11986
- Baker, M. and Fortin, N.M., 'Occupational gender composition and wages in Canada, 1987–1988', *Canadian Journal of Economics/Revue canadienne d'économique*, Vol. 34, No 2, 2001, pp. 345-376.
- Bárány, Z.L. and Siegel, C., 'Job Polarization and Structural Change', *American Economic Journal: Macroeconomics*, Vol. 10, No 1, 2018, pp. 57 – 89, doi: 10.1257/mac.20150258.
- Bárány, Z.L. and Siegel, C., 'Job Polarization, Structural Transformation and Biased Technological Change' *Travail et Emploi*, Vol. 157, 2019, pp. 25-44, doi: 10.4000/travailemploi.8996.
- Beach, C., *What has happened to middle-class earnings in Canada? in Income inequality: The Canadian Story*, Vol. 5, Part 1, edited by Green, D., Riddell, C.W. and France, S-H., Institute for Research and Public Policy (IRPP), 2016, pp. 83-101.
- Beaudry, P., Green, D. and Sand, B., *The great reversal in the demand for skill and cognitive tasks*, NBER Working Paper 18901, National Bureau of Economic Research (NBER), 2013, doi: 10.3386/w18901.
- Berman, E., Bound, J. and Machin, S., 'Implications of Skill-Biased Technological Change: International Evidence', *The Quarterly Journal of Economics*, Vol. 113, No 4, 1998, pp. 1245-1279, doi: 10.1162/003355398555892.
- Bourdabat, B., Lemieux, T. and Riddell, C., 'The Evolution of the Returns to Human Capital in Canada, 1980-2005', *Canadian Public Policy*, Vol. 36, No 1, 2010, pp. 64 – 89, doi: 10.3138/cpp.36.1.63.
- Cazes, S., Hijzen, A. and Saint-Martin, A., *Measuring and Assessing Job Quality: The OECD Job Quality Framework*, OECD Social, Employment and Migration Working Papers 174, OECD Publishing, Paris, 2015, doi: 10.1787/5jrp02kpw1mr-en.
- Chen, W-H. and Mehdi, T., 'Assessing Job Quality in Canada: A Multidimensional Approach', *Canadian Public Policy*, Vol. 45, No 2, 2019, pp. 172-191, doi: 10.3138/cpp.2018-030.
- Cortes, G.M., 'Where have the middle-wage workers gone? A study of polarization using panel data', *Journal of Labor Economics*, Vol. 34, No 1, 2016, pp. 63-105, doi: 10.1086/682289.
- Durlauf, S. and Blume, L. E. *The New Palgrave Dictionary of Economic*, Palgrave Macmillan, 2016.
- Dustmann, C., Ludsteck, J. and Schönberg, U., 'Revisiting the German wage structure', *Quarterly Journal of Economics*, Vol. 124, No 2, 2009, pp. 843-881, doi: 10.1162/qjec.2009.124.2.843.
- Dwyer, R.E. and Wright, E.O., 'Low-wage Job Growth, Polarization, and the Limits and Opportunities of the Service Economy', *RSF: The Russell Sage Foundation Journal of the Social Sciences* Vol. 5, No 4, 2019, pp. 56-76, doi: 10.7758/RSF.2019.5.4.02.

- Fernández-Macías, E., Hurley, J. and Arranz-Muñoz, J.M., *Occupational change and wage inequality: European Jobs Monitor 2017*, Publications Office of the European Union, Eurofound, Luxembourg, 2017, doi: 10.2806/332137.
- Fernández-Macías, E., Hurley, J., *Employment polarisation and job quality in the crisis: European Jobs Monitor 2013*, Eurofound, Dublin, 2013, doi: 10.2806/332137.
- Firpo, S., Fortin, N. and Lemieux, T., *Occupational Tasks and Changes in the Wage Structure*, IZA Discussion Paper 5542, Institute of Labor Economics (IZA), 2011, doi: 10.2139/ssrn.1778886.
- Fortin, N. and Lemieux, T., 'Changes in Wage Inequality in Canada: An Interprovincial Perspective', *Canadian Journal of Economics*, Vol. 48, No 2, 2015, pp. 682-713, doi: 10.1111/caje.12140.
- Foster, J.E. and Wolfson, M.C., 'Polarization and the decline of the middle class: Canada and the U.S.' *Journal of Economic Inequality*, Vol. 8, 2010, pp. 247-273, doi: 10.1007/s10888-009-9122-7.
- Freeman, R.B. and Needles, K., *Skill Differentials in Canada in an Era of Rising Labor Market Inequality*, NBER Working Paper 3827, National Bureau of Economic Research (NBER), 1991, doi: 10.3386/w3827.
- Frenette, M., *The changing nature of work since the onset of the COVID-19 pandemic*, Statistics Canada Economic and Social Reports, Vol. 3, No 7, 2023, doi: 10.25318/36280001202300700003-eng.
- Frenette, M., Green, D.A. and Milligan, K., *The Tale of the Tails: Revisiting Recent Trends in Canadian After-Tax Income Inequality Using Census Data*, Statistics Canada Analytical Studies Branch Research Paper Series 274, Statistics Canada, 2007, doi: 10.34989/sdp-2022-16.
- Goos, M. and Manning, A., 'Lousy and Lovely Jobs: The Rising Polarization of Work in Britain', *The Review of Economics and Statistics*, Vol. 89, No 1, 2007, pp. 118 – 133, doi: 10.1162/rest.89.1.118.
- Goos, M., Manning, A. and Salomons, A., 'Recent Changes in the European Employment Structure: The roles of technology and globalization', *American Economic Review Papers and Proceedings*, Vol. 99, No 2, 2009, pp. 58-63.
- Goos, M., Manning, A. and Salomons, A., 'Explaining Job Polarization: Routine-Based Technological Change and Offshoring', *American Economic Review*, Vol. 104, No 8, 2014, pp. 2509-2526, doi: 10.1257/aer.104.8.2509.
- Green, D.A. and Sand, B.M., 'Has The Canadian Labour Market Polarized?', *Canadian Journal of Economics/Revue canadienne d'économique*, Vol. 48, 2015, pp. 612 – 646, doi: 10.1111/caje.12145.
- Hunt, J. and Nunn, R., 'Has US employment really polarized? A critical reappraisal', *Labour Economics*, Vol. 75, 2022, 102117, doi: 10.1016/j.labeco.2022.102117.
- Juhn, C., *Wage Inequality and Industrial Change: Evidence from Five Decades*, NBER Working Paper 4684, National Bureau of Economic Research (NBER), 1994, doi: 10.3386/w4684.
- Juhn, C., Murhpy, K.M. and Pierce, B., 'Wage Inequality and the Rise in Returns to Skill', *Journal of Political Economy*, Vol. 101, No 3, 1993, pp. 410 – 442, doi: 10.1086/261881.
- Kampelmann, S. and Rycx, F., *Task-Biased Changes of Employment and Remuneration: The Case of Occupations*, IZA Discussion Papers 5470, Institute of Labor Economics (IZA), 2011, doi: 10.2139/ssrn.1756008.
- Katz, L.F. and Autor, D.H., *Chapter 26 - Changes in the Wage Structure and Earnings Inequality: Handbook of Labor Economics*, Vol. 3, No A, edited by Card, D. and Ashenfelter, O., Elsevier, 1999, pp. 1463 – 1555. doi: 10.1016/S1573-4463(99)03007-2.
- Maarek, P. and Moiteaux, E., 'Polarization, employment and the minimum wage: Evidence from European local labor markets', *Labour Economics*, Vol. 73, 2021, 102076. doi: 10.1016/j.labeco.2021.102076.

Muñoz de Bustillo, R., Fernández-Macías, E., Antón, J., and Esteve, F., *Measuring More Than Money*, Edward Elgar Publishing, Cheltenham, 2011, doi: 10.4337/9781849805919.

Murphy, K.M., Riddell, W.G. and Romer, P.M., *Wages, Skills and Technology in the United States and Canada*, NBER Working Paper 6638, National Bureau of Economic Research (NBER), 1998, doi: 10.3386/w6638.

Oesch, D. and Menés, J.R., 'Upgrading or polarization? Occupational change in Britain, Germany, Spain and Switzerland, 1990-2008', *Socio-Economic Review*, Vol. 9, No 3, 2011, pp. 505 – 531, doi: 10.1093/ser/mwq029.

Salvatori, A., 'The anatomy of job polarisation in the UK.' *Journal for Labour Market Research*, Vol. 52, No 8, 2018, doi: 10.1186/s12651-018-0242-z.

Torrejon Perez, S., Hurley, J., Fernandez Macias, E. and Staffa, E., *Employment shifts in Europe from 1997 to 2021: from job upgrading to polarisation*. JRC Working Papers Series on Labour, Education and Technology 2023/05, European Commission, 2023, JRC132678.

Violante, G.L., *Skill-Biased Technical Change: The New Palgrave Dictionary of Economic*, Palgrave Macmillan, London, 2008, doi: 10.1057/978-1-349-95121-5_2388-1.

Wright, E.O. and Dwyer, R.E., 'The patterns of job expansions in the USA: a comparison of the 1960s and 1990s', *Socio-Economic Review*, Vol. 1, No 3, 2003, pp. 289-325, doi:10.1093/soceco/1.3.289.

List of figures

Figure 1: Average nominal hourly wage in 1997, 2008, 2009, 2020 and 2022 by quintile	8
Figure 2: Share of total employment for each sector in 1997 and 2022	9
Figure 3: Change in employment by major occupation between 1997 and 2022	10
Figure 4: Changes in employment by quintile.....	11
Figure 5: Nominal wage profiles (solid) compared to average wage growth in Canada (dotted)	12
Figure 6: CPI from 1997 to 2022 relative to mean CPI in 1997	13
Figure 7: Real wage profiles (solid) compared to average wage growth in Canada (dotted).....	14
Figure 8: Employment change by broad sector	15
Figure 9: Broad sector employment share by quintile.....	16
Figure 10: Average real wage by year for broad sectors.....	18
Figure 11: Employment share of women by quintile, 1997 - 2022	19
Figure 12: Employment change in job-wage quintiles by sex	20
Figure 13: Average wage of women over average wage of men by quintile, 1997 to 2022.....	21
Figure 14: Employment change in job-wage quintile by age	22
Figure 15: Change in real wages by quintile for youth (15 to 24 years).....	23
Figure 16: Change in real wages by quintile for core-age workers (25 to 54 years).....	23
Figure 17: Change in real wages by quintile for mature workers (55 years and over)	24
Figure 18: Change in employment fixed quintiles.....	25
Figure 19: Real wage profiles (solid) compared to average wage growth in Canada (dotted).....	26

List of tables

Table 1: List of major occupations used in the analysis by broad occupational group..... 5
Table 2: NAICS 2017 v3 sectors used to construct job units 6
Table 3: Number of jobs by quintile in each period 7
Table 4: Employment change and growth by sector..... 17
Table 5: Mean nominal wage by quintile and age in 1998, 2008, 2009, 2020 and 2022..... 33

Appendix

Table 5: Mean nominal wage by quintile and age in 1998, 2008, 2009, 2020 and 2022.

	Q1	Q2	Q3	Q4	Q5
1998					
Youth	\$7.58	\$9.43	\$10.22	\$11.65	\$13.71
Core-age	\$10.55	\$13.64	\$15.80	\$18.94	\$23.33
Mature	\$10.63	\$13.67	\$15.76	\$20.07	\$25.90
2008					
Youth	\$9.92	\$12.68	\$13.86	\$17.01	\$18.63
Core-age	\$13.71	\$17.59	\$20.59	\$25.30	\$32.92
Mature	\$13.15	\$17.03	\$20.29	\$26.31	\$36.19
2009					
Youth	\$10.29	\$13.20	\$14.51	\$17.75	\$19.07
Core-age	\$13.89	\$17.85	\$21.05	\$26.59	\$34.00
Mature	\$13.28	\$17.60	\$21.08	\$27.14	\$37.50
2020					
Youth	\$14.93	\$17.91	\$19.83	\$24.57	\$25.48
Core-age	\$18.57	\$22.93	\$28.41	\$35.49	\$44.81
Mature	\$18.02	\$23.26	\$28.48	\$36.79	\$49.54
2022					
Youth	\$16.06	\$19.07	\$21.50	\$25.33	\$27.21
Core-age	\$19.82	\$24.33	\$29.92	\$37.65	\$47.68
Mature	\$19.52	\$23.92	\$29.67	\$38.84	\$51.64

Source: Labour Force Survey, Statistics Canada.

GETTING IN TOUCH WITH THE EU

In person

All over the European Union there are hundreds of Europe Direct centres. You can find the address of the centre nearest you online (european-union.europa.eu/contact-eu/meet-us_en).

On the phone or in writing

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

- by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),
- at the following standard number: +32 22999696,
- via the following form: european-union.europa.eu/contact-eu/write-us_en.

FINDING INFORMATION ABOUT THE EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website (european-union.europa.eu).

EU publications

You can view or order EU publications at op.europa.eu/en/publications. Multiple copies of free publications can be obtained by contacting Europe Direct or your local documentation centre (european-union.europa.eu/contact-eu/meet-us_en).

EU law and related documents

For access to legal information from the EU, including all EU law since 1951 in all the official language versions, go to EUR-Lex (eur-lex.europa.eu).

Open data from the EU

The portal data.europa.eu provides access to open datasets from the EU institutions, bodies and agencies. These can be downloaded and reused for free, for both commercial and non-commercial purposes. The portal also provides access to a wealth of datasets from European countries.

The European Commission's science and knowledge service

Joint Research Centre

JRC Mission

As the science and knowledge service of the European Commission, the Joint Research Centre's mission is to support EU policies with independent evidence throughout the whole policy cycle.



EU Science Hub
joint-research-centre.ec.europa.eu

 @EU_ScienceHub

 EU Science Hub - Joint Research Centre

 EU Science, Research and Innovation

 EU Science Hub

 EU Science