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BUREAU DU DIRECTEUR PARLEMENTAIRE DU BUDGET

Labour Market Assessment - 2018

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The Parliamentary Budget Officer (PBO) supports Parliament by providing economic and financial analysis for the purposes of raising the quality of parliamentary debate and promoting greater budget transparency and accountability.

This report provides parliamentarians with an assessment of the state of Canada's labour market.

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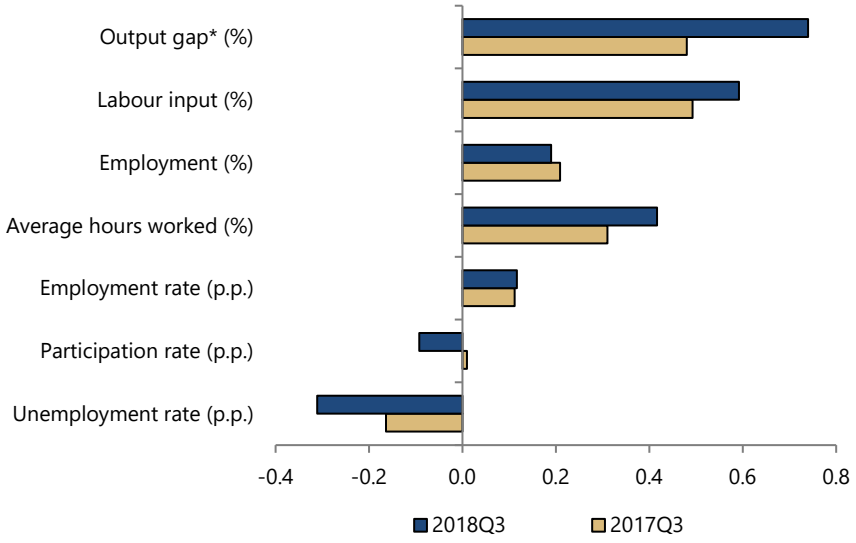
Executive Summary

This report provides parliamentarians with an assessment of the state of the labour market in Canada. It examines labour market indicators relative to their trend estimates, that is, the level that would be observed if cyclical fluctuations were excluded. PBO also compares Canada's labour market performance with that of other advanced economies, and examines changes in the distribution of hourly wages in Canada.

PBO finds that at the national level, the labour market in Canada has continued to operate above trend over the past 12 months (that is, from the third quarter of 2017 to the third quarter of 2018). This outperformance has lifted the Canadian economy above our estimate of potential GDP, resulting in an output gap of 0.7 per cent in third quarter of 2018.

Summary Figure 1 **Labour market indicators relative to trend, 2017Q3 vs. 2018Q3**



Sources: Parliamentary Budget Officer and Statistics Canada

Note: A positive number represents an indicator that is higher than its trend level, while a negative number suggests that an indicator is below its trend level.

* Our estimate of the output gap in 2018Q3 is based on third quarter real GDP growth of 1.9 per cent (annual rates).

Between the second quarter of 2017 and the second quarter of 2018, Canada's employment rate was essentially unchanged while other G7 and OECD countries saw, on balance, notable increases. The decline in Canada's

unemployment rate over the same period did outperform G7 and OECD averages, however, this was due to a pronounced decline in the participation rate. At 5.9 per cent, however, unemployment in the second quarter of 2018 remained higher in Canada than the 4.5 per cent in the other G7 countries.

The PBO generally reports on changes in wages at the national level as a function of the "average" employee's wages. In this report, we update Fortin and Lemieux's (2015) analysis and take a closer look at the distribution of wages at the national and provincial levels, but also by sex, between 1997 and 2018.

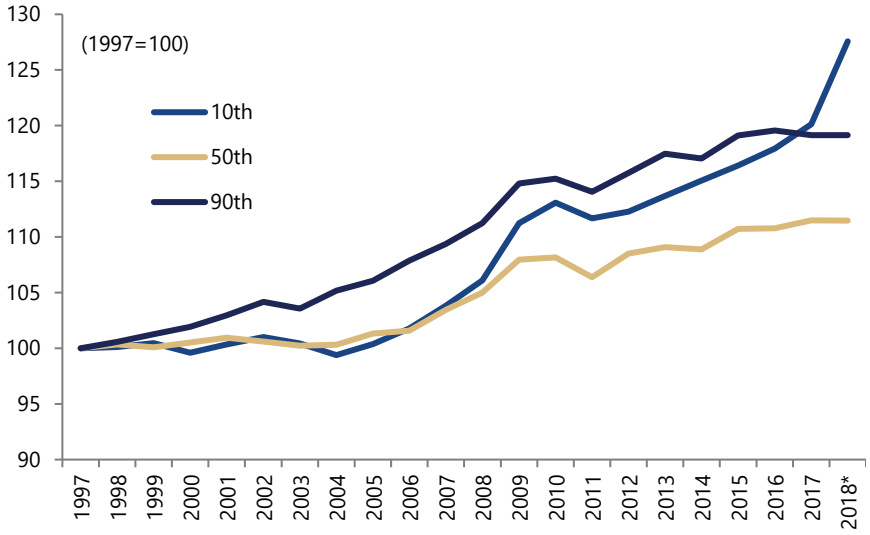
We find that on a cumulative basis, real wage gains at the lower (10^{th} percentile) and upper (90^{th} percentile) ends of the wage distribution exceeded those at the middle of the distribution (50^{th} percentile). Relatively larger wage gains at the lower end of the distribution reduced wage inequality in the lower half of the distribution between 1997 and 2018. On the other hand, they also resulted in wage polarization, i.e., a divergence in wage gains between the middle and the extremes of the distribution (Summary Figure 2).

Using the Fortin and Lemieux methodology, we found that minimum wage increases in the provinces fuelled wage gains in the 10^{th} percentile of the distribution. Indeed, recent increases in the minimum wage in Ontario and Alberta have contributed to increasing the real cumulative gains of the 10^{th} percentile of the distribution above the gains of the 90^{th} percentile.

Finally, we note that, since 1997, cumulative wage gains for women have exceeded those for men at all levels of the distribution. Despite these significant wage gains, there remains a considerable gap between the wage levels of women and men. In 2018, at the national level, men's wages were higher than women at all levels of the distribution, from 4 per cent in the 5^{th} percentile to 19 per cent in the 65^{th} percentile (Summary Figure 3).

Summary Figure 2

Index of cumulative growth in real hourly wages in Canada, by selected percentiles



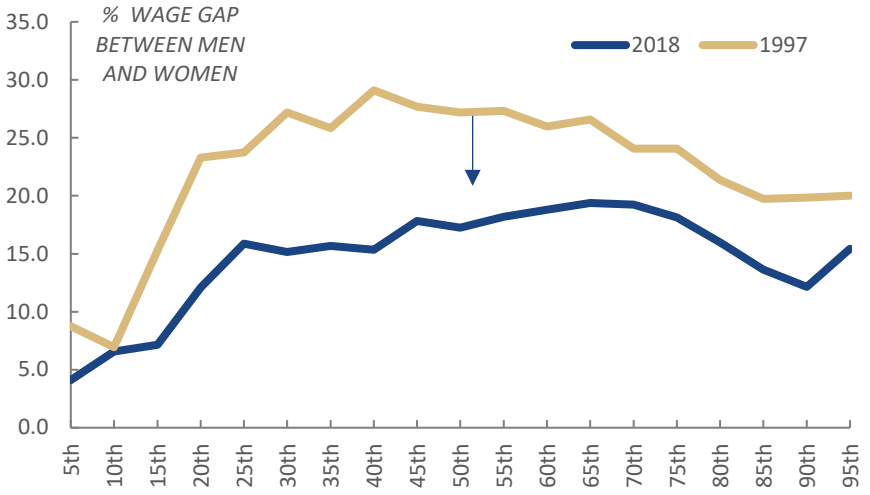
Sources: Parliamentary Budget Officer and Statistics Canada.

Note: The growth index is constructed using monthly data aggregated as an annual average per percentiles. The Consumer Price Index is used to deflate nominal wages.

* The year 2018 includes data up to September.

Summary Figure 3

Hourly wage gap between men and women, by selected percentile



Sources: Parliamentary Budget Officer and Statistics Canada.

1. Trend analysis

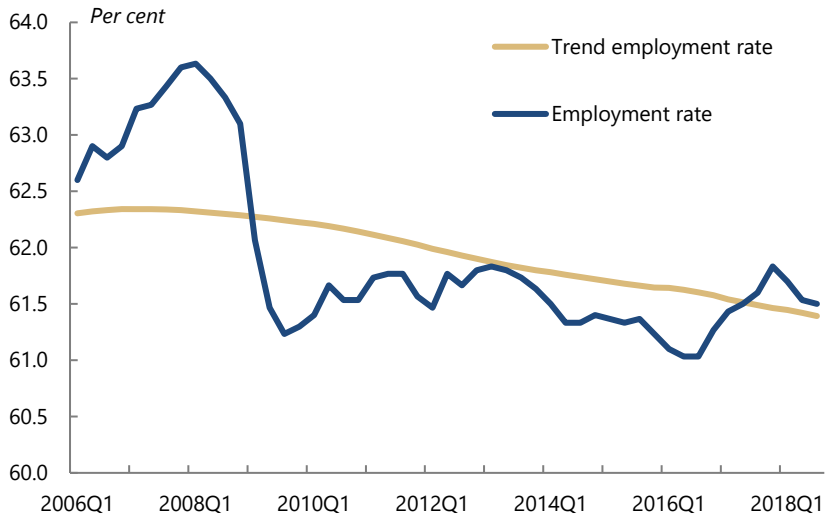
This section examines various labour market indicators relative to their respective trends. PBO analyzes labour utilization variables in relation to trends to determine whether changes in indicators are due to cyclical economic conditions or structural factors.

The methodology used by the PBO to develop its trend estimates is detailed in its report entitled: *PBO's Approach to Measuring Potential GDP*, which was released in August. The information in this report is current as of October 5, 2018.

Employment growth is fading but remains above trend

Between 2016Q3 and 2017Q4, employment growth outpaced working-age population growth. This brought the employment rate to 0.4 percentage points above its estimated trend in 2017Q4 (Figure 1-1). Over the last three quarters, growth in employment has been below that of the working-age population. The employment rate has nevertheless remained slightly above trend (by 0.1 percentage points in 2018Q3).

Figure 1-1 Employment rate, 2006Q1 to 2018Q3



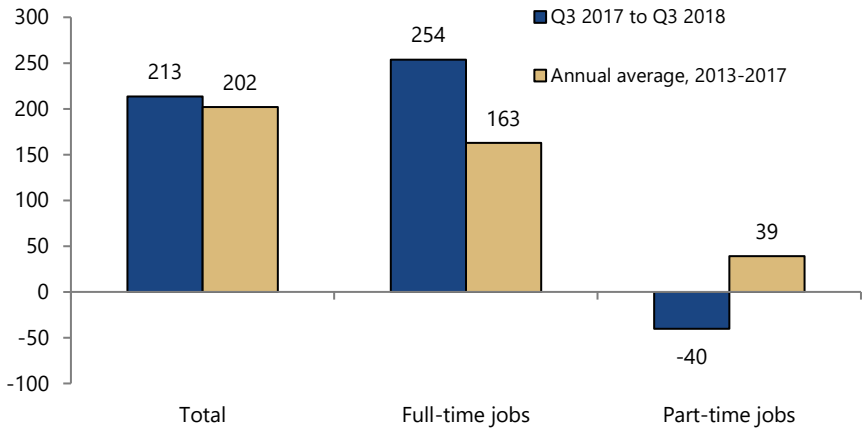
Sources: Parliamentary Budget Officer and Statistics Canada

Gains in full-time employment have contributed to the increase in employment over the past 12 months

The Canadian economy created 213,000 (net) jobs between the third quarter of 2017 and the third quarter of 2018, an increase of 1.2 per cent. This is relatively consistent with the average annual gain observed over the previous five years (Figure 1-2).

The number of full-time jobs increased by 254,000 between the third quarters of 2017 and 2018 (Figure 1-2), accounting for all employment gains and outperforming the trend over the past five years (2013 to 2017). Part-time jobs declined by 40,000 over the past year.

Figure 1-2 Full-time and part-time employment gains

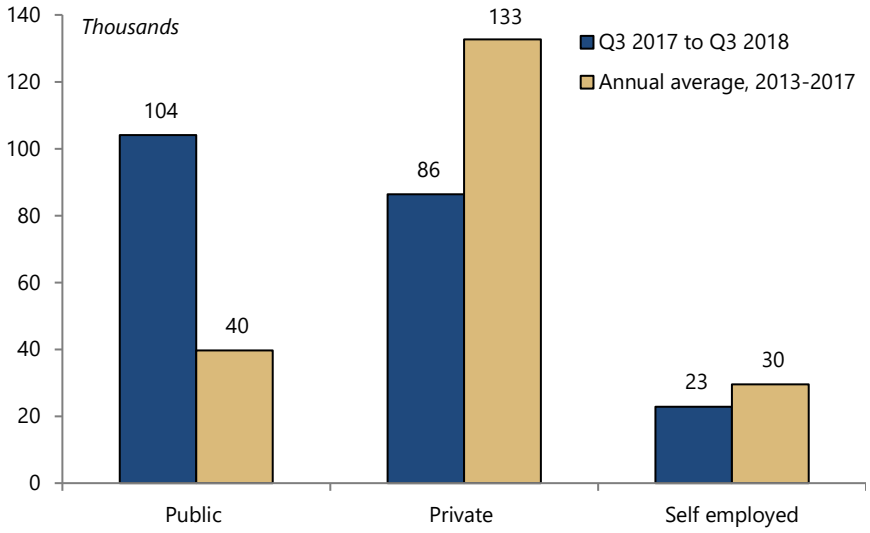


Sources: Parliamentary Budget Officer and Statistics Canada

Note: The average of the last five years is calculated from changes in the employment level between the last quarters of each year (Q4/Q4).

Over the past 12 months, the public sector has accounted for almost half of all employments gains, contributing 104,000 net jobs to the economy (Figure 1- 3). Indeed, public sector gains have well exceeded the average of the last five years. Private sector employment increased by 86,000 over the past 12 months, well below the average pace of gains over 2013 to 2017.

Figure 1-3 Employment gains by type of employment



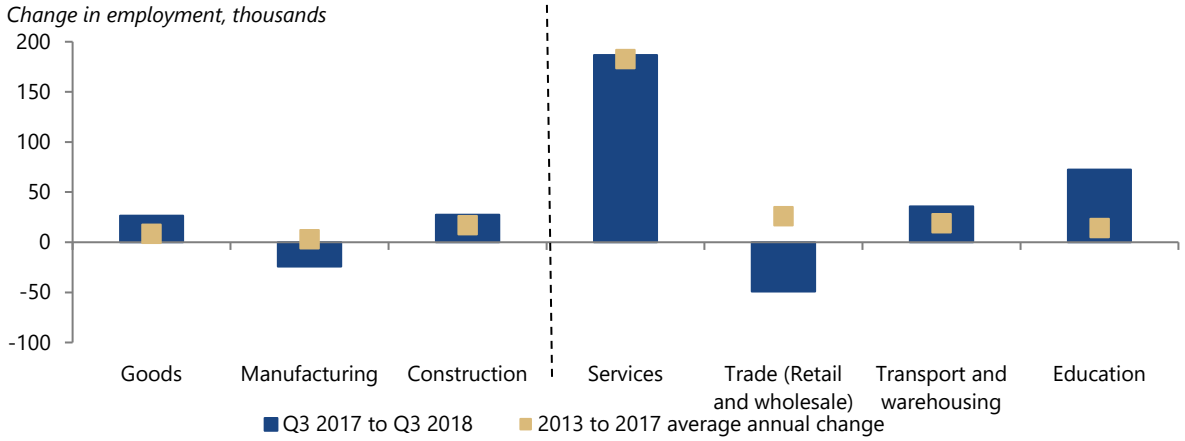
Sources: Parliamentary Budget Officer and Statistics Canada

Note: The average of the last five years is calculated from changes in the employment level between the last quarters of each year (Q4/Q4).

The service sector continues to be the main driver of employment growth

Once again, the service sector was the main driver of employment growth in Canada. Supported in part by strong growth in education services as well as transportation and warehousing services, this sector generated almost all the employment gains between 2017Q3 and 2018Q3 (Figure 1-4). In addition, the contribution of the service sector remains at the level of the average of the last five years. It should be noted, however, that employment in retail services has declined in the last year. The goods-producing sector experienced a slight increase in employment between 2017Q3 and 2018Q3, despite the loss of approximately 25,000 jobs in the manufacturing sector (which is included in the goods sector).

Figure 1-4 Employment change by select industry groups



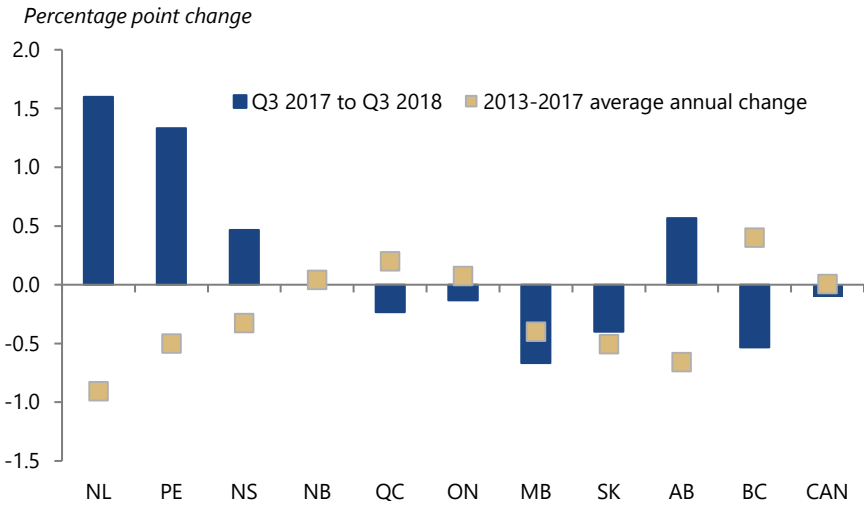
Sources: Parliamentary Budget Officer and Statistics Canada

Note: The average of the last five years is calculated from changes in the employment level between the last quarters of each year (Q4/Q4).

Newfoundland-and-Labrador, Prince Edward Island, Nova-Scotia and Alberta: Solid employment performance in the last 12 months

Given the variation in the growth of the working-age population across provinces, it is useful to compare changes in their employment rates (Figure 1-5). The provinces of Newfoundland and Labrador, Prince Edward Island, Nova Scotia and Alberta saw their employment rates increase between the third quarter of 2017 and the third quarter of 2018. Manitoba, Saskatchewan and British Columbia experienced the largest decreases in employment rates during this period. For some provinces, such as Newfoundland and Labrador, Prince Edward Island, Nova Scotia and Alberta, the increase in their employment rates from 2017Q3 to 2018Q3 was well above the average for the last five years (2013–2017). Meanwhile, Quebec, Ontario, Manitoba, and British Columbia in particular, underperformed relative to their average changes over the past five years.

Figure 1-5 Employment rate by province, changes from 2017Q3 to 2018Q3



Sources: Parliamentary Budget Officer and Statistics Canada

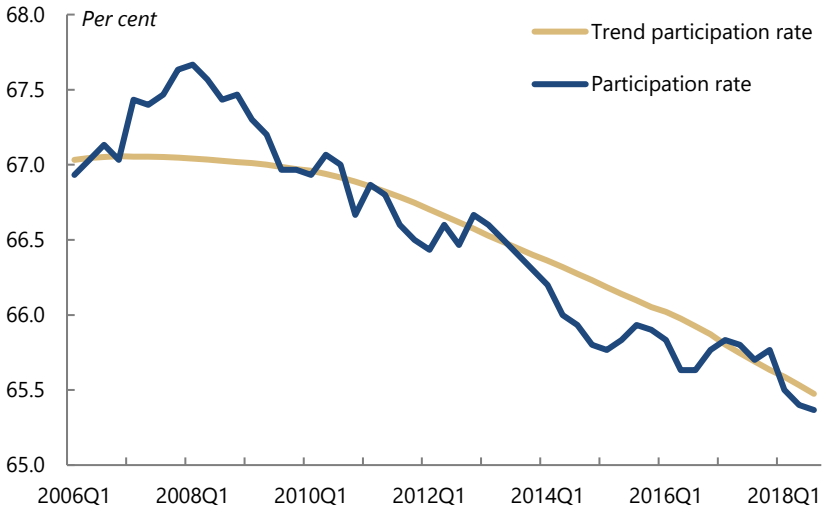
Note: The average of the last five years is calculated from changes in the employment level between the last quarters of each year (Q4/Q4).

See endnote (1) for information on abbreviations for provinces and the territories.

The participation rate remains close to trend

After rising slightly above trend in the last quarter of 2017, the participation rate fell by 0.4 percentage points in the first three quarters of 2018 to below trend, at 65.4 per cent. This continuing downward trend is mainly due to the ageing of the population, which limits the number of workers and the number of people looking for work.

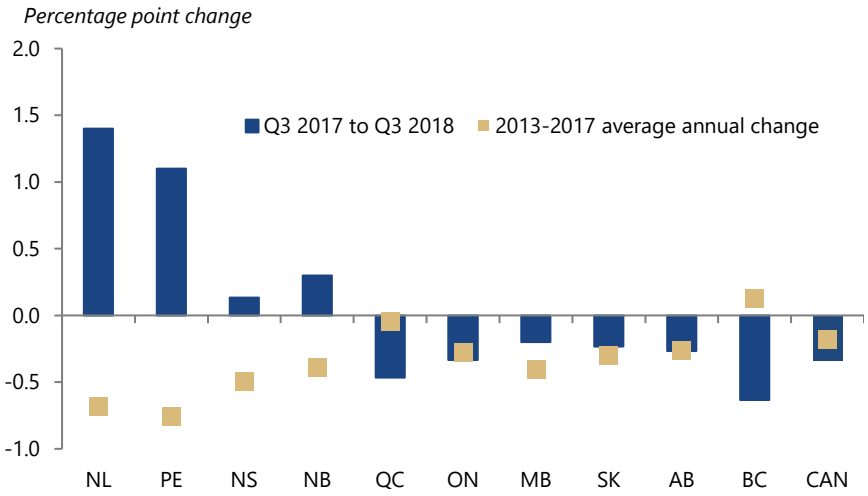
Figure 1-6 Participation rate, 2006Q1 to 2018Q3



Sources: Parliamentary Budget Officer and Statistics Canada

Only the Atlantic provinces experienced an increase in participation rates between 2017Q3 and 2018Q3. Most provinces performed better in the last 12 months than in the past five years. Only Quebec and British Columbia saw their rates fall below their average of the past five years, while declines in Ontario and Alberta were in line with their historical averages.

Figure 1-7 Participation rate by province, changes from 2017Q3 to 2018Q3



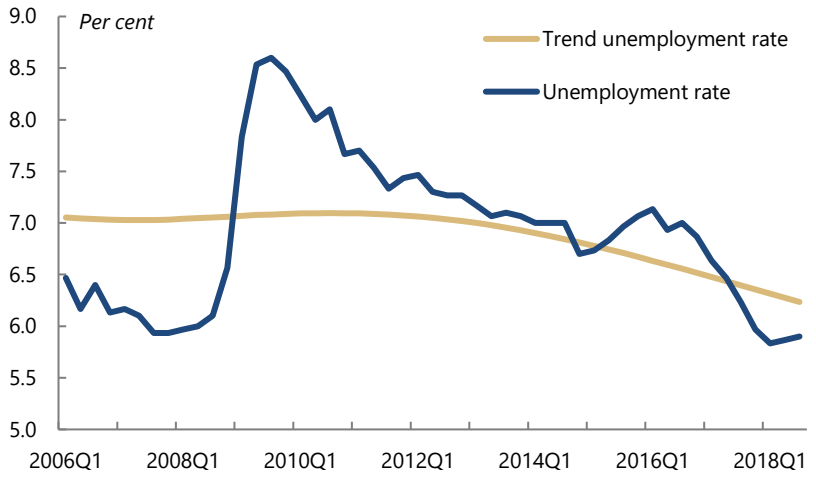
Sources: Parliamentary Budget Officer and Statistics Canada

Note: The average of the last 5 years is calculated from changes in the employment level between the last quarters of each year (Q4/Q4).

The unemployment rate continues to fall in Quebec and Ontario and has declined sharply in Alberta

"Unemployed" refers to the number of persons who are without work but who are actively looking for work. The number of unemployed fell by 3,8 per cent between the third quarters of 2017 and 2018. The unemployment rate is now at 5.9 per cent, which is 0.3 percentage points below its estimated trend (Figure 1-8).

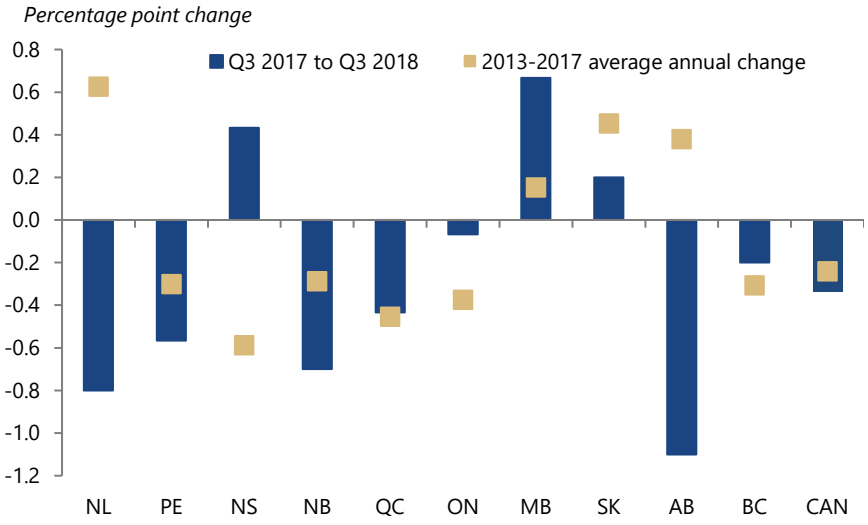
Figure 1-8 Unemployment rate, 2006Q1 to 2018Q3



Sources: Parliamentary Budget Officer and Statistics Canada

The decline in the unemployment rate in provinces such as Ontario, Quebec, Alberta and British Columbia between 2017Q3 and 2018Q3 helped maintain the national unemployment rate below its estimated trend. It should be noted that between 2017Q3 and 2018Q3, Alberta saw its employment grow faster than its labour force, which contributed to this significant drop in the unemployment rate (-1.1 percentage point) between 2017Q3 and 2018Q3. It should also be noted that Newfoundland and Labrador, Prince Edward Island and New Brunswick saw significant decreases in their respective unemployment rates despite increases in the labour force participation rates.

Figure 1-9 Unemployment rate by province, changes from 2017Q3 to 2018Q3



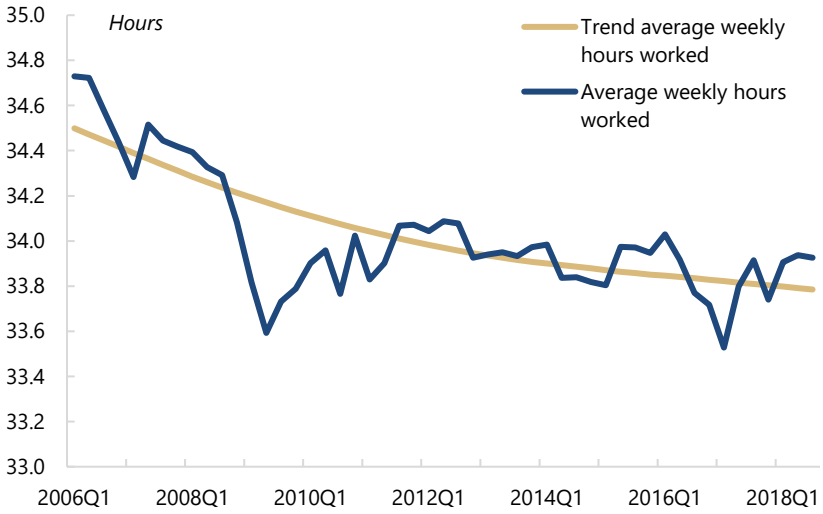
Sources: Parliamentary Budget Officer and Statistics Canada

Note: The average of the last five years is calculated from changes in the employment level between the last quarters of each year (Q4/Q4).

The average number of hours worked per week remains above trend

After a decrease in 2016, average weekly hours worked gradually began increasing in early 2017. Average weekly hours worked in the third quarter of 2018 was 33.93 hours, slightly higher than our estimated trend (Figure 1-10). The solid performance of full-time employment over the past year seems to have contributed to maintaining average hours worked above its trend level.

Figure 1-10 Average weekly hours worked, 2006Q1 to 2018Q3



Sources: Parliamentary Budget Officer and Statistics Canada

Labour input stayed above trend

PBO combines employment and average hours worked to produce a broader measure of labour input: total hours worked (annualised). The aggregate labour input is both an essential driver of economic growth and well-being and an important consideration in monetary and fiscal policy decision making. It is expressed as the following:

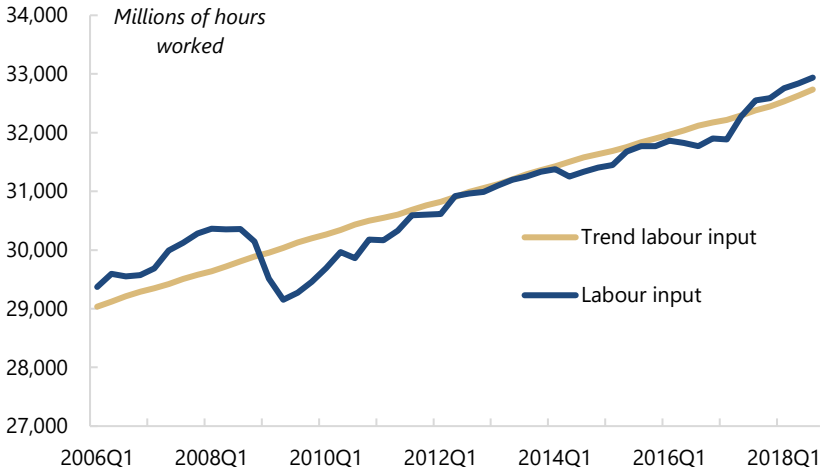
$$L = LFPOP \cdot LFER \cdot AHW \cdot 52,$$

where: LFPOP is the working-age population; LFER is the employment rate; and AHW is average weekly hours worked.

Between the third quarter of 2017 and the third quarter of 2018, labour input improved relative to trend.

Since 2017Q3, labour input has remained above our estimate of its trend level. In the third quarter of 2018, we estimate that total labour input was 0.6 per cent above its trend level, which is equivalent to about 109,000 full-time jobs (on an annual basis). The improvement in average weekly hours worked and an employment rate that is higher than trend contributed to this positive gap. (Figure 1-11).

Figure 1-11 Labour input, 2006Q3 to 2018Q3

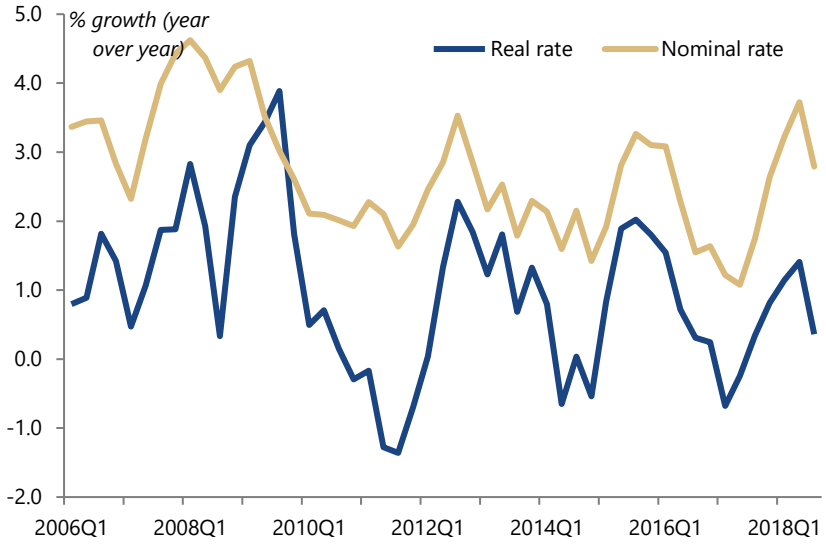


Sources: Parliamentary Budget Officer and Statistics Canada

Nominal and real wage gains have increased recently

Since the second quarter of 2017, nominal and real average hourly wage gains have picked up. In nominal terms, this represents the largest increase since the 2008–2009 recession (Figure 1-12). The average nominal hourly wage was $26.75 in the third quarter of 2018. Although year-over-year growth in nominal hourly wages pulled back in 2018Q3, the nominal wage rate was nevertheless 2.8 per cent higher compared to 2017Q3.

Figure 1-12 Nominal and real hourly wages, 2006Q1 to 2018Q3



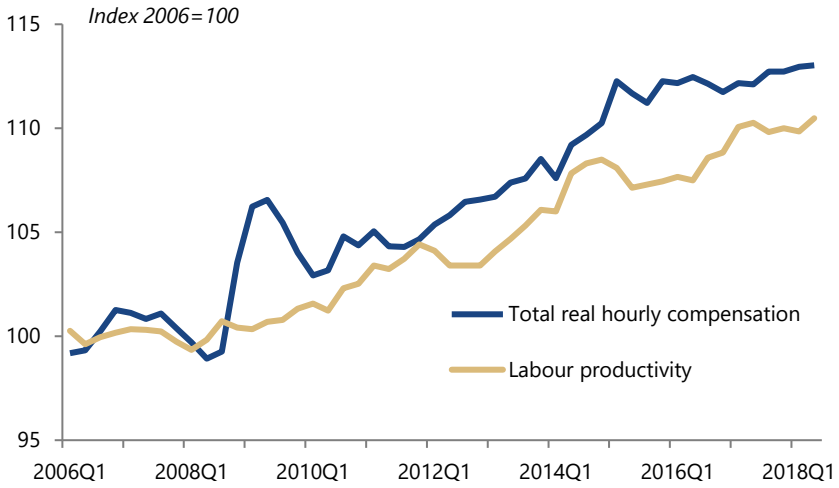
Sources: Parliamentary Budget Officer and Statistics Canada

Note: The Consumer Price Index is used to deflate the nominal hourly wage

Since the global financial crisis, increases in real hourly compensation for employees have exceeded labour productivity gains (Figure 1-13). More recently, with labour productivity stagnating since early 2017, the rebound in wage gains has widened the gap.

Figure 1-13

Real hourly employee compensation and labour productivity, 2006Q1 to 2018Q2

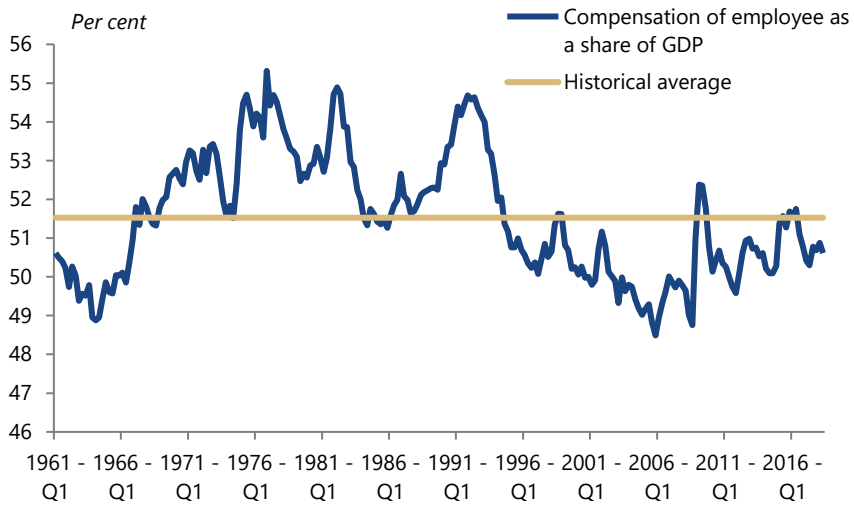


Sources: Parliamentary Budget Officer and Statistics Canada

Note: Total hourly compensation is calculated as compensation of employees from the National Accounts divided by total economy hours worked from the Productivity Accounts and is deflated using the GDP price index. Labour productivity is calculated as real GDP in the National Accounts divided by total economy hours worked from the Productivity Accounts

With real wages exceeding labour productivity since the beginning of 2006, the share of employee compensation in nominal GDP has rebounded from its historical low at the end of 2005 and is approaching its historical long-term average (Figure 1-14).

Figure 1-14 Share of employee compensation in GDP



Sources: Parliamentary Budget Officer and Statistics Canada

Note: This figure covers the period from the first quarter of 1961 to the second quarter of 2018.

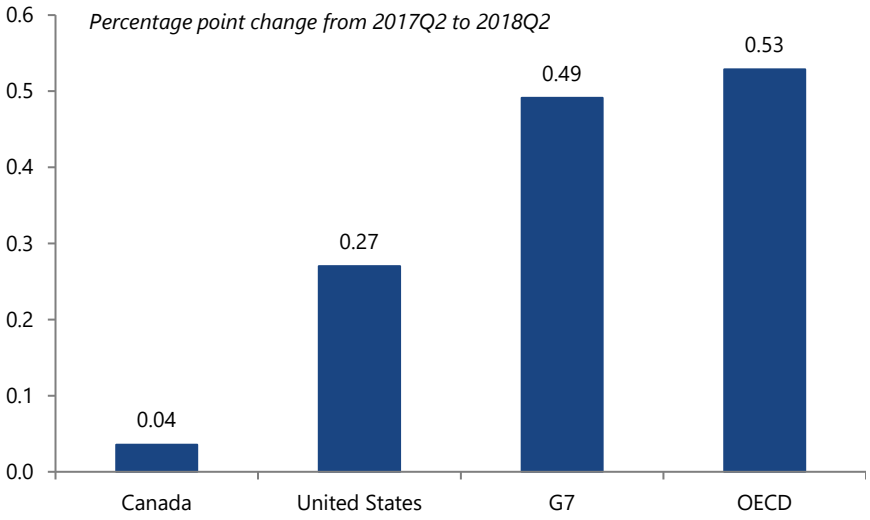
2. International comparison

As in past reports, PBO compares Canada's labour market performance with that of other advanced economies (G7 and OECD countries). It uses data compiled by the Organisation for Economic Co-operation and Development (OECD) that were submitted by national statistical agencies.

Canada's recent employment performance lags behind other G7 countries

Between the second quarters of 2017 and 2018, Canada's employment rate increased modestly, underperforming the United States and other G7 countries as well as the average across OECD countries (Figure 2-1).

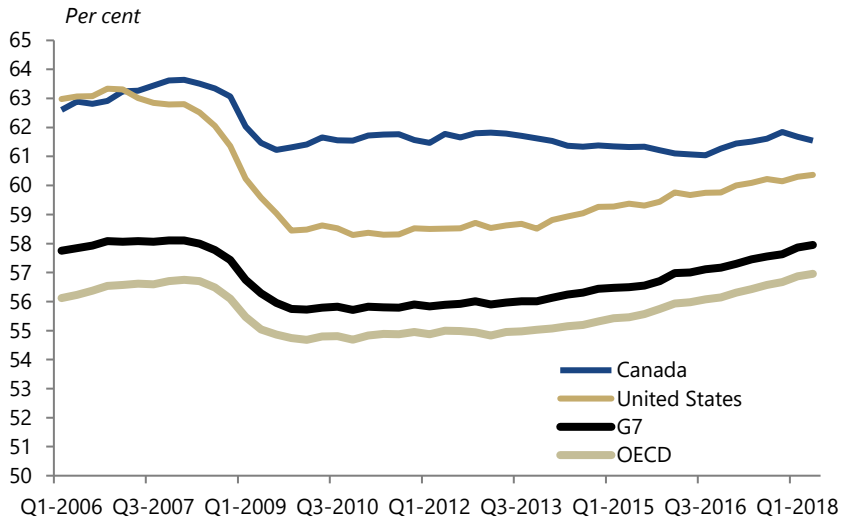
Figure 2-1 International comparison of employment rate changes from the second quarter of 2017 to the second quarter of 2018



Source: OECD.

That said, the employment rate in Canada remains above that of the U.S. and G7 and OECD averages (Figure 2-2). This gap had gradually narrowed during the recovery from the global financial crisis but appears to be stabilizing.

Figure 2-2 International comparison of employment rates

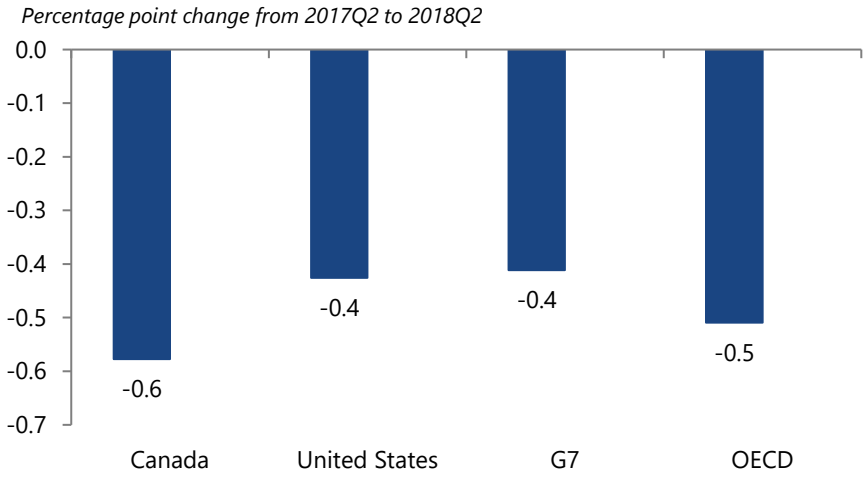


Source: OECD.

Canada's unemployment rate declined more than in other advanced economies

In Canada, the unemployment rate declined by 0.6 percentage points between the second quarters of 2017 and 2018, which is greater than the decreases recorded in the United States, G7 and OECD countries (Figure 2-3). Despite a marginal increase in the employment rate, the unemployment rate declined by a similar percentage in the other G7 countries; this reflects a more pronounced decline in the participation rate in Canada.

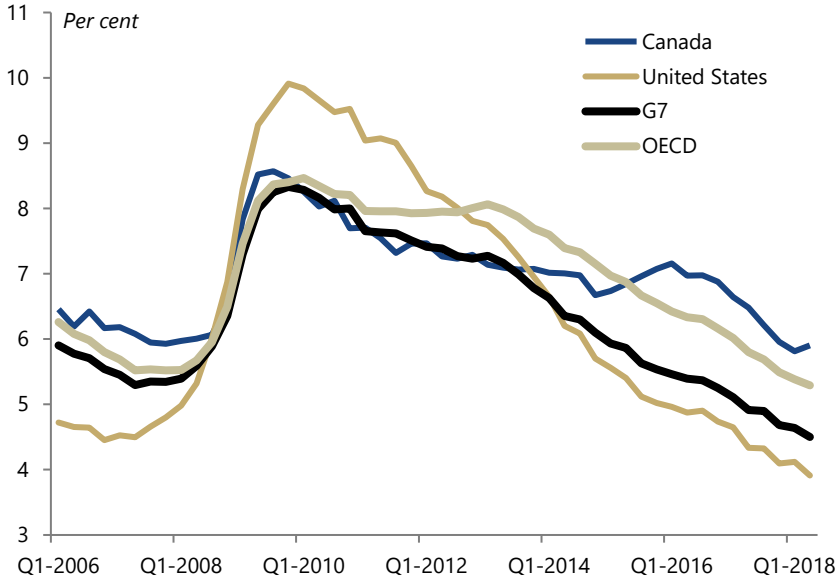
Figure 2-3 International comparison of changes in unemployment rates from the second quarter of 2017 to the second quarter of 2018



Source: OECD.

In the second quarter of 2018, the unemployment rate was 5.9 per cent in Canada, compared with 3.9 per cent in the United States and 4.5 per cent in G7 countries (excluding Canada). Despite the sharp decline over the past year, Canada's unemployment rate has remained higher than that of other advanced economies since the third quarter of 2015 (Figure 2-4).

Figure 2-4 International comparison of unemployment rates



Source: OECD

3. Wage inequality

As illustrated earlier in this report (see Figure 1-12), average nominal and real wage gains have increased since mid-2017. Indeed, at the nominal level, 2018Q2 saw the strongest growth since the 2009 recession.

In previous reports on labour market developments, PBO generally focused on wage gains for the "average" employee. However, concerns about greater income inequality, as well as this recent increase in average hourly wage growth, prompted the PBO to conduct a more in-depth analysis of wage gains. Consequently, this report highlights recent developments in the distribution of wage gains at the national level, as well as by province and sex. PBO updates the results of Fortin and Lemieux's 2015 study on wage inequality in Canada.

Stagnation of real hourly wage gains for the lower end and middle of the distribution before 2006

Figure 3-1 shows the cumulative growth index of real hourly wages for the 10^{th}, 50^{th} and 90^{th} percentiles since 1997. It is clear that the growth indices for the 10^{th} and 50^{th} percentiles experienced a period of stagnation around 2006.

Subsequently, the cumulative growth index for the 10^{th} percentile exceeded that of the 50^{th} percentile, thereby reducing wage inequality in the bottom half of the distribution. On the other hand, this resulted in the phenomenom of wage polarization given that the cumulative wage growth index at both ends of the distribution was significantly higher than that at the middle of the distribution.

Fortin and Lemieux paint much the same picture in their study. According to the authors, between 1997 and 2013, wage inequality in the lower half of the distribution decreased and also led to wage polarization.

Since 2013, real wage gains at the lower end of the distribution have continued to outperform those in the middle of the distribution, further reducing wage inequality in the lower half of the distribution.

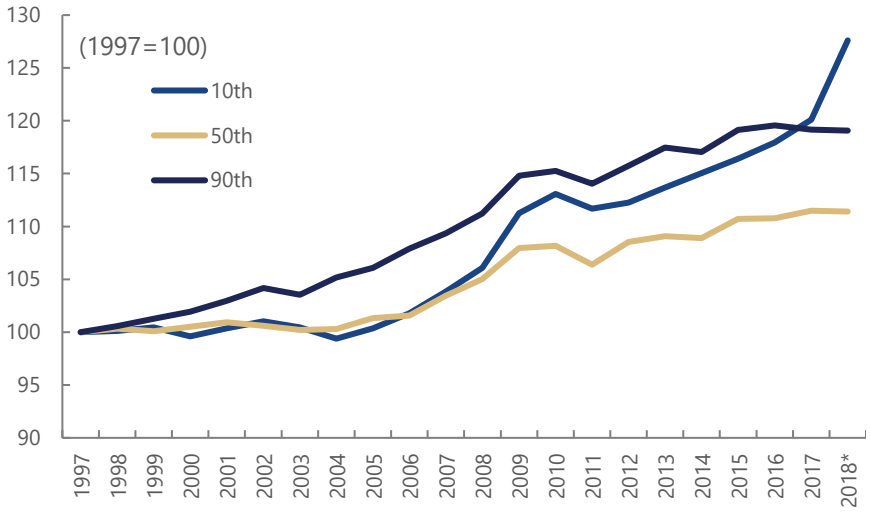
Conversely, cumulative real wage growth at the top of the distribution has been rather moderate, averaging 0.5 per cent per year between 2014 and 2018,well below the average growth of 3.1 per cent per year for the 10^{th} percentileand 0.6 per cent per year for the 50^{th} percentile. As a result, overall wage inequality has declined somewhat since 2013.

Moreover, with the strong growth in wage gains achieved in 2018, cumulative real wage growth at the bottom of the distribution now exceeds

that of the upper end of the distribution (28 per cent versus 19 per cent) for the period 1997 to 2018.

In summary, the cumulative growth in real wages since 1997 indicates that wage polarization continues to characterize the Canadian labour market.

Figure 3-1 Cumulative growth in real hourly wages, by selected percentiles



Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).

Note: The growth index is constructed using monthly data aggregated as an annual average per decile. The Consumer Price Index is used to deflate nominal wages.

* The year 2018 includes data up to September.

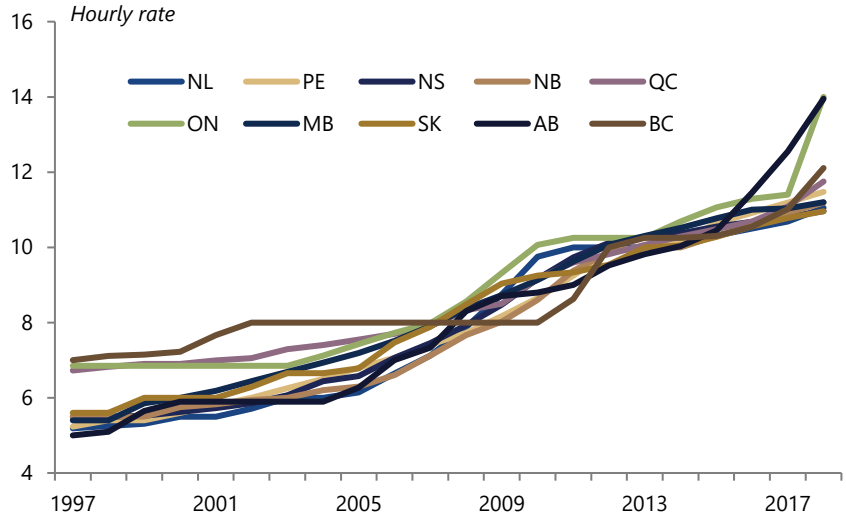
It is important to note, however, that despite the recent increase in cumulative wage growth at the average and lower levels of the distribution, significant differences in wage levels within the distribution persist. Indeed, according to Labour Force Survey data, in 2018, nominal hourly wages for the 10th, 50th and 90th percentiles in Canada were $13.25/h, $23.08/h and $46.00/h respectively.

In Canada, minimum wages play a key role in wage gains in the lower end of the distribution

A 2013 study by Autor and Dorn[2] shows that in the United States, the phenomenon of mechanical routinization linked to technological progress has largely contributed to the emergence of the wage polarization phenomenon. To date, however, no study has been able to confirm that these technological advances have had a similar impact on wage growth in Canada. On the other hand, Fortin and Lemieux conclude that successive minimum wage increases in most Canadian provinces from the mid-2000s onwards have had a significant impact on wage growth at the lower end of the distribution, at both the national and provincial levels.

Most Canadian provinces significantly increased their minimum wages around 2005. This phenomenon intensified following the 2008–2009 recession (Figure 3-2). There was also a large increase in Ontario's minimum wage for 2018, from $11.40 to $14.00 per hour. It should be noted that Alberta began the same minimum wage increase in 2015 but is proceeding more gradually.

Figure 3-2 Minimum wages by province, between 1997 and 2018



Sources: Parliamentary Budget Officer and Statistics Canada

In order to isolate the effect of the minimum wage increase on the cumulative growth index of real hourly wages, PBO reconstructed the adjusted growth index for the 10th percentile developed by Fortin and Lemieux, illustrating how the 10th percentile index would have grown had the minimum wage remained unchanged over time (see Appendix B for more details).

Appendix A includes several figures illustrating the cumulative growth index of the 10th, 50th and 90th percentiles by province, as well as the cumulative growth index of the 10th percentile adjusted for minimum wage. In all provinces except Saskatchewan, since 1997, cumulative wage growth in the 10th percentile has exceeded that of the 50th percentile. As a result, wage inequality in the bottom half of the distribution has declined overall in Canada.

However, once the adjustment for minimum wages in the lower part of the distribution is taken into account, only the provinces of Newfoundland and Labrador, Prince Edward Island and Saskatchewan still have cumulative growth in the 10th percentile that is significantly higher than that of the 50th percentile. On the other hand, we observe that the sharp increase in the minimum wage over the past year in Ontario has pushed the 10th percentile wage growth index well above that of the 90th percentile. In the other provinces, when adjusting for minimum wage the cumulative growth in the 10th percentile becomes relatively similar to that in the middle of the distribution.

Provincial data between 1997 and 2018 therefore indicate that wage polarization does not extend from coast to coast, but without the increase in minimum wages, it would have been limited to a few provinces.

All in all, the observations between 2014 and 2018 reinforce the conclusions of Fortin and Lemieux. That is, minimum wage increases explain in good part the stronger observed wage growth at the 10th percentile and thus significantly reduced wage inequality between the 10th and 50th percentiles, as well as between the 10th and 90th percentile. The phenomenon of wage polarization is therefore closely linked to this policy. Contrary to what Autor and Dorn observed in the United States, in Canada, technological advances or mechanical routinization do not appear to be at the root of this polarization.

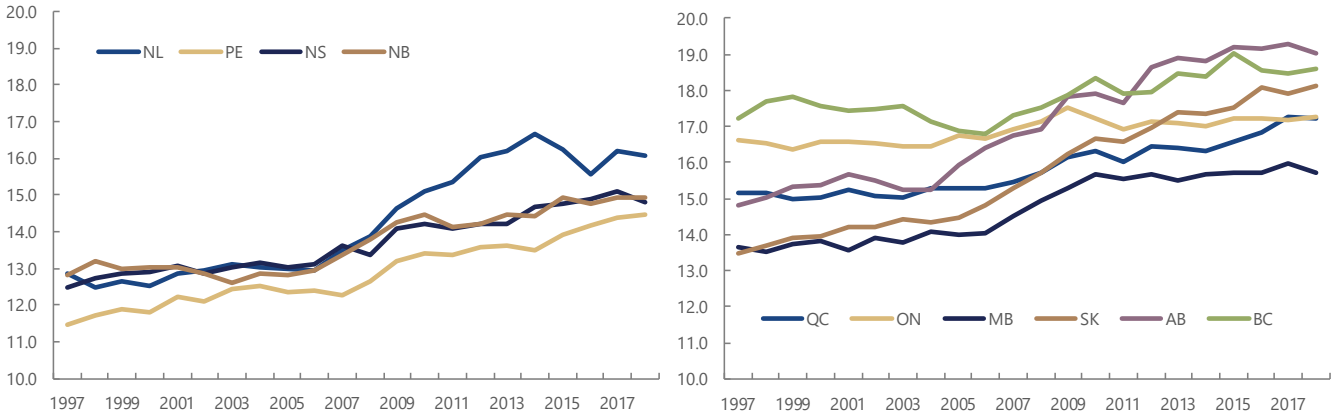
Real hourly wages in the Atlantic provinces remain significantly lower than in the rest of Canada

The left-hand side of Figure 3-3[3] clearly illustrates that median real hourly wages in the Maritimes have historically been among the lowest in Canada. Looking at the figure on the right, it is clear that Manitoba is also among the provinces with the lowest wages.

Between 1997 and 2018, the provinces with the highest cumulative growth in median real hourly wages were the energy-producing provinces of Newfoundland and Labrador, Saskatchewan and Alberta. It should be noted that Prince Edward Island has experienced solid growth in recent years, which has allowed it to move closer to the other Maritime provinces.

Finally, the figures in Appendix A show that Quebec and Ontario experienced a period of stagnation in median real hourly wage growth in the mid-2000s. However, the median wage in Quebec has very recently increased more significantly than in Ontario, thereby erasing the gap that persisted between the two neighbouring provinces.

Figure 3-3 Median real hourly wage, by province



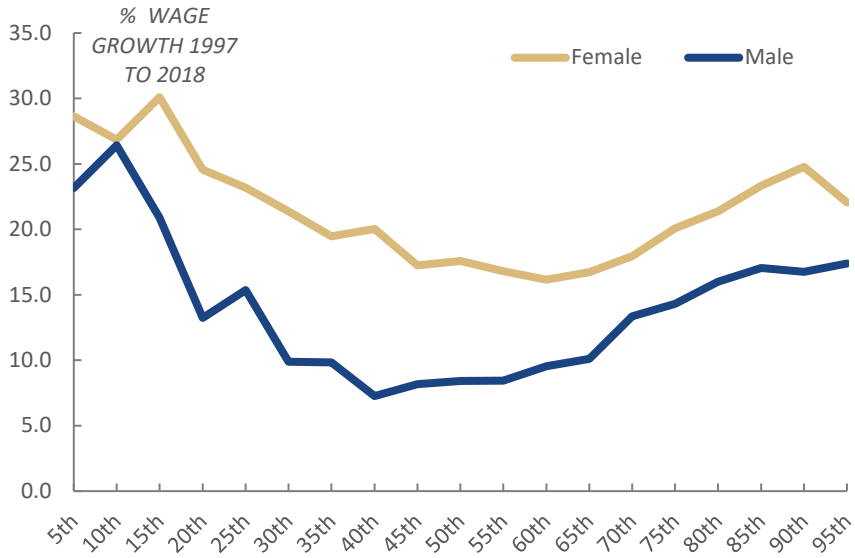
Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).

Note: The median hourly wage in each province is deflated using its provincial Consumer Price Index.

Some progress in the gender pay gap

At first glance, Figure 3-4 illustrates that over the past two decades, women have had greater cumulative wage gains than men. This graph also illustrates the phenomenon of wage polarization. Indeed, the U-shaped curves show that the ends of the distribution, for both men and women, experienced larger wage increases than the middle of the distribution. It is also worth noting that minimum wage increases around 2006 and the recent increase in the minimum wage in Ontario had a positive and significant effect on cumulative earnings for the 10th percentile during this period.

Figure 3-4 **Real wage gains for men and women, by selected percentiles**

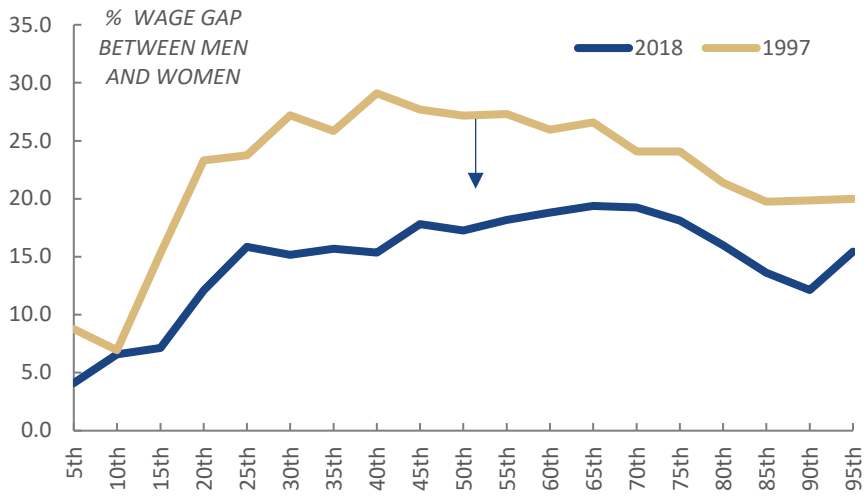


Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).

The hourly wage gap between men and women persists

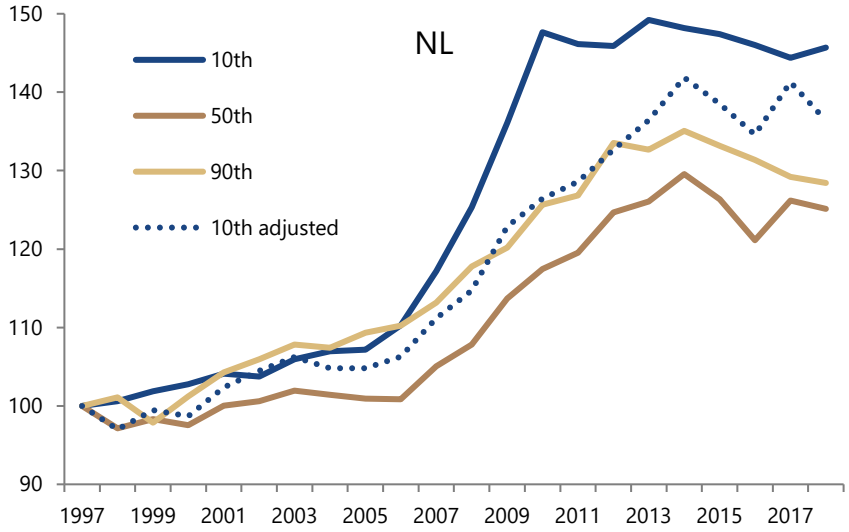
Even though women have enjoyed greater real wage gains over the past 22 years, the gender wage gap persists across the entire distribution. For example, if we look at the percentage gap between women and men in 2018, we see that men's wages are 4 per cent higher than women for the 5th percentile and 19 per cent higher for the 65th percentile (Figure 3-5). Finally, we note that the gap is greater in the middle range of the distribution, for both 1997 and 2018.

Figure 3-5 **Hourly wage gap between men and women, by selected percentiles**

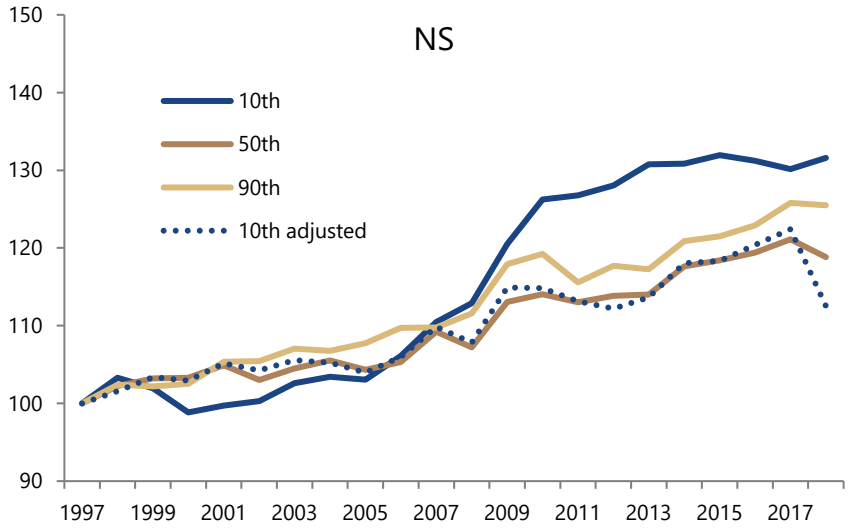


Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).

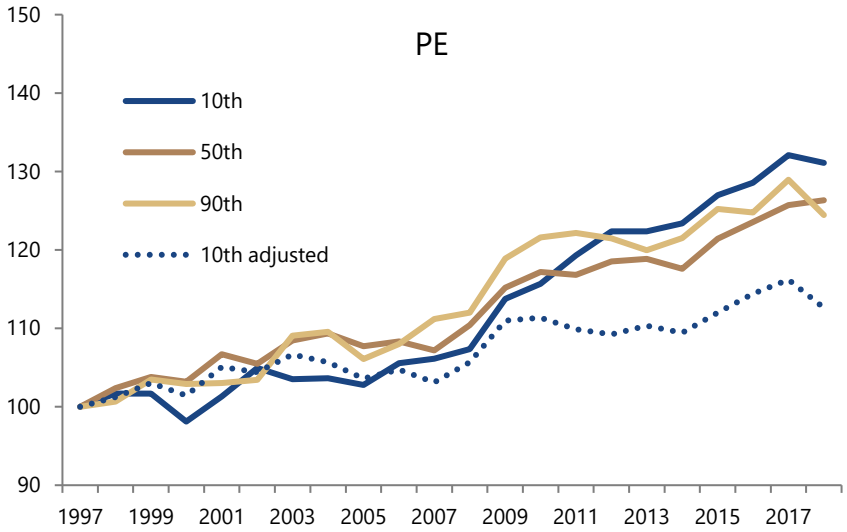
Appendix A: Cumulative real wage growth by provinces



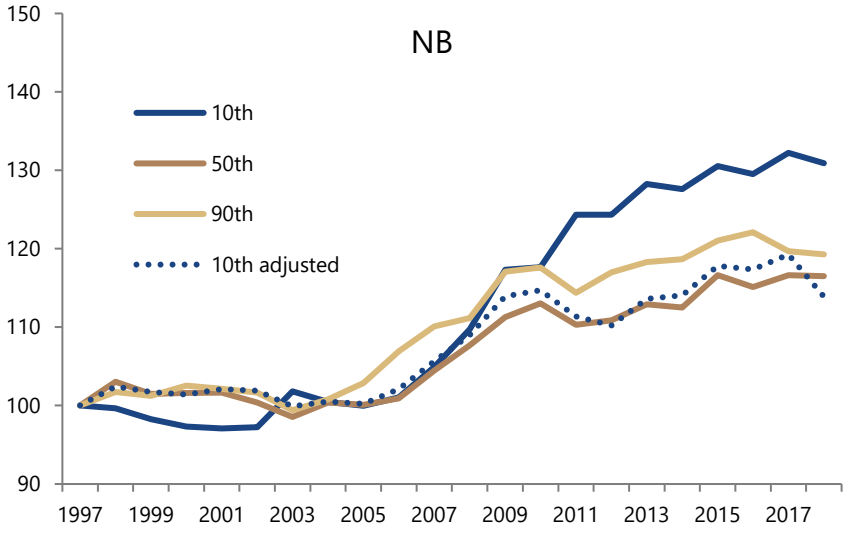
Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).



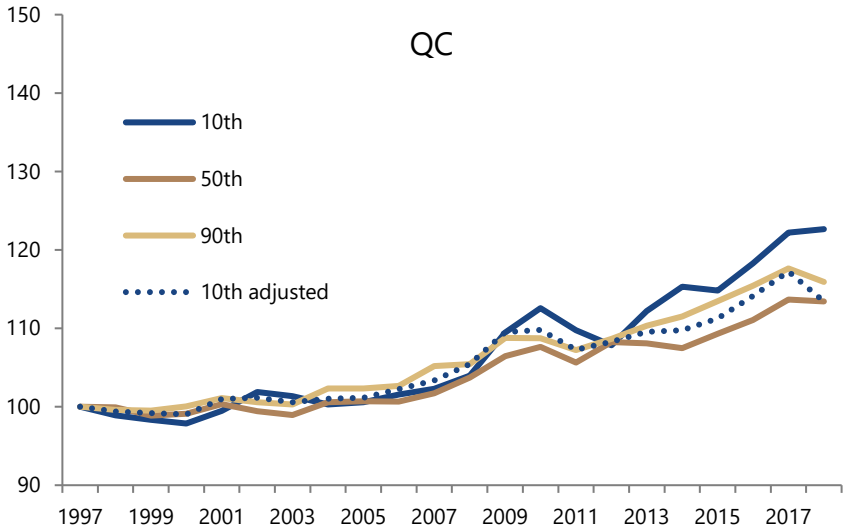
Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).



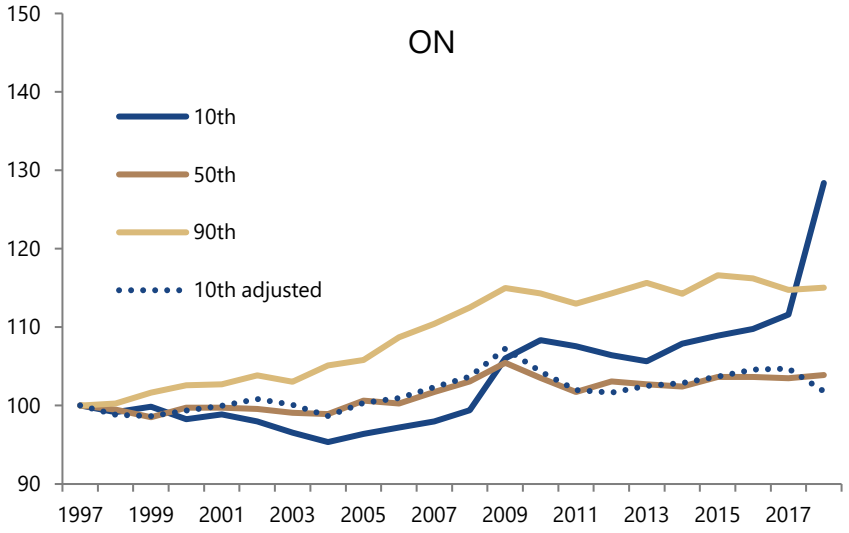
Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).



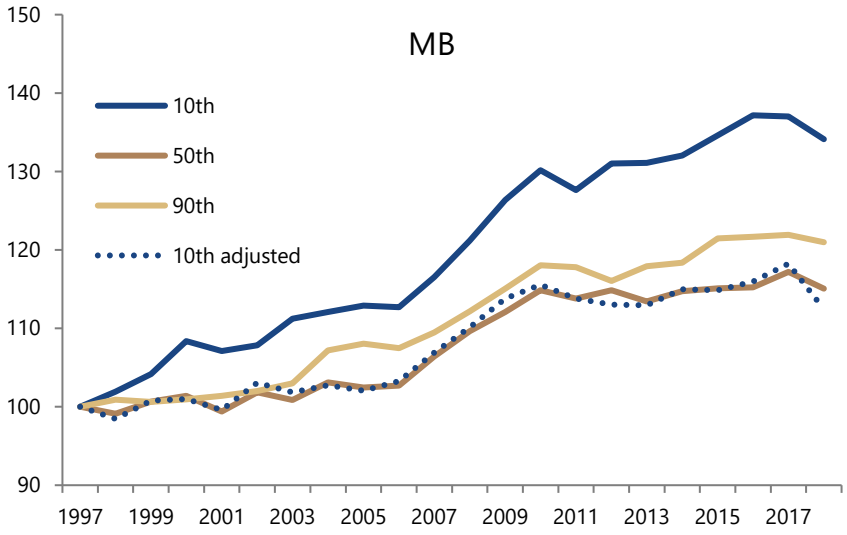
Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).



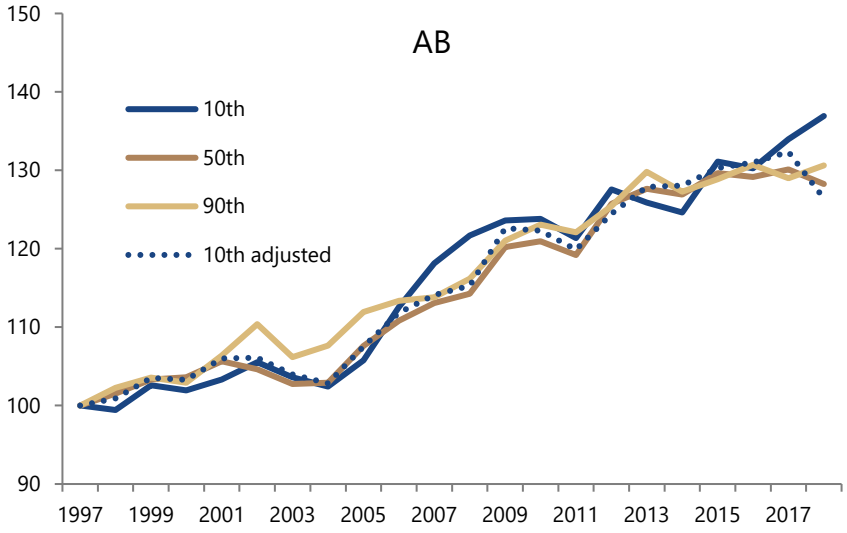
Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).



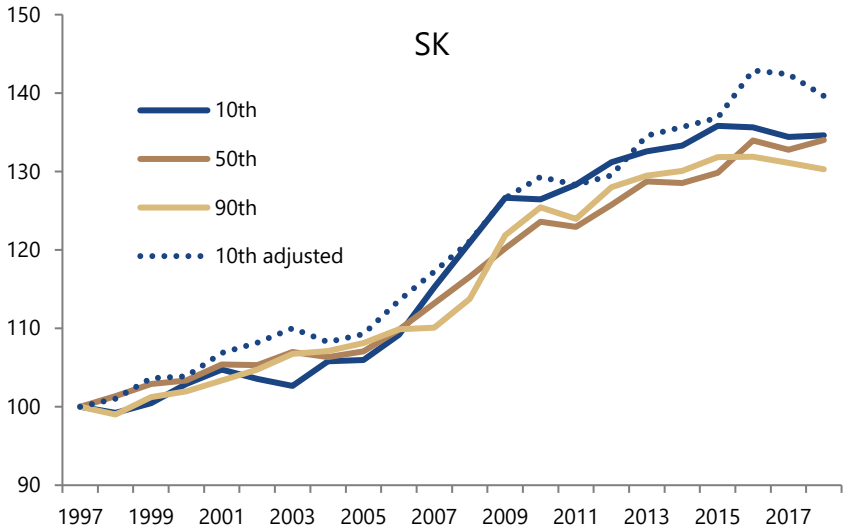
Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).



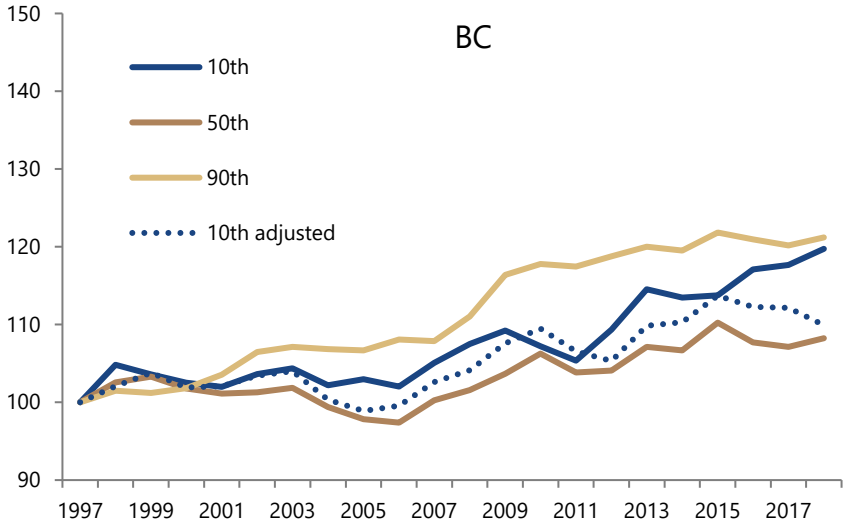
Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).



Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).



Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).



Sources: Parliamentary Budget Officer and Labour Force Survey (Statistics Canada).

Appendix B: Methodology to construct the adjusted 10th percentile wage index

To explain the growth in wages at the bottom of the distribution, Fortin and Lemieux (2015) looked at the effect of the increase in the minimum wage in the various provinces. The idea is that an increase in the minimum wage will not only affect the lowest wages, but that there will also be a spillover effect on slightly higher wages. For example, if the minimum wage increases from $10 to $15 per hour, we can expect those earning $16 per hour to ask for a raise. They therefore use a regression approach to measure this effect. This in turn allows them to study what would have happened to the growth of wages at the bottom of the distribution if the minimum wage had remained at a fixed level.

The results presented in Appendix A were obtained using the Fortin and Lemieux (2015) methodology. This appendix provides an overview of the study; the reader may refer directly to the paper for further details. PBO is particularly interested in the 10th percentile, since it is at this level that the minimum wage spillover effect is most significant.

The PBO constructed the adjusted 10th percentile wage growth index by regressing the difference between the 10th percentile and the median wage, $w^{0.1} - w^{0.5}$, on a function of the difference between the minimum wage and the median wage, $MW - w^{0.5}$. This function includes a linear and a quadratic term. A province fixed effect and a year fixed effect are also added. In this way, it is possible to control for different factors that can influence wage gaps. For example, the index is controlled for changes in labour demand that may affect different provinces differently, such as the resource boom in Alberta. We therefore ensure that the effect of the minimum wage on the difference between the 10th percentile and the median wage is isolated. More specifically, the following equation was estimated:

$$w_{it}^{0.1} - w_{it}^{0.5} = a(MW_{it} - w_{it}^{0.5}) + b(MW_{it} - w_{it}^{0.5})^2 + c_i t + \theta_i + \delta_t + \varepsilon_{it}, \quad (1)$$

where i refers to provinces and t refers to years. c_i is a linear trend term specific to provinces, θ_i is a province fixed effect (a different value for θ_i will therefore be estimated for each province), δ_t is a year fixed effect (a different value for δ will therefore be estimated for each year from 1997 to 2018) and ε_{it} is an error term. Once all these different coefficients have been estimated, we can use equation (1) to construct an adjusted wage index for the 10th percentile according to a scenario where the minimum wage remained at a fixed level, which was its average value across years and provinces between 1997 and 2018. We can then compare the observed growth of wages at the

10th percentile with the growth that could have been observed according to this alternative scenario.

References

Autor D.H. and Dorn D, *The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market,* American Economic Review, 2013, http://ddorn.net/papers/Autor-Dorn-LowSkillServices-Polarization.pdf

Office of the Parliamentary Budget Officer, *Labour Market Assessment 2014,* March 2014, https://pbo-dpb.gc.ca/web/default/files/files/files/Labour_Note_EN.pdf.

Office of the Parliamentary Budget Officer, Office of the Parliamentary Budget Officer, *Labour Market Assessment 2015*, November 2015, https://pbo-dpb.gc.ca/web/default/files/Documents/Reports/2015/Labour%202015/Labour_Market_Assessment_2015_EN.pdf

Office of the Parliamentary Budget Officer, *Labour Market Assessment 2016*, October 2016, https://pbo-dpb.gc.ca/web/default/files/Documents/Reports/2016/LMA%202016/Labour_Market_Assessment_2016%20_EN.pdf

Office of the Parliamentary Budget Officer, *Economic and Fiscal Outlook – Avril 2018*, https://pbo-dpb.gc.ca/web/default/files/Documents/Reports/2018/EFO%20April%202018/EFO_April%202018_EN.pdf

International Monetary Fund, *World Economic Outlook, April 2018: Chapter 2. Labour Force Participation in Advance Economies: Drivers and Prospects*, April 2018, https://www.imf.org/en/Publications/WEO/Issues/2018/03/20/world-economic-outlook-april-2018

Fortin M., Nicole and Lemieux, Thomas, *Changes in Wage Inequality in Canada: An interprovincial Perspective*, Canadian Journal of Economics, 2015.

Green, A. David and Sand, Benjamin, *Has the Canadian Labour Market Polarized?* November 2013.

Statistics Canada, *Labour Force Survey,* September 2018

Statistics Canada, *Annual Review of the Labour Market, 2017*, April 2018, https://www150.statcan.gc.ca/n1/pub/75-004-m/75-004-m2018001-eng.htm

Notes

1. Abbreviations for province names are based on the internationally-approved alpha code for Canada Post, see https://www150.statcan.gc.ca/n1/pub/92-195-x/2011001/geo/prov/tbl/tbl8-eng.htm. TR refers to the consolidated territories.
2. David H. Autor and David Dorn examine the phenomenon of labour market polarization in the United States between 1980 and 2005. The authors investigate whether mechanical routinization is the main factor explaining wage polarization. Among other things, they seek to explain wage gains at the ends of the distribution as well as those of employees in sectors where there is significant mechanical routinization.
3. PBO uses provincial consumer price indices (with 2002 as the base year) to calculate the real wage. As a result, absolute price differences between provinces are not included in our analysis.
3. Abbreviations for province names are based on the internationally-approved alpha code for Canada Post, see https://www150.statcan.gc.ca/n1/pub/92-195-x/2011001/geo/prov/tbl/tbl8-eng.htm. TR refers to the consolidated territories.