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New Brunswick Institute for
Research, Data and Training

WAGE GROWTH IN NEW BRUNSWICK, 1997-2017

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PROJECT TITLE

Wage Growth in New Brunswick, 1997-2017

RESEARCH TEAM

This project was completed with the assistance of NB-IRDT staff.

PARTNERS

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ABSTRACT

This report compares wage growth in New Brunswick to the Canadian average and investigates whether the province experienced wage stagnation over the past 20 years. We find that New Brunswick's growth rates in real average hourly wages are comparable to those of Ontario and the Canadian average – though maintaining a constant \$5 per hour wage gap. However, when wage growth is broken down by sex, age group, and sector, the results are more nuanced.

Our main findings confirm that New Brunswick's labour market is best understood as part of the national labour market, and long-run wage growth is associated with productivity growth trends for the national economy, as opposed to factors specific to the provincial economy. These results suggest that attempts to stimulate the economy should target growing labour demand, rather than pushing for isolated labour supply increases.

EXECUTIVE SUMMARY

This report compares wage growth in New Brunswick to the Canadian average and investigates whether the province experienced wage stagnation over the past 20 years. We find that New Brunswick's growth rates in real average hourly wages are comparable to those of Ontario and the Canadian average – though maintaining a constant \$5 per hour wage gap. However, when wage growth is broken down by sex, age group, and sector, the results are more nuanced. Public-sector workers above the age of 55 typically saw slowing growth rates over the study period. Meanwhile, public-sector workers between the ages of 15 and 24 saw an increase in hourly wage rates. These increases in labour productivity were not met with equal increases in hours worked; in fact, average weekly earnings often grew more slowly than wage rates.

When we estimate short-run labour market adjustment times to exogenous shocks, we find that most half-life values are less than or equal to 1, indicating a return to 94% of relative hourly wages within four years of a shock. The half-lives of weekly earnings are typically larger in magnitude, indicating longer adjustment times back to an equilibrium number of hours worked in a week.

Our main findings confirm that New Brunswick's labour market adjustments are consistent with those of a small open economy integrated with the labour markets of the other Canadian provinces. In other words, New Brunswick's labour market is best understood as part of the national labour market, and long-run wage growth is associated with productivity growth trends for the national economy, as opposed to factors specific to the provincial economy. The strong integration of provincial labour markets means that labour market adjustment is less visible in wage rates and earnings and is more apparent in employment changes. If labour demand falls, we see a decrease in the number of employed workers, rather than a shrinking wage rate.

These results suggest that attempts to stimulate the economy should target growing labour demand, rather than pushing for isolated labour supply increases. Growing labour demand will lead to short-lived increases in average real wages and earnings but permanent increases in employment, increasing the aggregate wage bill for the province. Further, labour demand will grow alongside increases in non-residential capital stock and higher prices for provincial exports, both of which could be achieved through higher commodity prices or a lower exchange rate between the Canadian dollar and the currency of trading partners.

INTRODUCTION

This report attempts to answer an important, overarching question: Have real wages stagnated in New Brunswick in the past 20 years? For New Brunswick, slow growth of the overall economy and changes in structural features of the labour market have led to growing concerns over the potential for slow growth in real wages. For example, technological changes in production could potentially depress wages by reducing the demand for many classes of labour. Likewise, seasonal industries (in which workers are reliant on Employment Insurance benefits) and industries employing temporary foreign workers (i.e., seafood processing) may be slowing down wage growth for low-skilled workers in the province.

Wage stagnation can indicate a “stagnant” quality of life and therefore serves as the primary motivation for our research. For many workers, labour markets – or, the interaction of employers and potential employees who exchange production of goods and services for money – are the primary source of income. Once received, this income can be used to purchase goods or services, or it may be saved for later. If one accepts the premise that goods, services, and savings can provide happiness and peace of mind to those with sufficient income, wages can serve as an indicator of quality of life.

Wages, which are often referred to as hourly earnings, are generalized as a rate of pay per unit of time. “Dollars per hour” is a measure of labour productivity, whereas annual earnings are products of the wage rate (dollars per hour) and hours worked. A stagnant wage rate indicates a lack of growth in labour productivity. By comparing the evolution of weekly and hourly earnings in the province, we attempt to tease out changes in labour productivity and the number of hours worked. We obtained data for average and median real hourly wages and real weekly earnings – broken down by NAICS industries –

from the CANSIM database.¹ From this data, we constructed two aggregate sectors – *Private* and *Public* – along with an *All Industries* category available through CANSIM.

We find that New Brunswick wages have been slowly and steadily increasing since 1997. Moreover, this growth is independent of the Great Financial Crisis,² which is taken into consideration when discussing wage growth over time. Most real hourly wages and real weekly earnings follow the same growth path over the 1997-2017 study period, and any large deviations are discussed in our report. When wage growth is broken down by sex, age group, and sector, the results are more nuanced, and these form the bulk of our analysis.

When equivalent measures are used to compare New Brunswick wage growth to Ontario and Canadian aggregates, all real wages follow similar trends. New Brunswick does, however, maintain a relatively constant wage gap between its average wages and those of Ontario and Canada more generally.

Along with constructing growth rates for New Brunswick wages relative to average Canadian wages, we also estimate short-run adjustment times to exogenous shocks. These estimates attempt to capture how quickly labour markets adjust back to “normal” wage growth differentials after facing a shock. In particular, we are interested in how New Brunswick’s adjustment times to the 2008 recession compare to the Canadian aggregate. Our estimates are expressed in “half-life” values – in other words, they show approximately how long it takes to halve the deviation from the long-run wage differential shown in the data. We find that most half-life values are less than or equal to 1, indicating a return to 94% of the relative wage steady-state within four years of a shock.

¹ Statistics Canada’s Canadian Socio-Economic Information Management System

² 2008 is used as an approximate time period for this event.

LITERATURE REVIEW

Low wage growth and wage stagnation imply an unchanging quality of life over time, even in the midst of other forms of growth, such as technological change. Since the mid-20th century, North America has seen large changes in the makeup of useful skills in American and Canadian labour forces. Continued automation and innovation have reduced the demand for labour in repetitive, algorithmic, and routine jobs typical of low- and middle-class workers (Autor, 2015). The result is a “wage polarization” of the labour force into two categories: highly-productive, high-wage jobs that involve abstract thinking and low-wage, manual jobs such as food preparation or janitorial work.

Since the 2000s, both “types” of jobs have seen their wages decline. Technological improvements, globalization, and the disappearance of manufacturing jobs are believed to have reduced the number of full-time, full-year employees in the middle-class across Canada (Beach, 2014). This dispersion of the middle-class has led to the aforementioned wage polarization phenomenon, increasing the number of both low-wage and high-wage jobs and making wage growth, wage stagnation, and wage decline fairly nuanced.

Morissette, Picot, and Lu (2013) look at the evolution of Canadian wages between 1981 and 2011, highlighting the decline of the gender hourly wage gap; wage growth driven by different industries; and wage growth/decline by education and age. Our study is particularly interested in their finding that an individual’s age and the wider age group to which they belong during data collection periods are important factors in determining wage growth. Between 1981 and the late 1990s, younger men (below the age of 44) saw stagnant or declining real hourly median wages, whereas those older than 44 experienced real hourly median wage growth.

This result is further analysed by Morissette (2018), who observes that wage growth for males aged 28/29 depends on (1) the percentile they belong to in the distribution of annual earnings and (2) which year they are in the labour force. Morissette (2018) finds that those near or below the median of the annual earnings distribution experienced annual wage decline during the early 2000s, compared to those in 1978. The opposite is true for those aged 28/29 at or above the 75th percentile in the early 2000s: they experienced wage growth relative to those in 1978.

On the other hand, women older than age 24 saw positive growth in median real hourly wages between 1981 and 1999 (Morissette et al., 2013). Compared to the male cohort, the positions of women aged 28/29 in the annual earnings distribution was a much smaller factor in the early 2000s labour force (Morissette, 2018). Morissette et al. (2013) attribute this to declining unionization rates and the movement of young workers away from higher wage sectors, such as public services.

Morissette et al. (2013) describe a reduction in the wage differential between younger and older ages between 1998 and 2011, which they attribute to the movement of the younger generation into high-wage industries like construction, mining, and oil and gas extraction. In light of these findings, we expect to see wage growth in New Brunswick. However, we must consider whether the growth we see makes up for or exceeds the declines experienced in the 1980s and 1990s.

RECENT INITIATIVES AND POLICY IN ATLANTIC CANADA AND NEW BRUNSWICK

The Atlantic provinces – New Brunswick, Prince Edward Island [PEI], Nova Scotia, and Newfoundland and Labrador – share a recent history of economic decline. During the Great Financial Crisis (2008-2009), they saw a 1.5% decline in real GDP (Atlantic Canada Opportunities Agency, 2017). Between 2010 and 2016, real GDP grew at 0.8% – nearly a quarter of pre-recession growth rates (3.5%). To increase growth in the region, most of the Atlantic provinces encourage expanding the skilled labour force through better education and by increasing the number of incoming skilled immigrants, among other initiatives (Bergman & Chaundy, 2013).

Chaundy's (2012) report shows that between 1991 and 2011, the Maritimes³ saw higher annual average growth in real GDP per capita and labour productivity, which was nearly equal to the Canadian average. His projections for 2031 predict that Atlantic Canada will see little to no growth in the labour force and will instead experience a steady decline in participation rates. However, Chaundy's projections also anticipate higher growth rates in both real GDP per capita and labour productivity between 2012 and 2031. If wages are reflective of labour force productivity, there is reason to believe that wages in Atlantic Canada should increase relative to the aggregate Canadian wage, therefore reducing existing wage differentials.

³ The Maritimes refers to the provinces of New Brunswick, Prince Edward Island, and Nova Scotia.

CANSIM TABLES AND DATA TRANSFORMATIONS

Information on wages, employees per sector, and the consumer price index (CPI) have been collected from Statistics Canada's Canadian Socio-Economic Information Management System (CANSIM) at the provincial level.

ANNUAL DATA

CANSIM Table 282-0072 summarizes data from the Labour Force Survey (LFS), which provides annual wage information for employees by province. Type of work is based on the North American Industry Classification System (NAICS), sex, and age group. The total number of employees per industry is also included.

We implement four measures of real wages for all industries:⁴ 1) average hourly wages; 2) median hourly wages; 3) average weekly earnings; and 4) median weekly earnings. Drawing on the age groupings provided by Statistics Canada, we look at cohorts of individuals older than 15 years old. In particular, we use age groups between 15 and 24 years old; between 25 and 54 years old; and older than 55 years of age. Finally, we extract the CPI for "all items" by province and year using CANSIM Table 326-0021 to construct real wages. Our annual data ranges between 1997 and 2017 with an initial base year of 2008.

Real Wages (2008) and Public/Private Sector Measures

Wages (both hourly and weekly) have been adjusted by province to 2008 constant dollars using the appropriate CPI. These take the form

$$W_{\text{REAL},t} = W_{\text{NOMINAL},t} \times \frac{\text{CPI}_{2008}}{\text{CPI}_t}$$

We have also created two measures to capture aggregate public- versus private-sector wages. Each measure is constructed as an equally-weighted average from their respective NAICS sectors (CANSIM 282-0072).

Whenever values are missing from the data, we omit them from the calculation and reduce the number of sectors counted in the denominator of the statistic.

Our public sector aggregate is comprised of Education Services, Health Care and Social Assistance, and Public. The other 13 NAICS sectors compose our private sector.⁵ Number of employees is not weighted as above but is the simple summation. We begin by describing the average hourly wages of the Canadian economy.

Canada

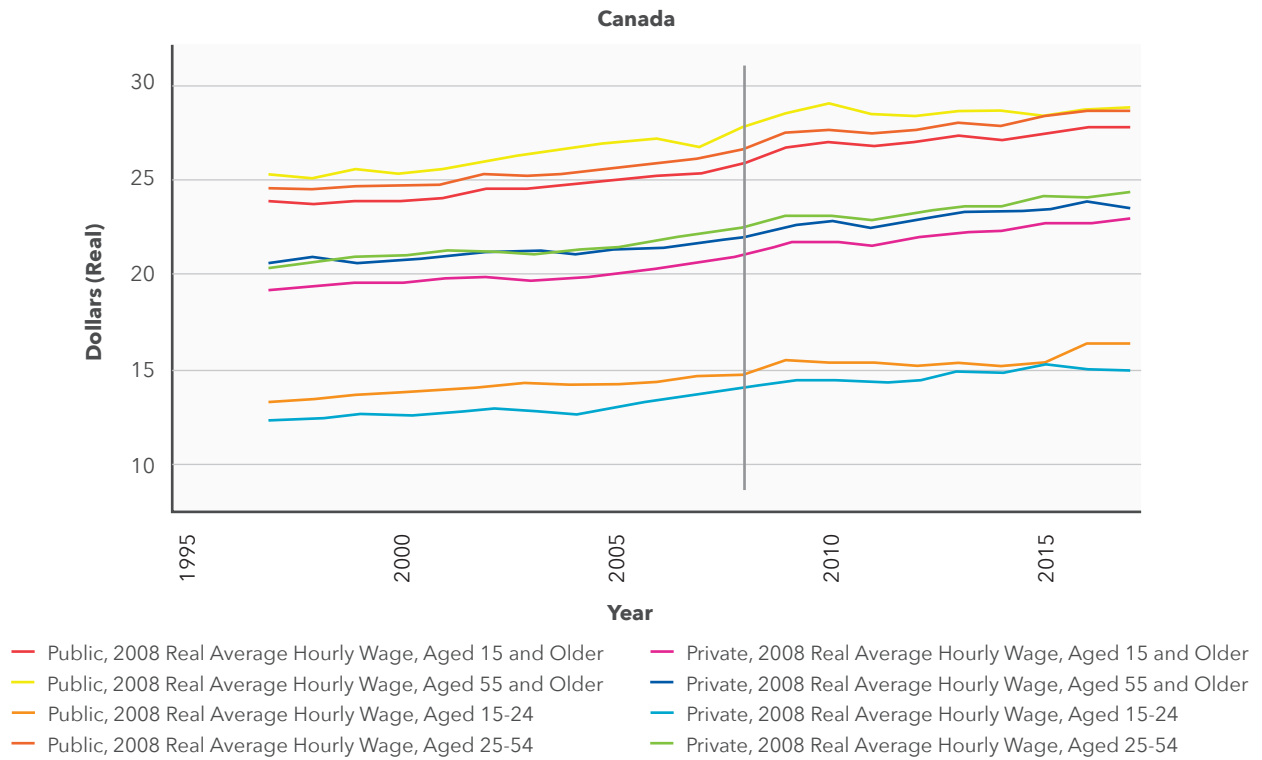
Figure 1 shows how the 2008 constant dollar average hourly wages - now abbreviated as AHW - changed between 1997 and 2017 within the Canadian Provinces. The vertical red line indicates the beginning of 2008, which is our approximation for the Great Financial Crisis. Solid lines represent public-sector AHW; dashed lines indicate private-sector AHW. Different colours represent different age groups. This graph captures three common features of the data:

1. Public Aggregate AHW exceeding Private Aggregate AHW
2. A slow, steady increase in AHW between 1997 and 2017
3. The association of low AHW with those aged 15-24

⁴ Wages will refer to both dollars per hour (hourly) and dollars per week (weekly). The weekly measure should be interpreted as earnings.

⁵ Agriculture, forestry, fishing and hunting; Mining, quarrying, and oil and gas extraction; Utilities; Construction; and Manufacturing make up the goods-producing industries of the private sector. Wholesale trade and retail trade; Transportation and warehousing; Finance, insurance, real estate, and rental and leasing; Professional, scientific, and technical services; Business building and other support services; Information and cultural industries; Accommodation and food services; and Other services comprise the services-producing industries of the private sector.

Figure 1: Canada Average Hourly Wage (2008 Constant)



We contrast Figure 1: Canada Average Hourly Wage with Figure 2: Canada Average Weekly Wage. If we assume that both public- and private-sector employees work 35 hours per week, with a wage rate of \$25 in the public sector and \$20 in the private sector (in 1997), we would expect to see weekly earnings of \$875 in the public sector and \$700 in the private sector. Figure 2

presents these values for those older than 25. However, it is clear that private-sector workers aged 15 to 24 typically earn more weekly than their public-sector counterparts - not because of higher hourly wage rates (labour productivity) but because of a difference in the number of hours worked.

Figure 2: Canada Average Weekly Wage (2008 Constant)

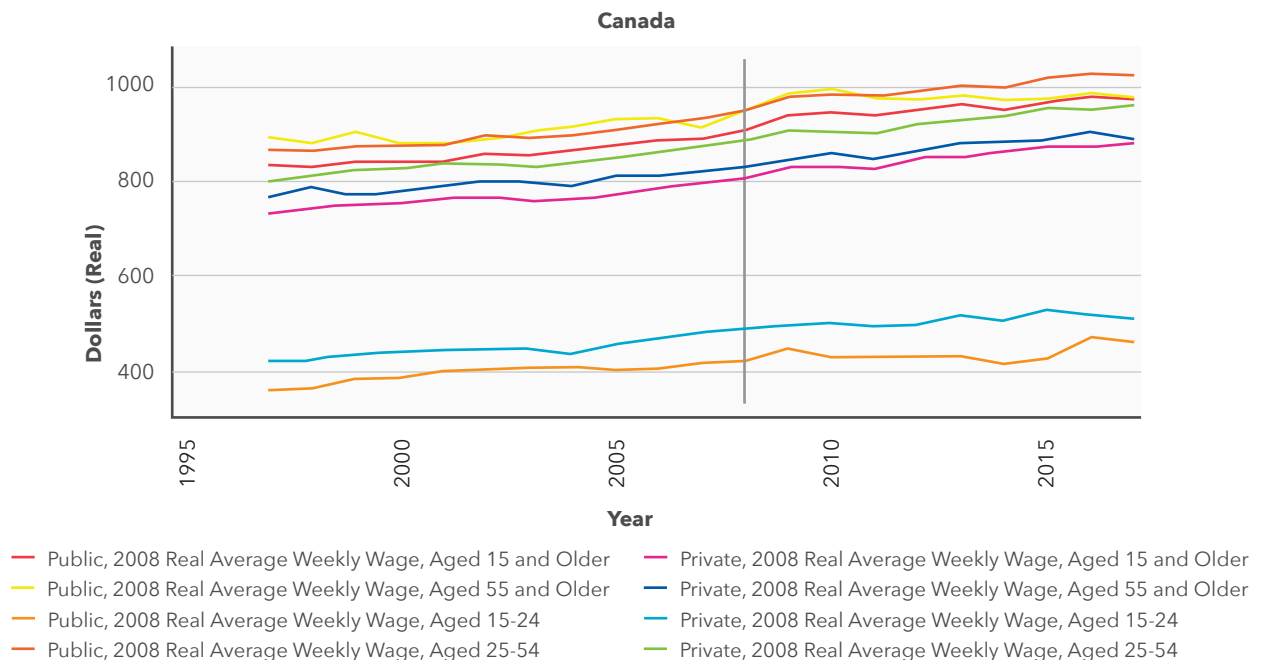


Figure 3: Ontario Average Hourly Wage (2008 Constant)

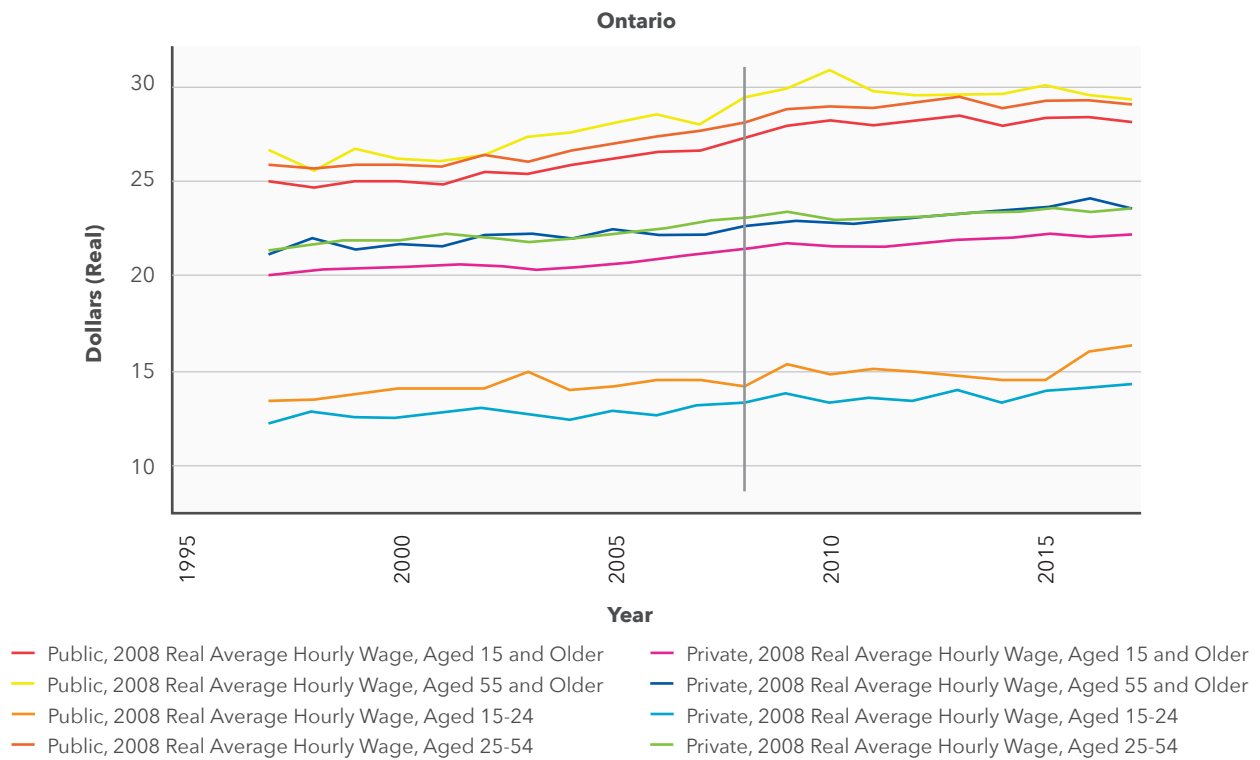


Figure 3 shows that Ontario’s levels of AHW are strikingly high for any wage group, exceeding the Canadian graph in Figure 1. Ontario workers aged 25-54 had AHW between \$25-\$30 in the public sector and between \$20-\$25 in the private sector. Meanwhile, those aged 15-24 made between \$12 and \$16. When we compare the hourly wages of Figure 3 with the weekly wages of Figure 4, Ontario still follows the same trend as the Canadian

aggregate. Those over 25 made approximately the same weekly wages for the same number of hours worked in their respective sector. However, weekly wages for those aged 15-24 were higher in the private than the public sector. Since private-sector workers are paid a lower wage than public-sector workers, this can only be the case if that age cohort worked more hours.

Figure 4: Ontario Average Weekly Wage (2008 Constant)

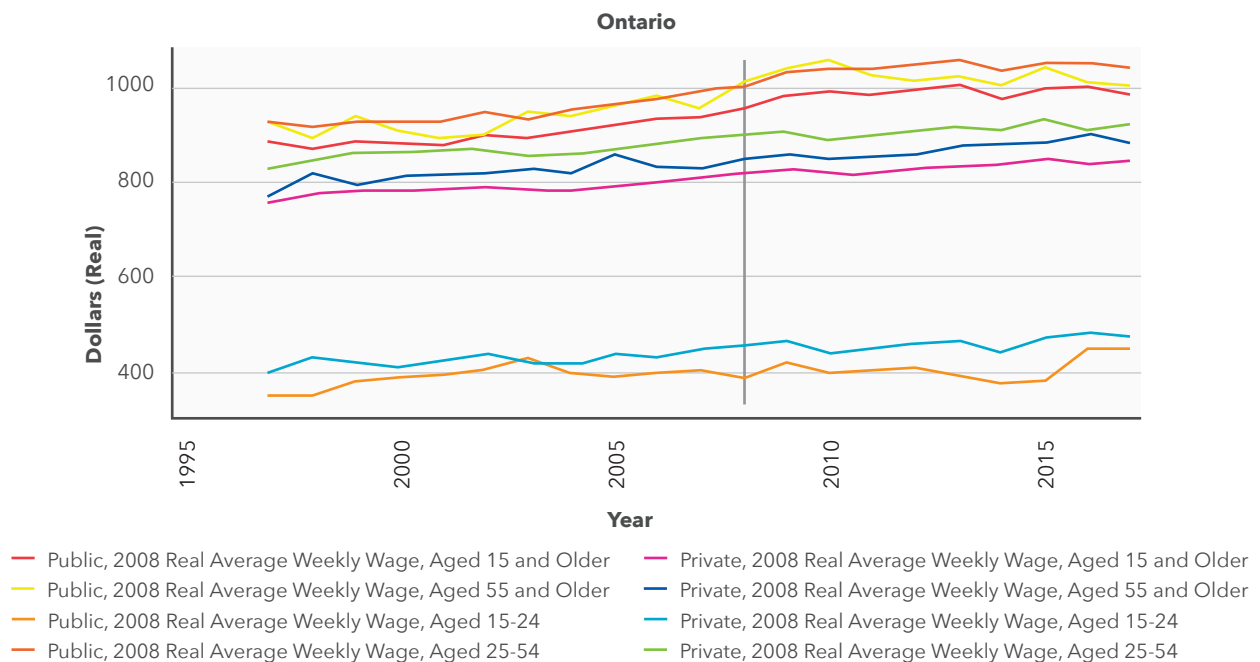
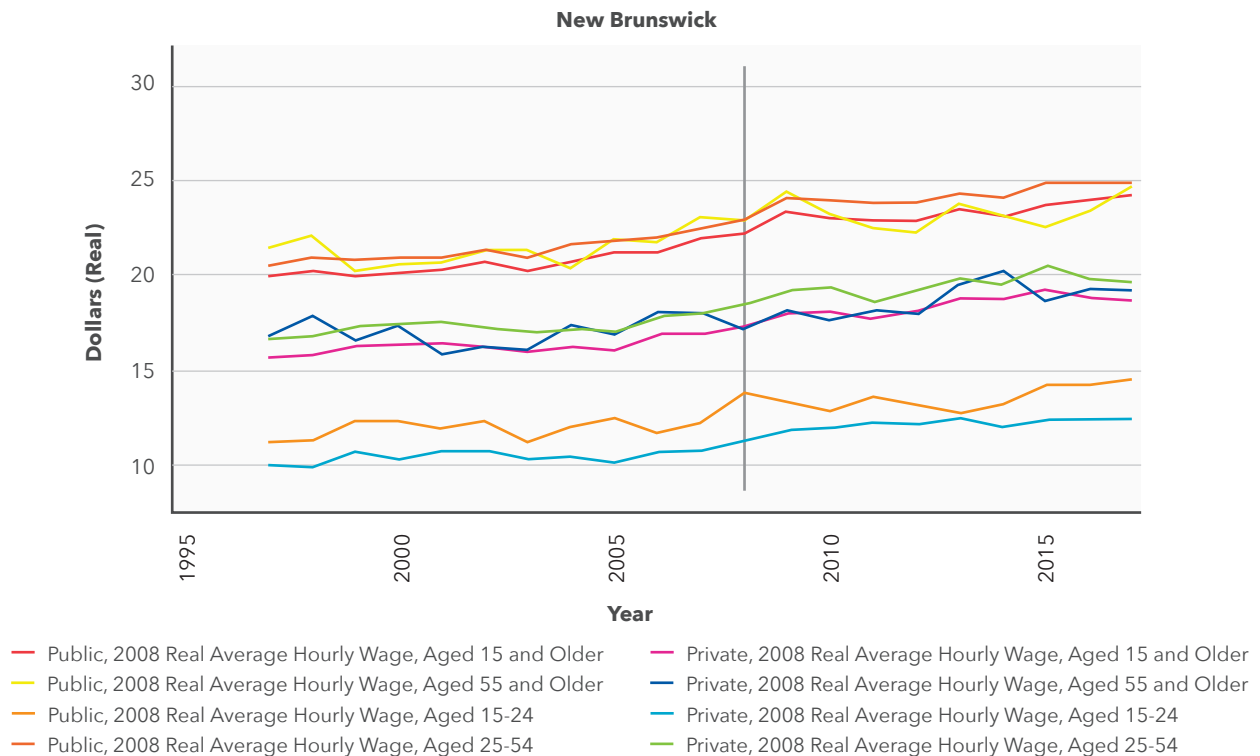


Figure 5: New Brunswick Average Hourly Wage (2008 Constant)



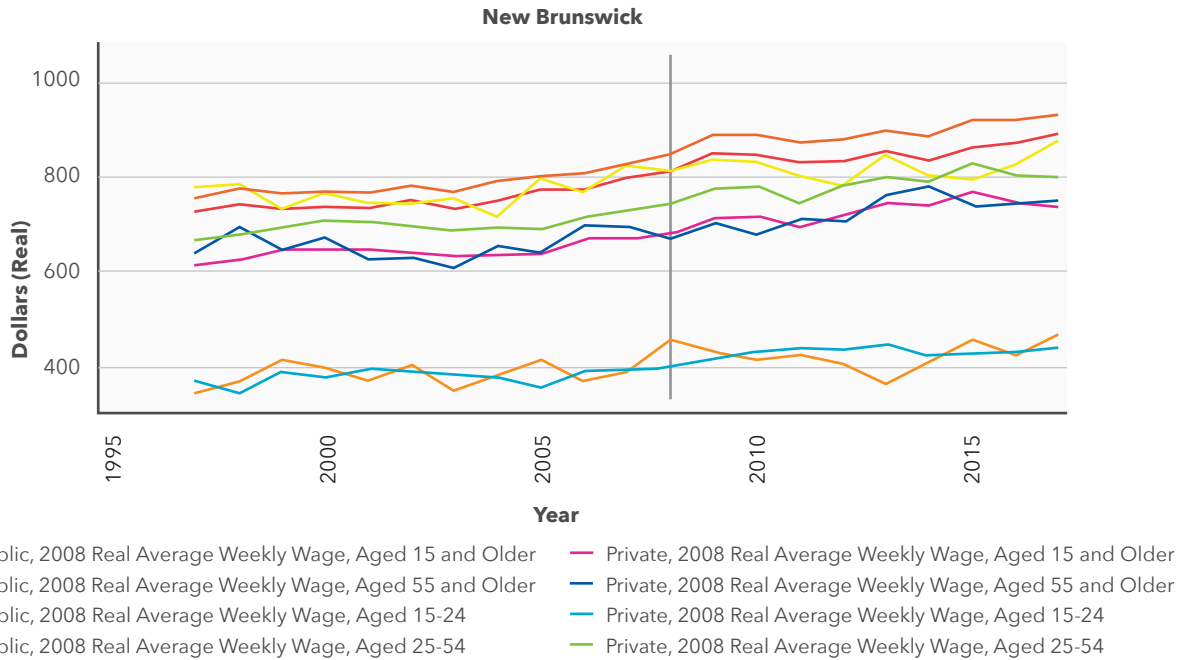
We contrast the graphs detailing the average hourly wages of Ontario and Canada (Figures 1 and 3) with the equivalent graph for New Brunswick (Figure 5). The average hourly wage for New Brunswick workers aged 25-54 and those 55 years and older is roughly \$5 less than in Ontario and Canada. This is also true for the 15-24 age group, though the gap in AHW between New Brunswick and Ontario has been shrinking over the past two decades.

Generally, a gap exists across all age groups between New Brunswick AHW and Canada/Ontario AHW, where the difference between wages was nearly unchanged over the past two decades. This does not mean, however, that AHW have been stagnant. All graphs display rough increases in AHW for New Brunswick between 1997 and 2017.

We see similar results when comparing weekly wages for New Brunswick to those of Ontario and Canada for workers over the age of 25. That is, we find that the premium paid for public-sector workers drives the weekly earnings differential.

When comparing workers aged 15-24 in Ontario and Canada to those in New Brunswick, we find that those working in the public sector make approximately the same amount of weekly earnings at nearly the same hourly wage. This is not true of the same age group in the private sector; those in the private sector have the same weekly earnings, but they work for a lower hourly wage. Thus, individuals in the private sector must work more on average than their public sector counterparts in New Brunswick. When compared to the private sector in Ontario, New Brunswickers in the private sector generally work for a lower hourly wage, making it more difficult to compare hours worked.

Figure 6: New Brunswick Average Weekly Wage (2008 Constant)



Nova Scotia, Prince Edward Island, and Newfoundland and Labrador

The remaining Atlantic Canadian provinces have seen average hourly wages start and grow in a manner similar to those of New Brunswick. However, there are some notable differences, particularly regarding PEI and Newfoundland and Labrador.

For PEI, we notice that private-sector wages for any age group started below the wages for Nova Scotia, New Brunswick, and Newfoundland and Labrador in 1997, only reaching about the same wage levels by 2017.

From 2005 onwards, Newfoundland and Labrador saw average hourly wage levels higher than any other Atlantic Canada province; and by 2017, its wages were only a couple dollars below the Canadian average. While the hourly wage difference between public- and private-sector workers in Newfoundland and Labrador is similar to the other provinces, the same is not true for the weekly earnings measure.

At least in Newfoundland and Labrador, private-sector workers between 25 and 54 years old have weekly earnings close to those of their public-sector counterparts, suggesting a larger a number of hours worked in the private sector.

Finally, private-sector workers aged 15-24 typically have higher weekly earnings than their counterparts in Newfoundland and Labrador’s public sector. This mirrors the trend for Canada and Ontario: younger employees work more hours in the private sector than the public sector. The major difference for Newfoundland and Labrador is that less of a premium is paid to public-sector workers. That is, in this province, the wage rates for public and private sectors are about the same.

Figure 7: Nova Scotia Average Hourly Wage (2008 Constant)

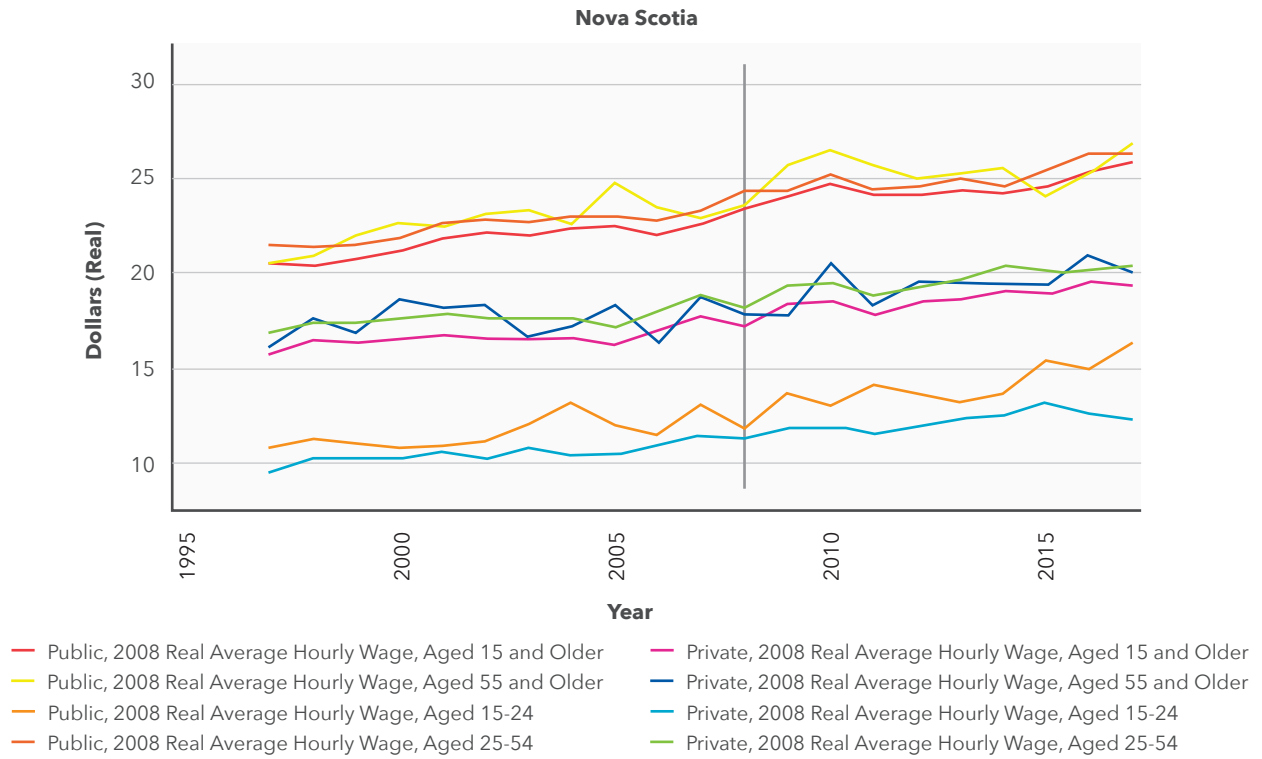


Figure 8: Nova Scotia Average Weekly Wage (2008 Constant)

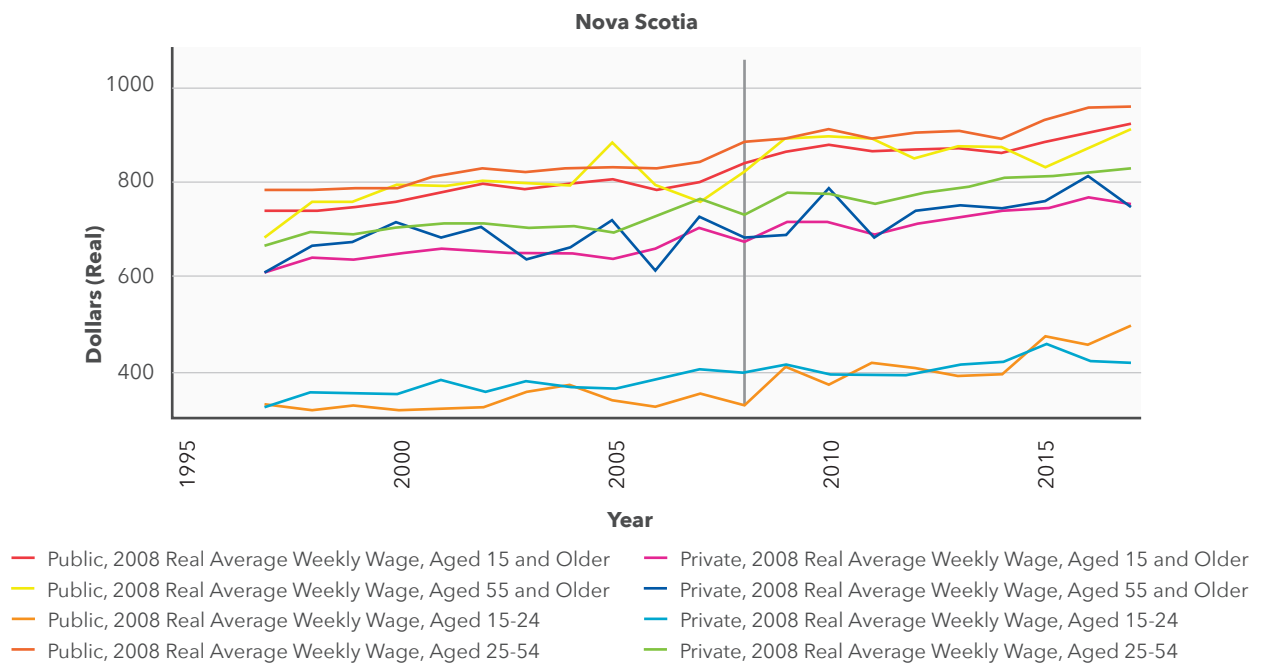


Figure 9: Prince Edward Island Average Hourly Wage (2008 Constant)

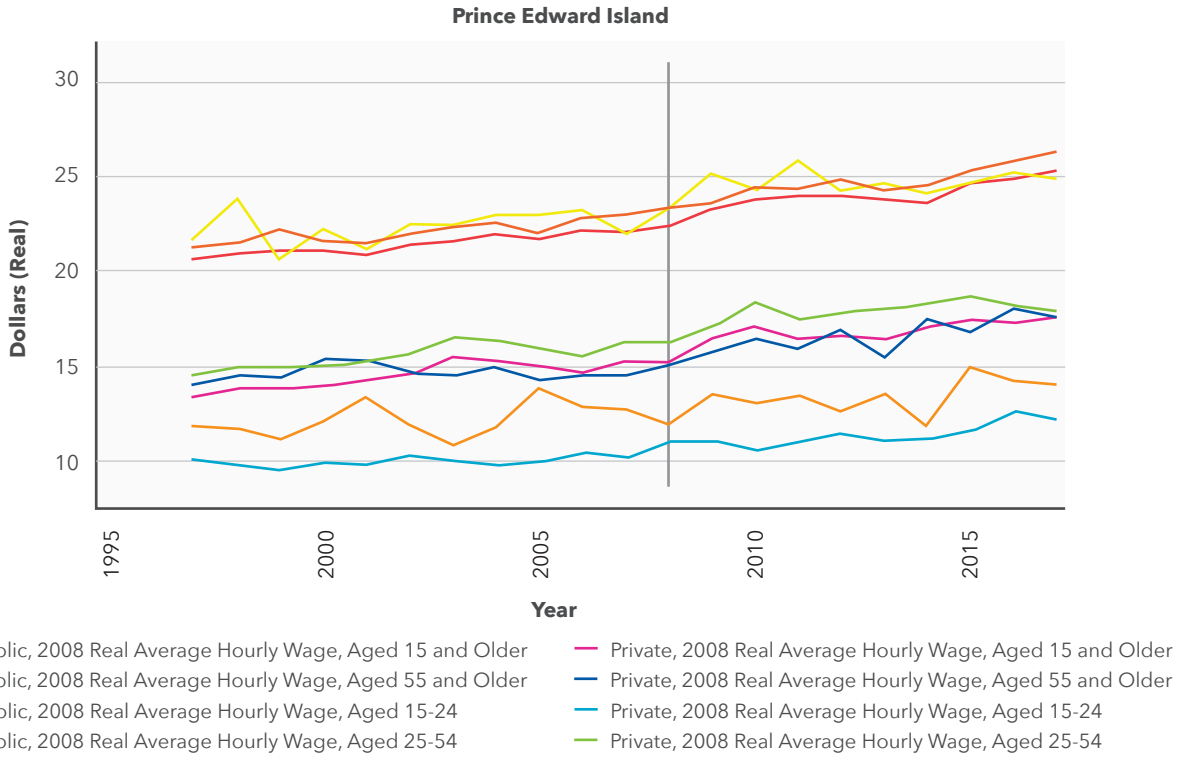


Figure 10: Prince Edward Island Average Weekly Wage (2008 Constant)

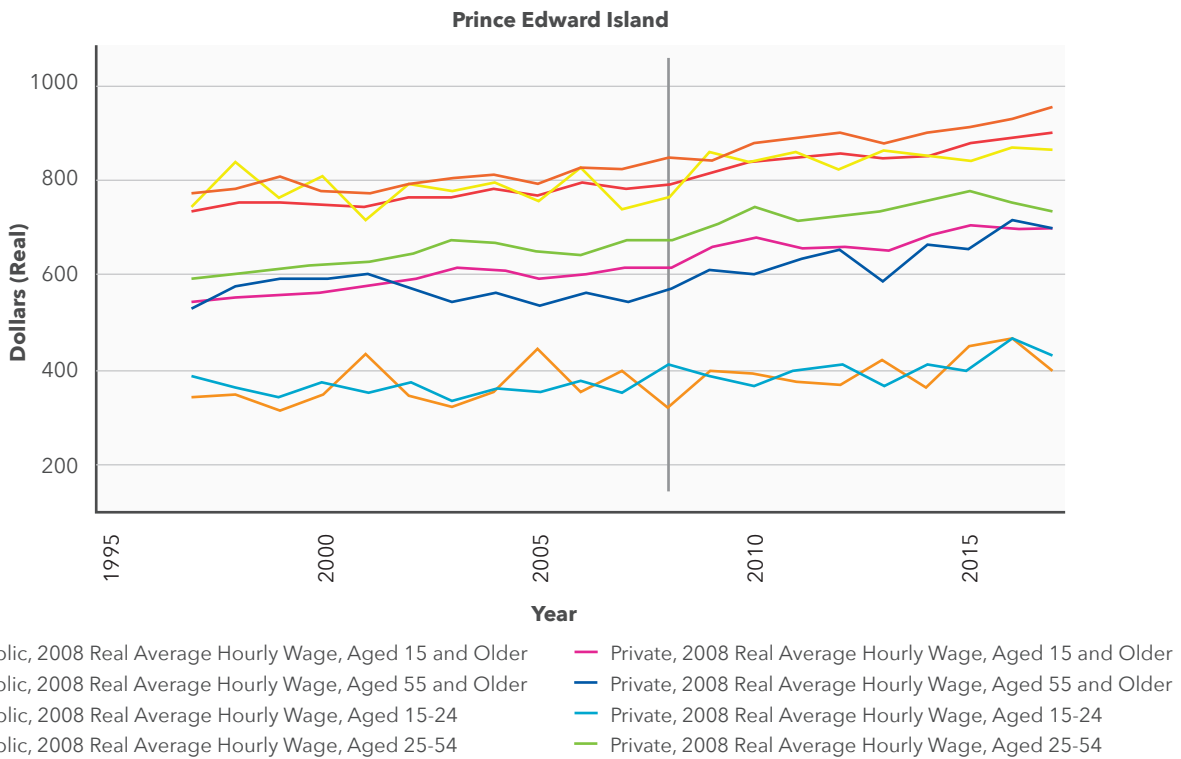
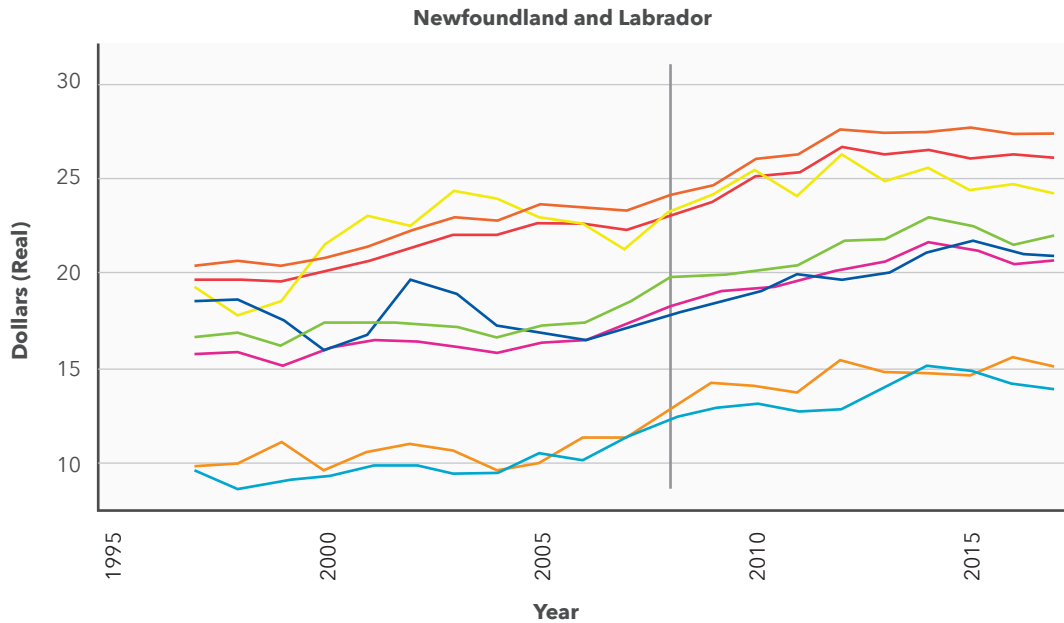
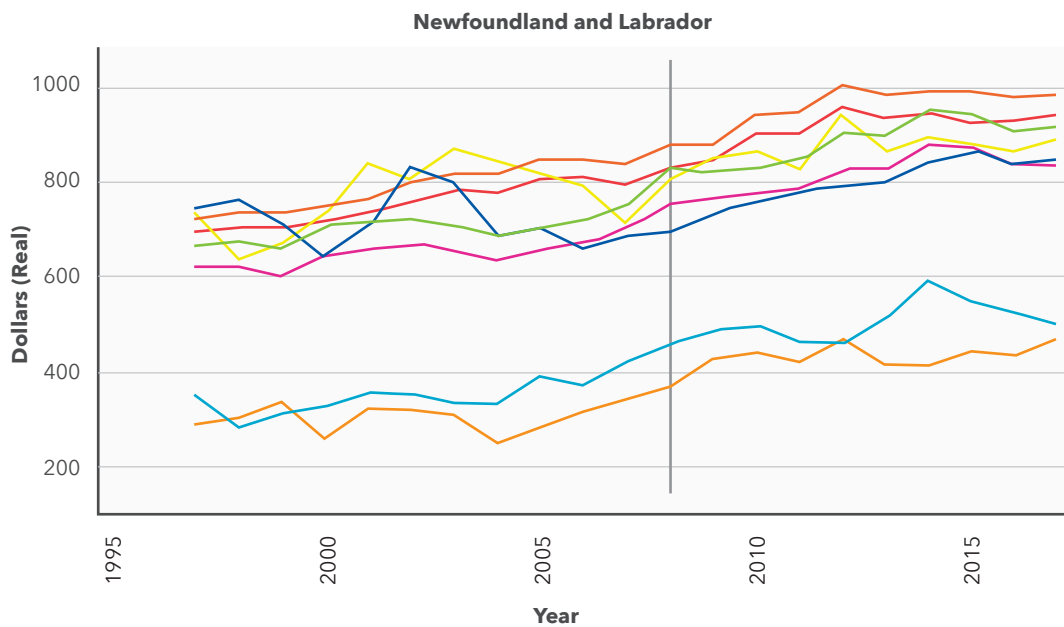


Figure 11: Newfoundland and Labrador Average Hourly Wage (2008 Constant)



- Public, 2008 Real Average Hourly Wage, Aged 15 and Older
- Private, 2008 Real Average Hourly Wage, Aged 15 and Older
- Public, 2008 Real Average Hourly Wage, Aged 55 and Older
- Private, 2008 Real Average Hourly Wage, Aged 55 and Older
- Public, 2008 Real Average Hourly Wage, Aged 15-24
- Private, 2008 Real Average Hourly Wage, Aged 15-24
- Public, 2008 Real Average Hourly Wage, Aged 25-54
- Private, 2008 Real Average Hourly Wage, Aged 25-54

Figure 12: Newfoundland and Labrador Average Weekly Wage (2008 Constant)



- Public, 2008 Real Average Hourly Wage, Aged 15 and Older
- Private, 2008 Real Average Hourly Wage, Aged 15 and Older
- Public, 2008 Real Average Hourly Wage, Aged 55 and Older
- Private, 2008 Real Average Hourly Wage, Aged 55 and Older
- Public, 2008 Real Average Hourly Wage, Aged 15-24
- Private, 2008 Real Average Hourly Wage, Aged 15-24
- Public, 2008 Real Average Hourly Wage, Aged 25-54
- Private, 2008 Real Average Hourly Wage, Aged 25-54

AVERAGE GROWTH RATE OF REAL WAGES

The average growth rate of the real (2008) wage for age/sex⁶ category i in industry j and province k from 1997 to 2007 is calculated as the solution (g) to

$$\frac{W_{i,j,k,2007}}{W_{i,j,k,1997}} = (1+g)^{10}$$

where $W_{i,j,k,2007}$ is the wage to age/sex category i in industry j and province k in 2007, and $W_{i,j,k,1997}$ is the wage to age/sex category i in industry j and province k in 1997.⁷

Similarly, the average growth rate of the real wage for age/sex category i in industry j and province k from 2008 to 2017 is calculated as the solution (g) to

$$\frac{W_{i,j,k,2017}}{W_{i,j,k,2008}} = (1+g)^{10}$$

where $W_{i,j,k,2017}$ is the wage to age/sex category i in industry j and province k in 2017.

A positive growth rate, (g), indicates long-run average growth in wages, and a negative value indicates wage decline. A value near 0 indicates approximately stagnant wages (i.e., no change in wages over the decade). Since we are asking whether wages have stagnated in New Brunswick, we are looking for approximately 0 values for growth rates in wage to age/sex category i in industry j and province k .

We first discuss a table for AHW and their respective average growth rates across two periods (1997-2007 and 2008-2017) for every age/sex pair in the *All Industries* category. We then display a set of graphs corresponding to the table. This is done for tractability and ease of interpretation. The sets of graphs quickly capture the information of the table and will be used once more to describe how median wages have changed over the two decades of the study period.

Average Growth Rate of Average Hourly Wages

Table 1 exemplifies the average growth rates of AHW across the 1997-2007 and 2008-2017 periods. The table has been truncated to include only Canada, Newfoundland and Labrador, PEI, Nova Scotia, New Brunswick, and Ontario. If we look at the Canada row, Both Sexes and 15-24 column, we see that the average growth rates of AHW were relatively slower in the 2008-2017 decade than the decade immediately preceding it.

The difference between average growth rates for Canada is captured by the value -0.19268 in the *Difference* row. A negative value indicates a slowing of the growth rates of AHW; meanwhile, a positive value indicates increasing growth rates.

Most entries in Table 1 show positive values, indicating positive average growth. In other words, wages are generally growing. Notably, Newfoundland and Labrador saw large post-recession growth rates across all age/sex combinations, with emphasis on the younger (15-24) and older (55+) workers. The opposite is true of Nova Scotian 15-24-year-old males and workers aged 55+, who saw their average wage growth slow after the Great Recession.

Are wages stagnant in New Brunswick? Table 1 shows positive differentials for the province, implying higher growth for the 2008-2017 period in all age categories except 55+ females and 55+ both sexes. Across both periods, we see positive growth rates of wages for all age/sex pairs over the ten years. In a nutshell, there has been wage growth.

Between 2008 and 2017, New Brunswick wage growth rates exceeded those of Ontario in all age/sex pairs except 55+ females. Meanwhile, New Brunswick growth rates exceeded Canadian rates in all age/sex pairs other than the 55+ females and 55+ both sexes categories.

⁶ Recall that age can come from five categories: 15 and older, 15-24, 25-54, 55 and older, and the aggregate of these four categories. Sex is male or female. Therefore, each i has two components: age and sex. It is worth noting that we tend not to look at the 15 and older category.

⁷ These statistics allow us to compare industries even if some information is missing. Both measures are adopted for median hourly wages, average hourly wages, median weekly wages, and average weekly wages.

Table 1: All Industries, 10 Year Average Growth Rates of Average Hourly Wages by Region and Age/Sex Pair

| All Industries, 10-Year Average Growth Rates of Average Hourly Wages | | | | | | | | | | |
|--|------------|------------|----------|----------|---------|---------|----------|----------|----------|----------|
| Location | Decade | Both Sexes | | | Females | | | Males | | |
| | | 15-24 | 25-54 | 55+ | 15-24 | 25-54 | 55+ | 15-24 | 25-54 | 55+ |
| Canada | 1997-2007 | 1.0157 | 0.65353 | 0.42927 | 0.97669 | 0.88078 | 0.98994 | 1.0693 | 0.58276 | 0.38992 |
| | 2008-2017 | 0.82302 | 0.88088 | 0.54586 | 1.077 | 1.0928 | 0.89899 | 0.65346 | 0.73744 | 0.36254 |
| | Difference | -0.19268 | 0.22735 | 0.11659 | 0.10031 | 0.21202 | -0.09095 | -0.41584 | 0.15468 | -0.02738 |
| Newfoundland & Labrador | 1997-2007 | 1.3384 | 0.94306 | -0.01731 | 0.63558 | 1.2476 | 0.43906 | 1.8972 | 0.82079 | 0.13097 |
| | 2008-2017 | 2.4045 | 1.6791 | 1.1996 | 2.9443 | 2.2002 | 1.6209 | 1.958 | 1.3249 | 1.245 |
| | Difference | 1.0661 | 0.73604 | 1.21691 | 2.30872 | 0.9526 | 1.18184 | 0.0608 | 0.50411 | 1.11403 |
| Prince Edward Island | 1997-2007 | 0.73323 | 0.79684 | 0.58273 | 0.87112 | 1.4417 | 1.6462 | 0.62705 | 0.2489 | -0.04602 |
| | 2008-2017 | 1.2357 | 1.3753 | 1.1373 | 1.4091 | 1.5989 | 1.3051 | 1.0925 | 1.1453 | 0.99705 |
| | Difference | 0.50247 | 0.57846 | 0.55457 | 0.53798 | 0.1572 | -0.3411 | 0.46545 | 0.8964 | 1.043065 |
| Nova Scotia | 1997-2007 | 1.2761 | 0.76461 | 1.0245 | 1.047 | 1.1864 | 0.63551 | 1.5026 | 0.59453 | 1.4861 |
| | 2008-2017 | 1.0669 | 1.1221 | 1.0851 | 1.9368 | 1.4291 | 1.7994 | 0.33495 | 0.88187 | 0.68282 |
| | Difference | -0.2092 | 0.35749 | 0.0606 | 0.8898 | 0.2427 | 1.16389 | -1.16765 | 0.28734 | -0.80328 |
| New Brunswick | 1997-2007 | 0.80115 | 0.54403 | 0.42839 | 0.98554 | 1.134 | 1.5589 | 0.67433 | 0.26089 | 0.15353 |
| | 2008-2017 | 1.5214 | 1.0437 | 0.30745 | 1.4602 | 1.488 | 0.4497 | 1.577 | 0.67815 | 0.30191 |
| | Difference | 0.72025 | 0.49967 | -0.12094 | 0.47466 | 0.354 | -1.1092 | 0.90267 | 0.41726 | 0.14838 |
| Ontario | 1997-2007 | 0.30088 | 0.60199 | 0.38414 | 0.37816 | 0.75697 | 0.76439 | 0.28424 | 0.59253 | 0.38697 |
| | 2008-2017 | 0.73072 | 0.34163 | 0.21174 | 0.96243 | 0.58267 | 0.68837 | 0.56254 | 0.15365 | -0.07904 |
| | Difference | 0.42984 | -0.26036 | -0.1724 | 0.58427 | -0.1743 | -0.07602 | 0.2783 | -0.43888 | -0.46601 |

We previously noted slow, steady growth across all provinces in Canada. Table 1 shows that, with the exception of females 55+, there was a reduction in the gap between New Brunswick and Ontario from 2008 to 2017. We now introduce a diagram which expresses Table 1 while comparing *All Industries* to disaggregated *Public Sector* and *Private Sector* growth rates as defined in our data section.

Figure 13 shows ten-year annualized average hourly wage growth for 1997-2007 and 2008-2017 for both sexes. The coloured dots represent different provinces, and each dot is created from

two components: the ten-year average growth rate between 1997 and 2007 (horizontal, dashed axis) and the ten-year average growth rate between 2008 and 2017 (vertical, dashed axis). Dots further to the right of the vertical, dashed axis indicate *higher* growth rates between 1997 and 2008; those above the horizontal, dashed axis indicate *higher* growth rates between 2008 and 2017.

For example, in the top left corner of Figure 13 (*All Industries 15-24*), the light blue dot (ON) is closer to the origin⁸ than the red dot (NB) in both horizontal and vertical directions. That means that

⁸ The origin is the intersection of the dashed lines.

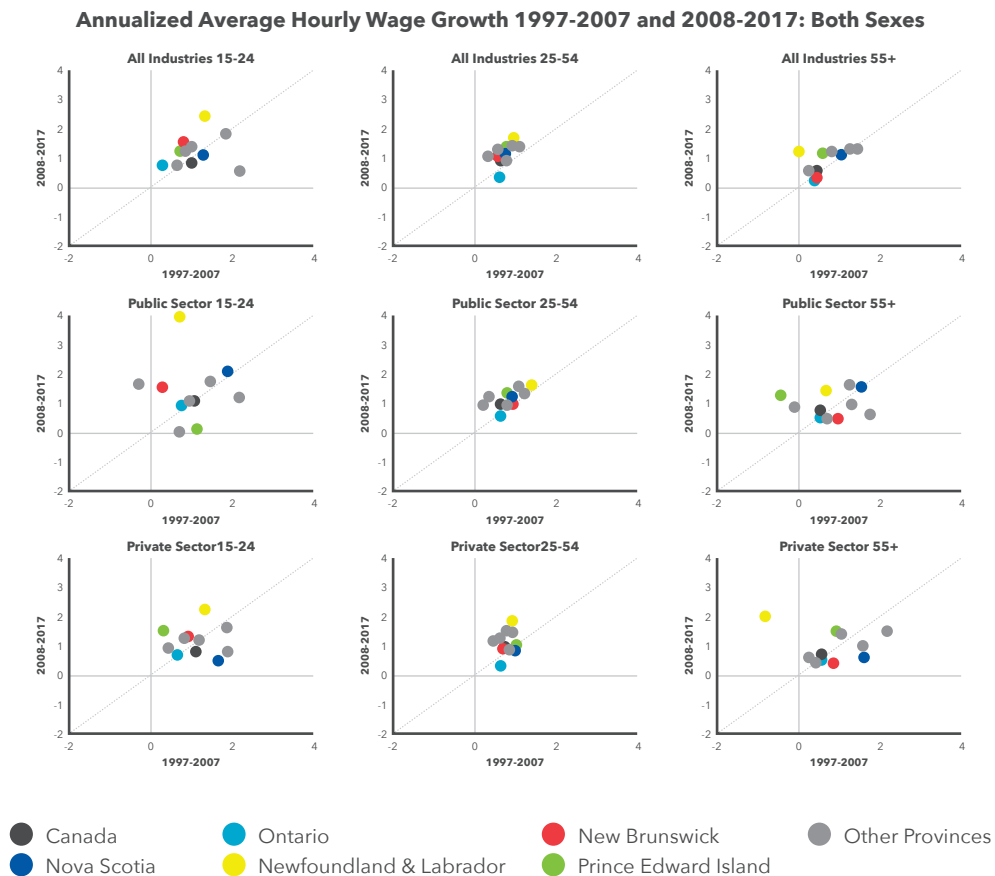
NB (red) had higher growth than ON (light blue) in both 1997-2007 (horizontal) and 2008-2017 (vertical) study periods.

Next, compare the NB dot (red) to the NS dot (dark blue). The red dot (NB) is closer to the vertical, dashed axis than the dark blue dot (NS) but further from the horizontal, dashed axis. This means that in the 1997-2007 period, NS grew faster than NB; but in 2008-2017, NB grew faster than NS.

The dotted 45° line gives a visual representation of the differential, as in Table 1. Take, for example, the difference between the *Canada* row, *Both Sexes* and ages 15-24 column in Table 1. The difference between average growth rates for Canada is captured through the value -0.19268. In Figure 13, this means the black dot - Canada - lies *below* the 45° line, as seen in the upper-left corner graph (*All Industries 15-24*).

Wage stagnation is shown in the following graphs through dots close to the origin. This indicates no change in wages across either period. Of course, wage stagnation can also be period-specific. Low wage growth in the 1997-2007 decade is reflected when a dot is close to the vertical, dashed axis. Likewise, low wage growth in the 2008-2017 decade is shown when a dot is close to the horizontal, dashed axis. Wage decline (negative growth) in the 1997-2007 period is shown when a dot is to the left of the vertical dashed axis. This is perhaps most evident in Newfoundland and Labrador's position in the Private Sector 55+ graph (bottom right), which is indicated by the yellow dot placed far to the left of the vertical dashed axis. Alternatively, wage decline in 2008-2017 is shown when a dot is below the horizontal dashed axis.

Figure 13: Annualized Average Hourly Wage Growth, 1997-2007 and 2008-2017: Both Sexes



Both Sexes, Annualized Average Hourly Wage Growth

Figure 13 presents some features about New Brunswick that are worth reiterating. For instance, it depicts growth rates at or above the 45° line for those between the ages of 15-24 and 25-54 in the 2008-2017 decade. Those above the age of 55 saw higher growth rates in the 1997-2007 decade. These results appear to be independent of our NAICS breakdown of public and private sectors.

Maintaining New Brunswick as our province of interest, we see low growth for the 15-24 age group in the 1997-2007 decade. This is evidenced by the red dot nearly touching the vertical dashed axis in the middle-left panel (*Public Sector 15-24*). The opposite is true of those older than 55, as their red dot is close to the horizontal axis in the middle-right panel (*Public Sector 55+*). This indicates near zero growth during the 2008-2017 decade.

Females, Annualized Average Hourly Wage Growth

Female average hourly wage growth in Atlantic Canada is displayed in Figure 14, where New Brunswick shows similar trends to the Both Sexes graphs in Figure 13. Though, we see higher wage growth for the province's 15-24 age group during the 2008-2017 timeframe.

Notably, the public sector graphs in the middle row appear to have the largest magnitude of growth rates indicated by distance from the 45° line. The 15-24 group shows slow growth between 1997-2007 and high growth in 2008-2017. The red dot (NB) on the middle right graph (*Public Sector 55+*) is nearly touching the horizontal dotted line, indicating that those older than 55 had high growth between 1997 and 2007 and low growth in the following decade.

Males, Annualized Average Hourly Wage Growth

Figure 15 depicts AHW for males in Atlantic Canada. We have a similar trend for New Brunswick males compared to the previous figures in the private sector (bottom row of panels). Though, average hourly wages demonstrate low growth for those above 55 in the 2008-2017 decade, as the red dot (NB) is near the horizontal axis. There are additional differences worth noting.

The public sector (middle row) shows a disproportionate increase in the growth rate of average hourly wages for younger males between 1997-2007 and 2008-2017. Further, the top panels show that, in *All Industries*, males typically had higher growth rates in the 2008-2017 decade relative to the previous decade.

Broadly speaking, Figures 13, 14, and 15 show positive, slow and steady growth for the 25-54 age group, seemingly independent of age/sex pairs. Moreover, we see higher growth in average hourly wages across Canada in the 2008-2017 decade, as the coloured dots are near to or above the 45° line. The largest changes in the growth rates of AHW seem to occur in the age groups either entering or leaving the labour market (i.e., 15-24 and 55+).

Average Growth Rate of Median Hourly Wages

We follow the same procedure to similarly construct the ten-year average growth rate of median hourly wages (MHW) by province, and we omit data tables in favour of the dot diagrams because they have the same interpretation of growth rates. We recall that the median represents the middle value of the data on wages.

⁹ The origin is the intersection of the dashed lines.

Figure 14: Annualized Average Hourly Wage Growth, 1997-2007 and 2008-2017: Females

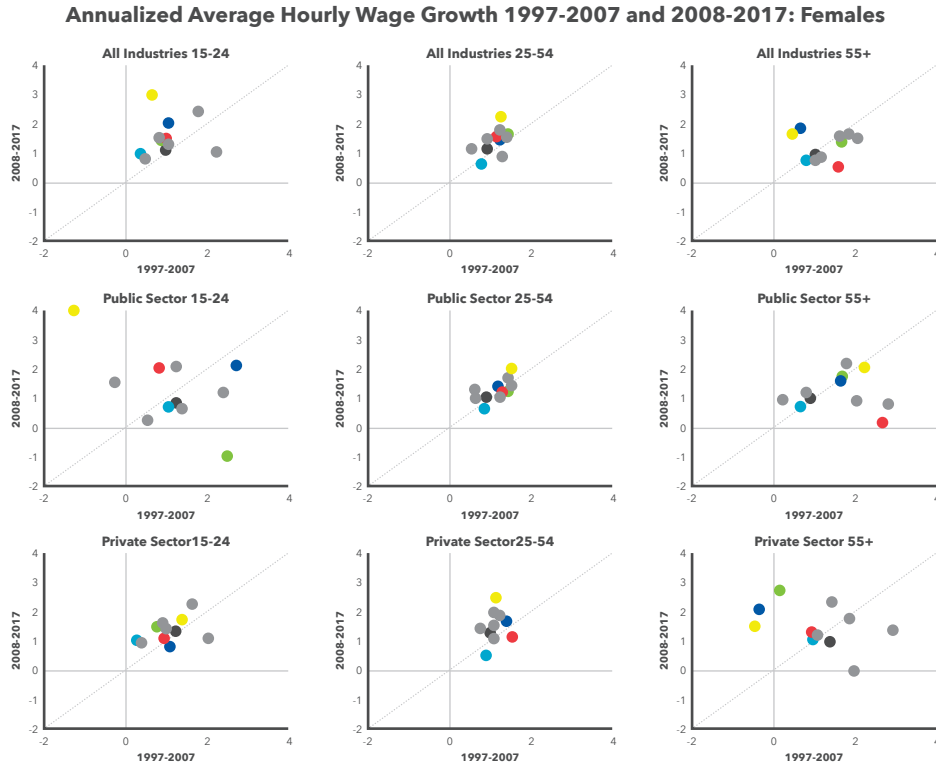
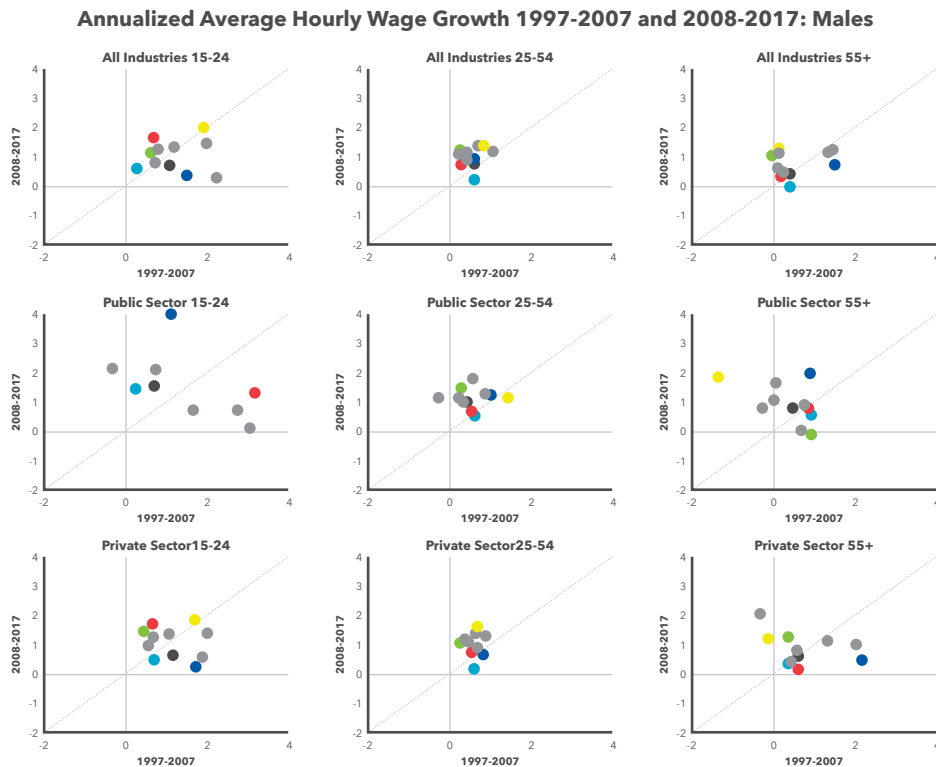


Figure 15: Annualized Average Hourly Wage Growth, 1997-2007 and 2008-2017: Males



Canada
 Ontario
 New Brunswick
 Other Provinces
 Nova Scotia
 Newfoundland & Labrador
 Prince Edward Island

Both Sexes, Annualized Median Hourly Wage Growth

Median wage stagnation is shown in Figure 16: Annualized Median Hourly Wage Growth, 1997-2007 and 2008-2017: Both Sexes. In the 55+ age group in All Industries (top-right), both New Brunswick and Ontario are nearly touching the intersection of the dotted lines, indicating approximate stagnation of real median hourly wages. That is, the persons at the median position did not see any growth in their wages in either period.

Median wage decline between 1997 and 2007 is exemplified in the 55+ age group of Newfoundland and Labrador (yellow) in the middle right and bottom right panels, where the yellow dots are to the left of the vertical dashed line. However, they did experience median wage growth between 2008 and 2017.

New Brunswick workers aged 15-24 have seen generally positive growth rates of median wages, as indicated by the red dots located far from the origin. Notably, the public sector saw high increases in wages in the 2008-2017 decade. Those aged 25-54 saw positive growth rates as well, though their 1997-2007 median hourly wages seem to have grown more slowly than those in the 2008-2017 decade. Individuals aged 55+ show the most variety in their median hourly wage: private-sector workers saw small positive increases, whereas public-sector workers saw wages decline in the 2008-2017 decade. The All Industries 55+ graph (top right) shows no growth in general.

Females, Annualized Median Hourly Wage Growth

Figure 17 shows the annualized average of the MHW for a female sample. The private- and public-sector trends analogously follow the previous Both Sexes trends for median wages. The private sector shows positive growth of MHW, whereas the public sector shows high 2008-2017 growth rates for females aged 15-24.

Females aged 25-54 saw similar growth rates across both decades, but those aged 55+ saw MHW decline between 2008 and 2017.

Across All Industries (top row), we see that females below the age of 55 typically experienced higher growth rates in median hourly wages during the 2008-2017 decade than the 1997-2007 decade. This trend is completely reversed for those older than 55.

Males, Annualized Median Hourly Wage Growth

When compared to the aggregate category or to the female category, males in New Brunswick experienced different trends in MHW. Figure 18 shows that, in All Industries, those aged 15-24 had relatively higher growth rates in 2008-2017 than in the preceding decade. Both periods do, however, show positive growth rates.

The results for the 55+ age group are perhaps the most deviant from the previous females and both sexes panels (see Figures 16 and 17). The 2008-2017 decade shows zero or small negative median wage growth - i.e., stagnation or slight decline - in MHW. The 1997-2007 decade shows stagnation across All Industries, with small, positive wage growth for both public and private sectors when disaggregated.

Those aged 25-54 show generally positive growth rates in MHW across the 2008-2017 decade, whereas there was MHW decline across All Industries in the 1997-2007 decade. The public and private sectors for this age group show positive, albeit low, MHW growth.

Comparison to Growth Rates of Average Real Weekly Earnings and Median Real Weekly Earnings

The preceding section analyzes the growth rates of average and median real hourly wages. We contrast the results with the growth rates of

Figure 16: Annualized Median Hourly Wage Growth, 1997-2007 and 2008-2017: Both Sexes

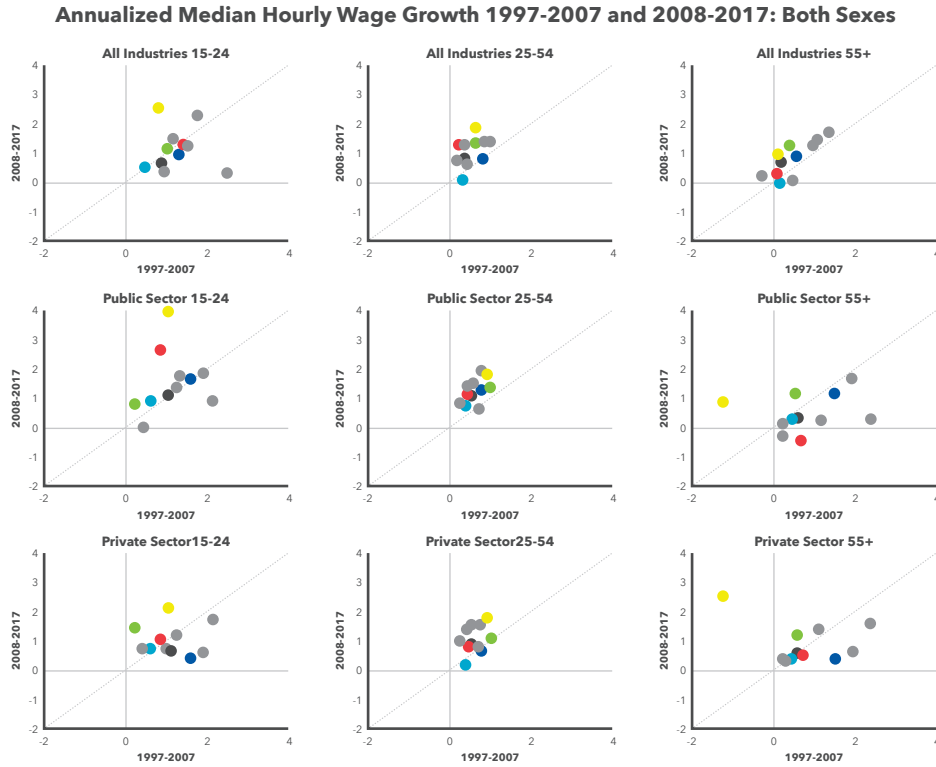
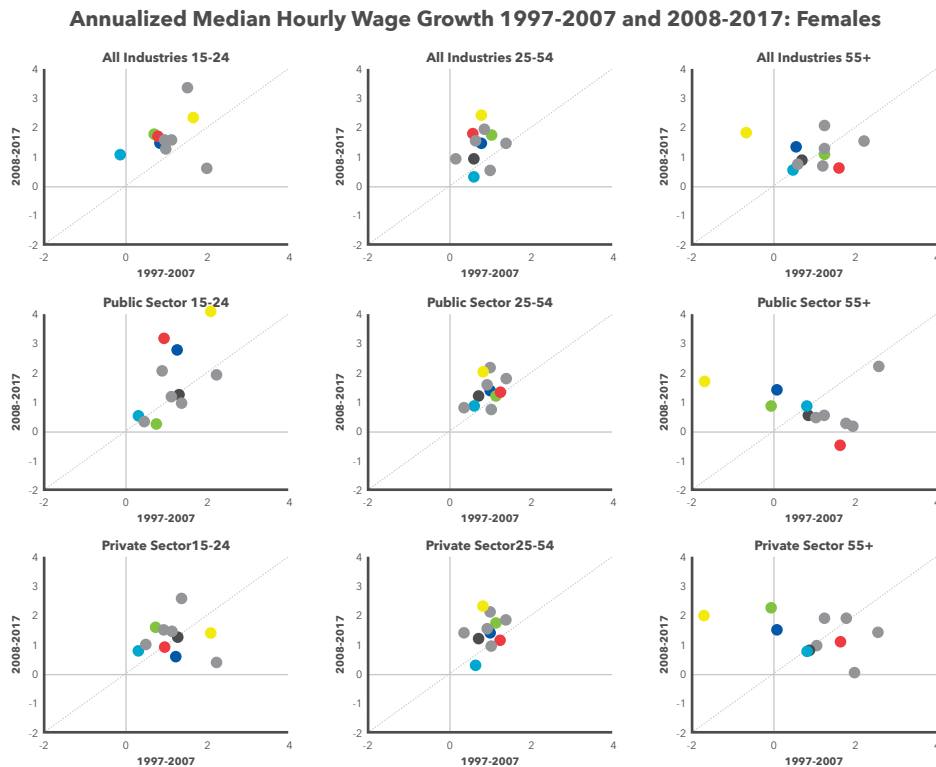


Figure 17: Annualized Median Hourly Wage Growth, 1997-2007 and 2008-2017: Females



- Canada
- Ontario
- New Brunswick
- Other Provinces
- Nova Scotia
- Newfoundland & Labrador
- Prince Edward Island

average and median real weekly earnings. This exercise allows us to see potential differences in the number of hours worked over a week for the same age/sex pairs by province and aggregation. If the growth rate of weekly earnings is greater than the growth rate of hourly wages, the number of hours worked over a week is likely to be increasing.

Our data shows that, for the most part, average hourly wages and average weekly earnings grow at about the same rates. This section focuses only on differences between the two measures of stagnation. Any omitted discussion indicates no large differences between hourly and weekly measures.

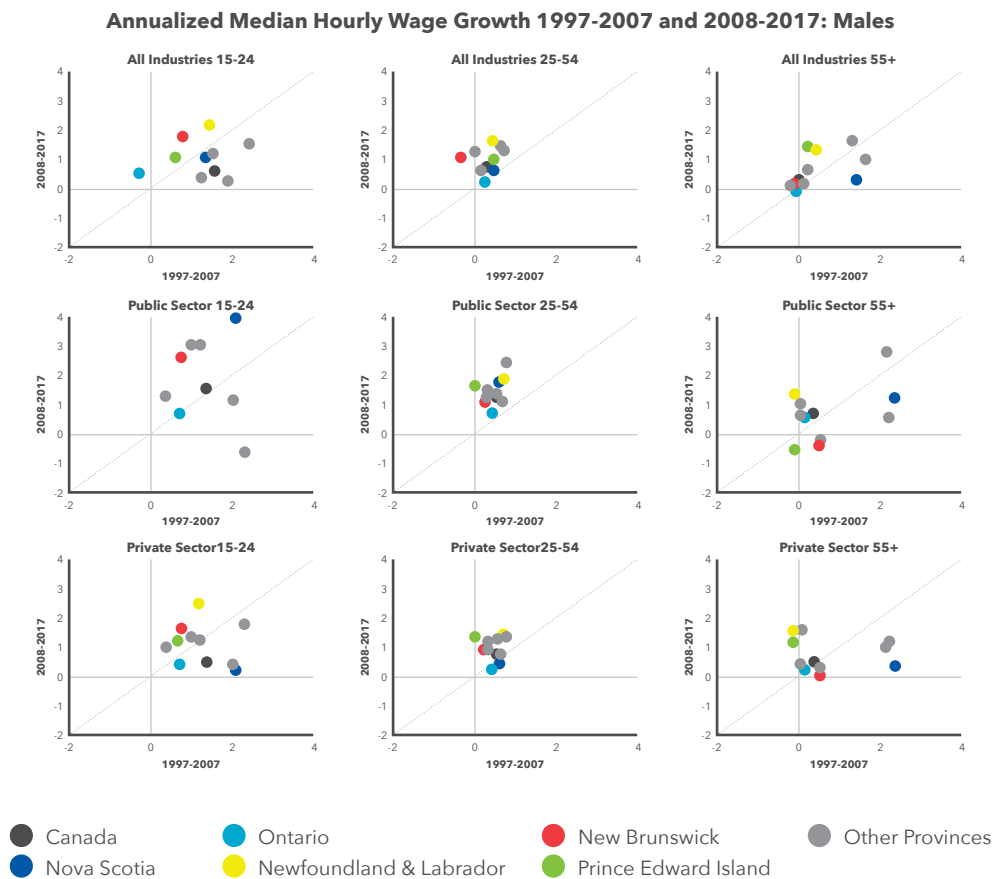
New Brunswick, Both Sexes, Public Sector, Aged 15-24

For those aged 15-24 in the public sector, we find a decline of approximately 1.5% in median weekly earnings between 1997 and 2007, while the median hourly wages across the same period grew by about 1%. This suggests a decrease in the median number of hours worked per week.

New Brunswick, Both Sexes, Public Sector, Aged 55+

Real median growth of hourly wages for both sexes in the public sector was below 1% between 1997 and 2007 and approximately -0.5% between 2008 and 2017. When looking at median weekly earnings, we find slightly higher growth between 1997 and 2007 but closer to a -1% decline between 2008 and 2017. These findings suggest a decline in both the wages and total number of hours worked since 2008.

Figure 18: Annualized Median Hourly Wage Growth, 1997-2007 and 2008-2017: Males



New Brunswick, Females, All Industries, Aged 15-24

Median weekly earnings grew near 1.5% across both periods. For 2008-2017, we saw comparable growth rates of median hourly wages near 1.5%, but the 1997-2007 period shows a growth rate of median hourly wages of about 1.0%.

New Brunswick, Females, All Industries, Aged 25-54

This group follows precisely the same patterns as the 15-24 age group. That is, it experienced approximately 1.25% growth in median weekly earnings across both periods and a 1.0% growth rate in median hourly wages between 1997 and 2007.

New Brunswick, Females, Public Sector, Aged 55+

This group saw the largest growth rates (almost 4%) in median weekly earnings between 1997 and 2007, later experiencing a weekly earnings decline of just below -1.0% between 2008 and 2017. The trend for hourly wages is slightly different: we see just below 2% positive growth between 1997 and 2007 and approximately -0.5% growth between 2008 and 2017.

New Brunswick, Females, Private Sector, Aged 55+

Before 2007, median hourly wages grew at about 2%, and the 2008-2017 period saw this growth slow to about 1%. This is precisely the opposite of weekly earnings, which saw an average growth rate of about 1% between 1997 and 2007 and an increase in growth to approximately 2% during the 2008-2017 period.

New Brunswick, Males, All Industries, Aged 25-54

The real median hourly wage for those aged 25-54 underwent negative growth in the 1997-2007 period. However, this did not translate into negative growth in real median weekly earnings, which experienced zero change between 1997 and 2007, suggesting an increased number of hours worked per week. Once again, we reiterate that we only focus our discussion on those graphs which showed substantial differences in growth rates between hourly wages and weekly earnings.

New Brunswick, Males, Public Sector, Aged 15-24

This group saw about 3% growth in average hourly wages between 1997 and 2007 and a 1% increase between 2008 and 2017. While average weekly earnings increased by about the same amount in the 1997-2007 period, they only saw 0.5% growth post-2008. This suggests that wage increases are not being met with similar increases in the number of hours worked.

Across both periods, the median weekly earnings saw equal growth rates of about 2%, with the 2008-2017 rates seeing slightly slower growth. When these are compared to the median hourly wages for the same group, we find approximately 1% growth in the 1997-2007 period and 3% growth in the 2008-2017 period.

Since median hourly wages increased but median weekly earnings remained unchanged, our results suggest a reduction in the number of hours worked by males (aged 15-24) in the public sector after 2008.

New Brunswick, Males, Private Sector, 15-24

After 2008, both average weekly earnings and average hourly wages saw increases just below 2%. Prior to 2008, we saw average hourly wages increase by about 0.5%, with no associated change in the number of hours worked.

Measuring Half-Life Adjustment of Wages to Exogenous Shocks

To measure wage adjustment across locations, this report calculates the persistence in the log-difference between the wage to age/sex category i in industry j and province k relative to the Canadian aggregate for the same age/sex category and industry. The relative wage in year t is defined as

$$\tilde{w}_{i,j,k,t} = \ln W_{i,j,k,t} - \ln W_{i,j,CAN,t}$$

where $W_{i,j,CAN,t}$ is the Canadian aggregate wage to age/sex category i in industry j in year t .

To measure persistence, the following equation is estimated using CANSIM real wage data from 1997 to 2017:

$$\tilde{w}_{i,j,k,t} = \alpha + \beta\tau_t + \rho_1\tilde{w}_{i,j,k,t-1} + \rho_2D_t\tilde{w}_{i,j,k,t-1} + u_{i,j,k,t}$$

The term $\alpha + \beta\tau_t$ represents the equilibrium real wage differential between province k and Canada and reflects differences in local amenities. The term τ_t is a linear time trend and allows for the possibility that this equilibrium differential might change over time.

If $\beta=0$, then this differential is constant and equal to α . D_t is a dummy variable that takes on a value of 0 prior to 2008 and 1 from 2008 onwards; D_t also allows for changes in the persistence of shocks to relative wages in 2008, which we discuss below.

The term u_t is assumed to be normally distributed with a mean of 0 and variance of σ_u^2 and represents the shock to the relative wage in year t . A positive value for u_t implies that the relative wage is pushed above its equilibrium value in year t . At this point, we would expect to see workers attracted to province k by this higher relative wage, which would increase labour supply in province k and put downward pressure on the wage.

This process continues until the relative wage returns to its equilibrium level. In contrast, a negative value for u_t means the relative wage falls below its equilibrium value in year t , and thus workers may leave province k for higher relative wages elsewhere. This reduces labour supply in province k , putting upward pressure on the wage. Again, this process continues until the relative wage is returned to its equilibrium level.

The parameters ρ_1 and ρ_2 capture the persistence in relative wages and measure how long the adjustment process takes. Suppose that $\rho_2=0$, and that there is no change in the persistence of shocks in 2008. In this case, the effect of a shock in year t on the relative wage in year $t+n$ is given by ρ_1^n . If $\rho_1=1$, the effect of the shock is permanent, implying that the adjustment process described above does not take place.

If $\rho_1 < 1$, the effect of the shock at year t decays over time. The lower the value of ρ_1 , the more quickly the effect of the shock decays, implying more rapid labour market adjustment. Figure 19 illustrates this point by plotting the effect of a shock in year 0 of $u_0=1$ on relative wages from year 0 to year 15 for cases where $\rho_1=0.75$ and $\rho_1=0.50$.

Measures of persistence such as those in Figure 19 are cumbersome. A useful summary statistic for persistence is the half-life of a shock. The half-life of a shock is given by

$$h = \left\lceil \frac{\ln 0.5}{\ln \rho_1} \right\rceil$$

and measures how long it will take for the effect of a shock to decay to half of its original magnitude. Figure 19 shows that for the case where $\rho_1=0.5$, the half-life of the shock is exactly one year ($h=1$), and when $\rho_1=0.75$, it is $h=2.41$ years. Larger half-life values imply a longer adjustment period for province k .

Deterministic components such as an intercept (α) or a time trend (τ) are included in an autoregressive model such as the one estimated here, where we note that standard estimators of the autoregressive parameters (ρ_1 and ρ_2) contain downward bias.

This is problematic in this context, as downward bias in these parameters translates into downward bias in the estimated half-life; this could lead us to conclude that shocks to relative wages are less persistent than they really are. To avoid this potential pitfall, this report uses median-unbiased estimates for the autoregressive parameters, which are obtained following the procedure of Andrews (1993).

The dummy variable D_t allows for the possibility of a change in persistence in 2008. Prior to 2008, the effect of a shock in year t on the relative wage in year $t+n$ is given by ρ_1^n , and the estimated half-life of a shock is the same as h above. However, from 2008 onwards, the effect of a shock in year t on the relative wage in year $t+n$ is given by $(\rho_1 + \rho_2)^n$, and the estimated half-life of a shock is

$$h = \left\lceil \frac{\ln 0.5}{\ln (\rho_1 + \rho_2)} \right\rceil$$

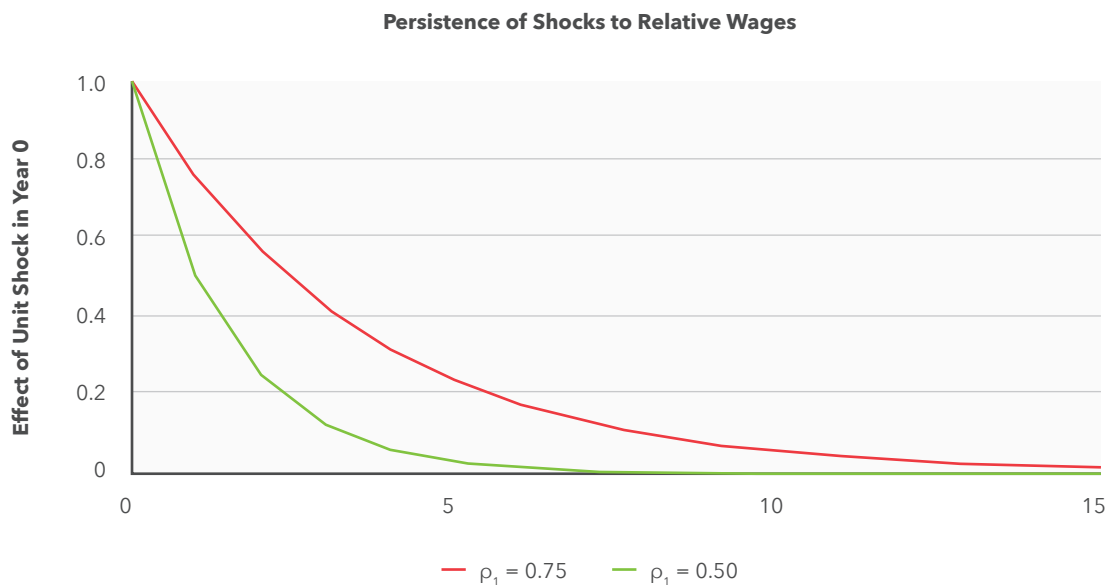
An estimate of $\rho_2=0$ implies no change in persistence in 2008.

These estimates allow us to compare province k 's wage adjustment processes to those of the Canadian aggregate. The closer a half-life is to 0, the faster the wages in province k return to their relative equilibrium. Wage stagnation - at least in terms of the Canadian aggregate - could come about with relatively long adjustment periods.

Figure 20 uses diagrams to display the half-lives of each province as defined above, though we focus specifically on New Brunswick. The 45° line shows the relative half-lives of the 1997-2007 period (horizontal axis) and the 2008-2017 period (vertical axis).

A value below the 45° line indicates that persistence declined after the Great Financial Crisis. That is, the labour market for the given province adjusted more quickly to equilibrium post-2008. A value above the 45° line suggests that the labour market for the given province adjusted more slowly after 2008 than before.

Figure 19: Speed of Adjustment After Unit Shock, Example



Half-Lives of Shocks to Relative Average Hourly Wages, Both Sexes

New Brunswick (red dot) is nearly on or below the 45° line in all graphs in Figure 20. This indicates that labour markets adjusted at the same pace, or more slowly, in the 1997-2007 period than in the 2008-2017 period. Those aged 55 and older (right column) show the most consistent estimates of half-life – about half-year adjustment periods – seemingly independent of period.

New Brunswick workers aged 25-54 in the *Public* and *Private* sectors (middle and bottom middle) closely resemble one another in terms of adjustment back to the relative wage growth equilibrium. We note that *Public* and *Private* sectors post-2008 had slightly faster adjustment speeds (smaller half-lives) than those pre-2008. From 2008-2017, the half-life measures were about half a year. The *All Industries* graph for those aged 25-54 (top middle) shows much slower adjustment speeds with a half-life close to 1 for both periods, with faster adjustment in the post-2008 period.

Those aged 15-24 have the fastest adjustment speeds post-2008 – below ½ a year – while in the pre-2008 period they have slightly higher than 1-year half-lives.

Half-Lives of Shocks to Relative Average Hourly Wages, Females

When we look only at women in New Brunswick, the trends tell a story different than the Both Sexes graphs from Figure 20. Women show faster readjustment back to the steady-state of relative wage growth in New Brunswick (red dot). That is, shocks to relative wages do not persist in our estimates for females: this is true for seven of the nine graphs in Figure 21.

New Brunswick females aged 25-54 in the *All Industries* category (top middle) have the longest adjustment periods back to the steady-state relative wage differential. From 1997-2007, half-life adjustments took about 1.5 years before decreasing to about 1.0 years.

The female graphs have higher half-life measurements when compared to the Both Sexes graph in Figure 20 for this same category. Finally, females 55+ in the private sector (bottom right) closely resemble the graph's Both Sexes counterpart, in which half-lives in both periods are about a half-year.

Half-Lives of Shocks to Relative Average Hourly Wages, Males

Figure 22 shows the half-lives of the AHW of males. However, two comments must be made regarding these graphs. First, there is no New Brunswick dot (red) for public-sector males aged 15-24 (middle left). Second, the red dots for public-sector males aged 25-54 (middle) and *All Industries* 55+ (top right) are covered up by other dots near the origin.

Generally, males older than 55 have relatively small half-lives: all are less than or equal to half-life values of one-half. Finally, the wages of males older than 55 working in the public sector took longer to adjust to the steady-state differential in the post-2008 period.

Those between 15 and 24 have red dots below the 45° line for both the private sector and all industries, indicating the decreasing values of half-lives post-2008. This implies faster adjustment back to the steady-state growth differential than the Canadian AHW. Those aged 15-24 in the private sector and those aged 25-54 in the public sector show near instantaneous adjustment to steady-state wage differentials.

We now look at graphs that use relative median hourly wages (MHW) in place of the average hourly wage.

Half-Lives of Shocks to Relative Median Hourly Wages, Both Sexes

Restricting our attention to the top row of Figure 23 (*All Industries*), we see half-lives in the magnitude of about 1 year for relative median hourly wages. This contrasts Figure 20, in which we see the half-life magnitudes of the younger and older groups (15-24 and 55+) closer to, or less than, one-half in either period. Essentially, in Figure 23, we see average wages adjust more quickly than median wages.

Figure 20: Half-Lives of Shocks to Relative Average Hourly Wage, 1997-2007 and 2008-2017: Both Sexes

Half Lives of Shocks to Relative Average Hourly Wage 1997-2007 and 2008-2017: Both Sexes

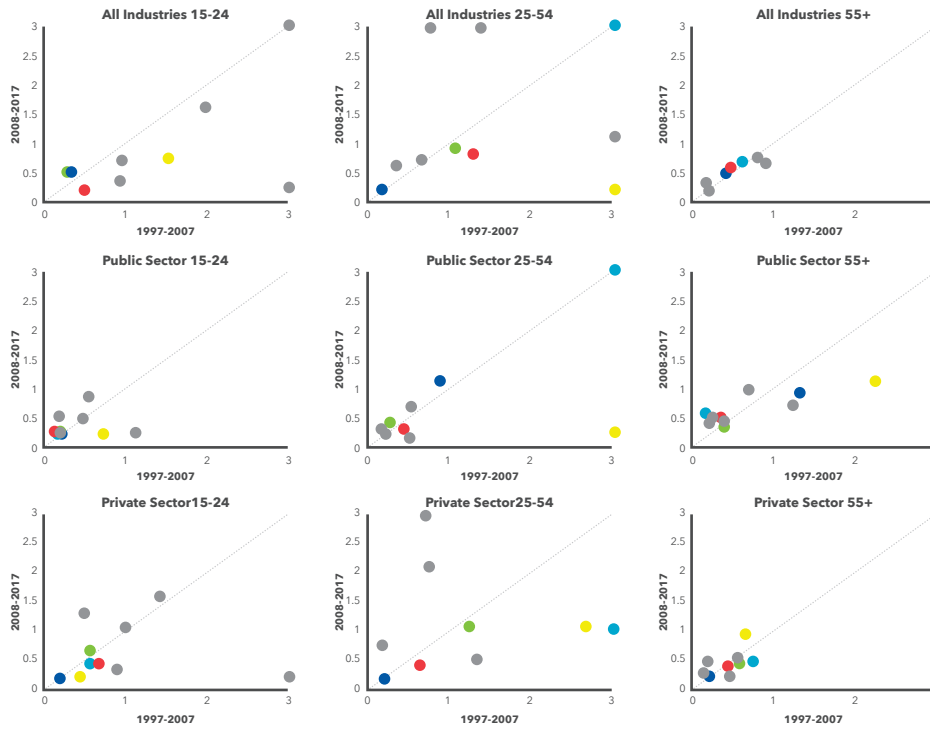
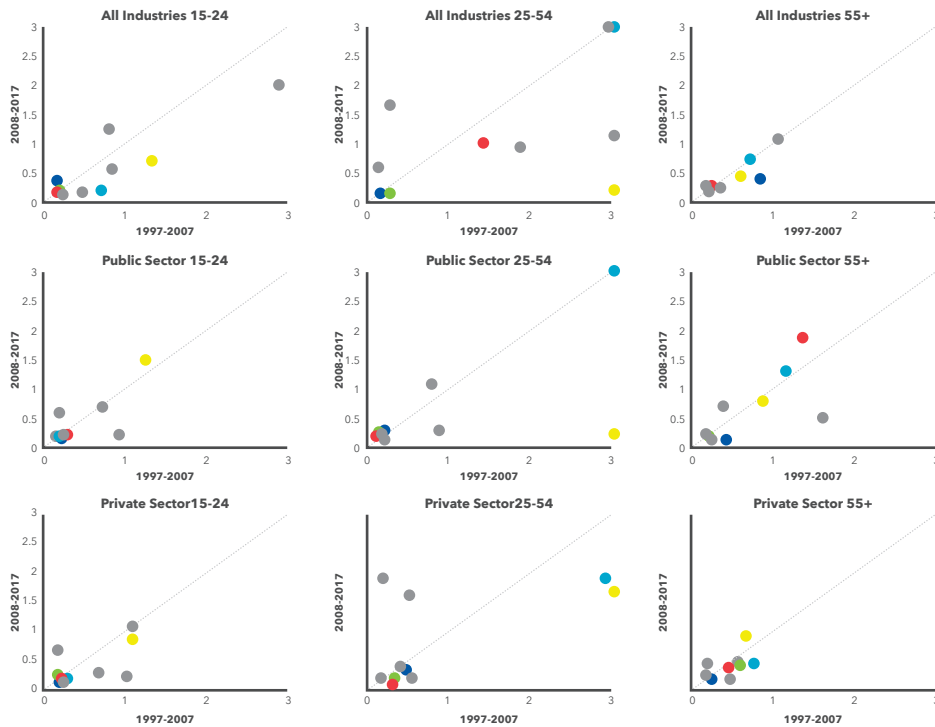


Figure 21: Half-Lives of Shocks to Relative Average Hourly Wage, 1997-2007 and 2008-2017: Females

Half Lives of Shocks to Relative Average Hourly Wage 1997-2007 and 2008-2017: Females



The remaining diagrams in Figure 23 show similar trends to those of the average hourly wages. The most persistent median wage estimates for New Brunswick occur in private-sector workers aged 15-24 and public-sector workers aged 25-54.

Half-Lives of Shocks to Relative Average Hourly Wage, Females

Regarding the half-lives of relative median hourly wages for females in New Brunswick, the trend is again very similar to the half-lives of average hourly wages. That is, adjustment speed remains consistent across measures, ages, and time periods, with a few exceptions.

The All Industries category for females between the ages of 15 and 24 seems to show median wages becoming more persistent after 2008, whereas the average wages show no change in half-life estimates.

Half-Lives of Shocks to Relative Average Hourly Wages, Males

When comparing the half-lives of shocks to AHW and to MHW, we see that the results in Figure 25 track the half-life values of Figure 22 too closely. The only notable exception is the median relative wage of those older than 55 in the All Industries category, who show larger half-life values – about 1 – compared to the relative average wage half-life measures closer to zero. That is, median wages are slower to change than average wages.

Comparison of Half-Lives of Average Real Weekly Earnings and Median Real Weekly Earnings

The preceding section analyzed the half-life measures of average and median real hourly wages. We contrast this with half-life measures of average and median real weekly earnings. As before, this exercise allows us to see potential differences in the adjustment of the different labour markets to exogenous shocks.

New Brunswick, Both Sexes

When comparing average hourly wages to average weekly earnings, we see minor differences in the magnitudes of half-lives. Typically, the differences in half-life values between hourly versus weekly measures are less than 0.25. However, there are two major outliers: the 55+ age group in the public sector and the same age group in the private sector.

In the private sector, average weekly earnings take about twice as long as average hourly wages to come back to long-term steady-state differentials. The exact opposite is true of the public sector, which sees average weekly earnings adjust back to the equilibrium growth differential twice as quickly as the average hourly wage.

When using median weekly earnings and hourly wages as measures, we see limited change in the estimates of half-lives. Notably, in the 2008-2017 period, the half-life measure of median weekly earnings adjusts back to the long-run steady-state percentage difference with Canada twice as quickly as hourly wages. During the 1997-2007 period, this adjustment occurs about 1.5 times faster than that of hourly wages. The half-life value for median weekly earnings is about 0.5 in both periods; for median hourly wages, the half-life is about 0.75 pre-2008 and 1.0 post-2008.

The half-life of median weekly earnings for those aged 55+ is about 1.5 between 1997 and 2007 and 2.5 between 2008 and 2017. This is in contrast to the median hourly wage measure of about 1 for either period.

New Brunswick, Females

Females aged 25-54 in the public sector saw near instantaneous return to the steady-state in average hourly wage differentials to Canada, while weekly earnings had half-life measures of about 0.5 years. The only other outlier for females when comparing average weekly earnings to average hourly earnings are those in the private sector. There, average hourly wages had half-life measures of 0.5 across both periods. The analogous measure using average weekly earnings has a half-life value of 0.75 across both periods, indicating slightly longer adjustment times for weekly earnings.

Figure 22: Half-Lives of Shocks to Relative Average Hourly Wage, 1997-2007 and 2008-2017: Males

Half Lives of Shocks to Relative Average Hourly Wage 1997-2007 and 2008-2017: Males

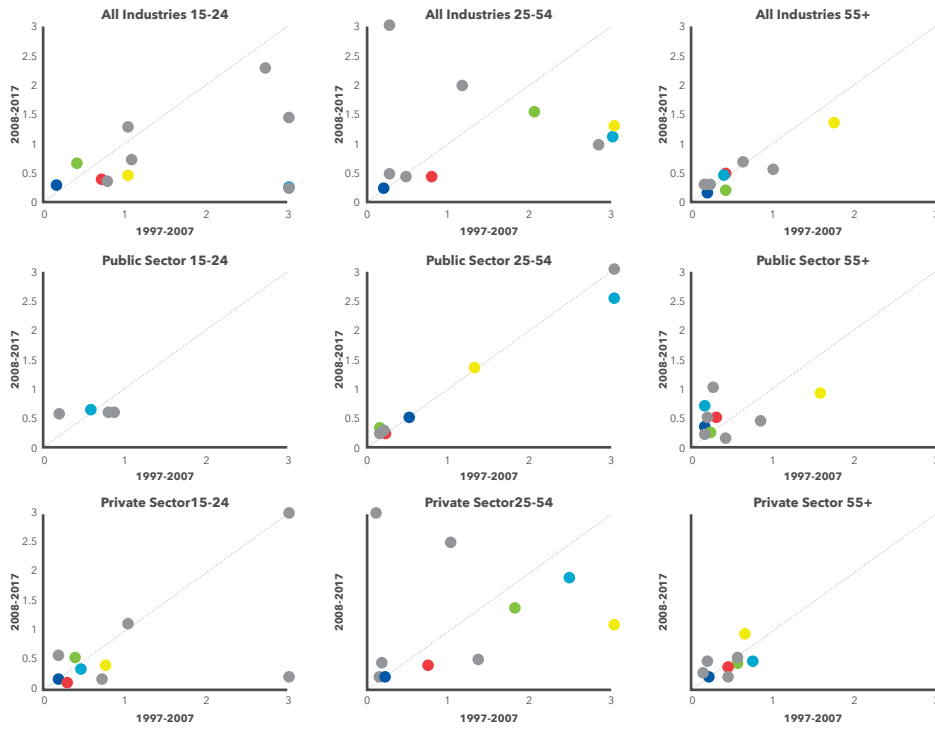


Figure 23: Half-Lives of Shocks to Relative Median Hourly Wage, 1997-2007 and 2008-2017: Both Sexes

Half Lives of Shocks to Median Hourly Wage 1997-2007 and 2008-2017: Males

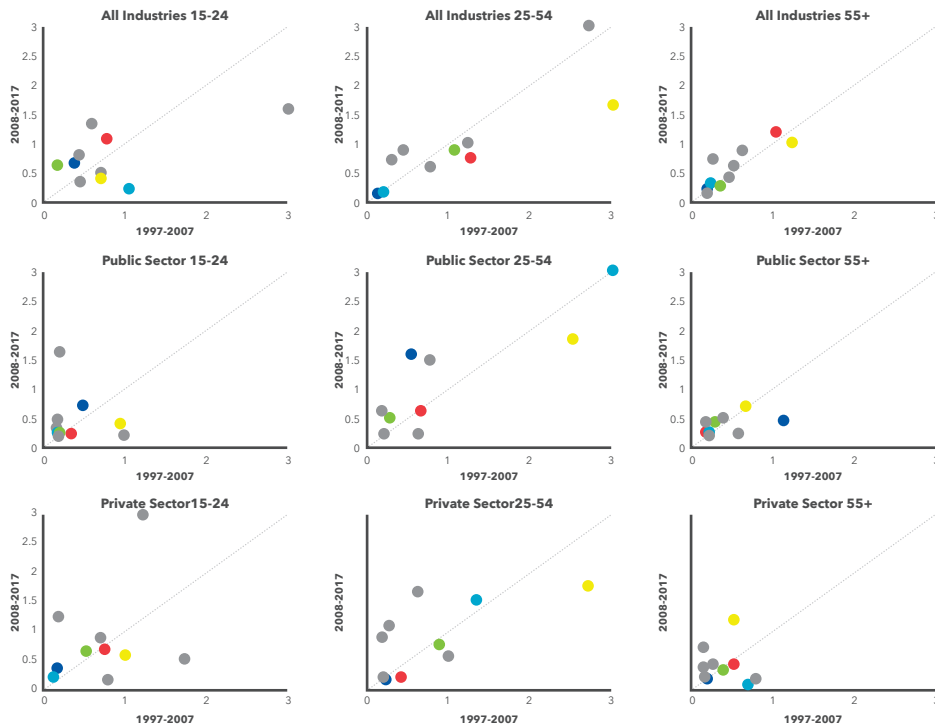


Figure 24: Half-Lives of Shocks to Relative Median Hourly Wage, 1997-2007 and 2008-2017: Females

Half Lives of Shocks to Relative Median Hourly Wage 1997-2007 and 2008-2017: Females

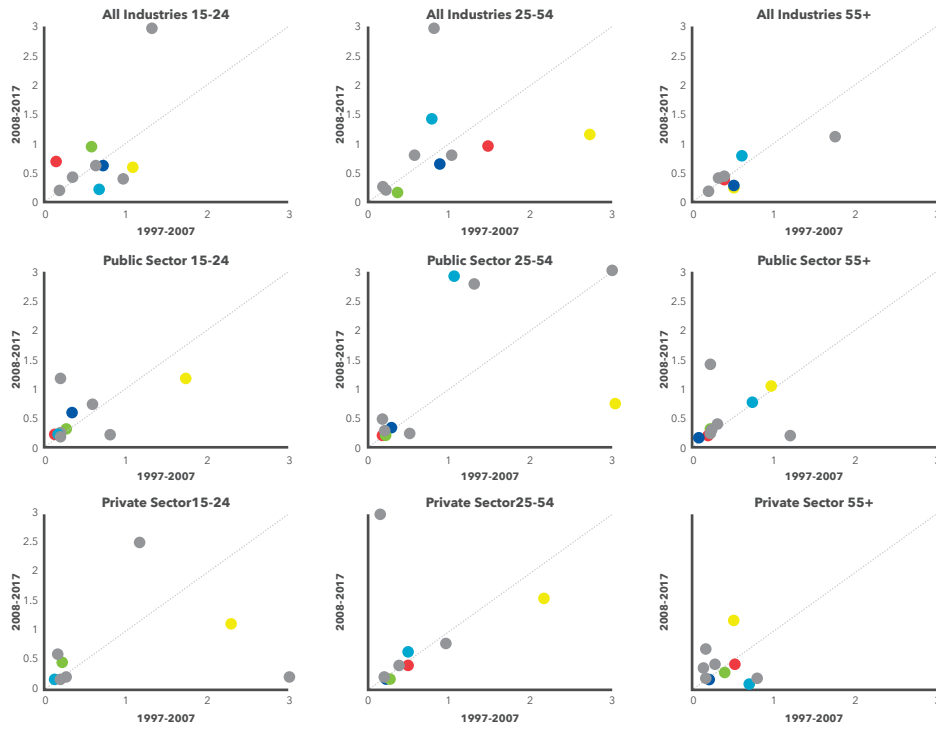
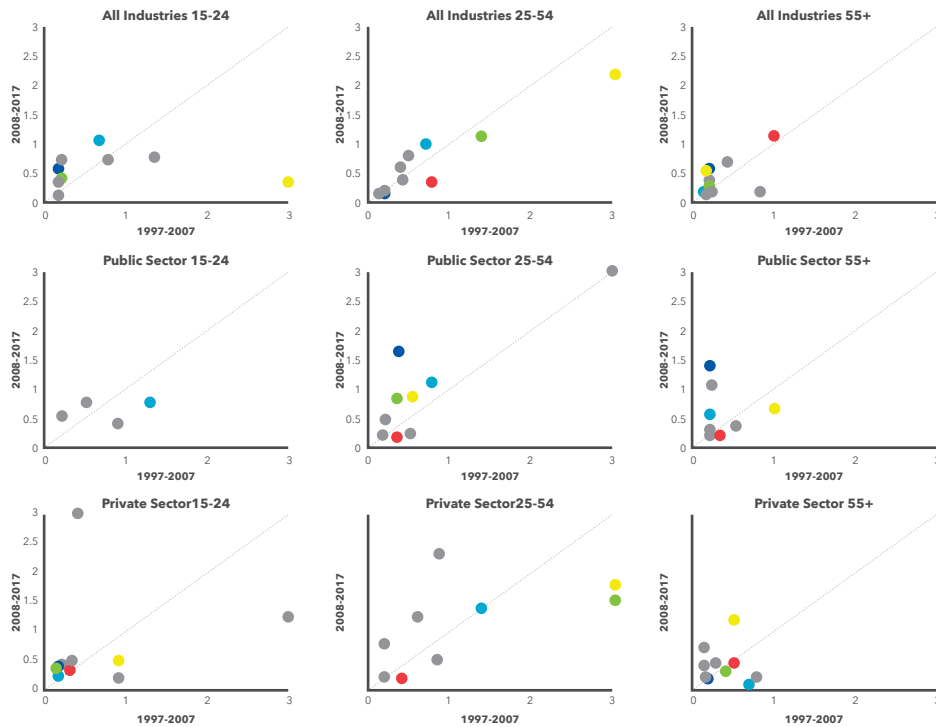


Figure 25: Half-Lives of Shocks to Relative Median Hourly Wage, 1997-2007 and 2008-2017: Males

Half Lives of Shocks to Relative Median Hourly Wage 1997-2007 and 2008-2017: Males



When comparing median hourly wages to median weekly earnings, we see that the All Industries category for those aged 15-24 and 25-54 shows the largest differences. In the first case, median hourly wages adjusted nearly instantaneously before 2008, with a half-life value of about 0.7 after 2008. In the median weekly earnings measure, a half-life measure for the 1997-2007 period was just above 1.5, with a value of about 1.0 after 2008.

Essentially, shocks that affect the number of hours worked are more likely to persist longer than shocks to the wage rates, independent of period. In the 1997-2007 period, changes in wage rates relative to the Canadian aggregate adjusted quickly, while those shocks which affected earnings (i.e., wages and hours worked) took much longer to return to the Canadian aggregate.

New Brunswick, Males

Our findings for males are similar to those for females in the sense that half-life estimates for average hourly wages are similar to average weekly earnings across both periods. The only large deviation in adjustment times comes from men older than 55 working in the private sector. In that case, average hourly wages have a half-life estimate of about 0.4 across both periods. Average weekly earnings have a half-life value of about 0.7 in the 1997-2007 period and a value of about 0.6 after 2008.

When we look for any large changes between median hourly wages and median weekly earnings, we see that the latter measure typically takes longer to adjust to a unit shock. For men aged 15-24 in the All Industries category, the half-life for hourly wages is about 0.2 for 1997-2007 and 0.3 post-2008. The weekly earnings half-life measures are about 0.9 and 0.7 for the All Industries category in 1997-2007 and 2008-2017, respectively.

For men aged 25-54 in the public sector, the half-life for median hourly wages is about 0.3 pre-2008 and 0.1 post-2008. This is contrasted with the median weekly earnings half-life measure of about 0.7 pre-2008 and 0.5 post-2008. In other words, the median weekly earnings take at least twice as long as the hourly wages to adjust back the steady-state wage differential across both periods.

Finally, when looking at the All Industries 55+ age group for men, we find an increase in the half-life from about 1.0 for median hourly wages to 1.25 for median weekly earnings across both periods.

CONCLUSIONS

This report makes the argument that New Brunswick has seen slow, steady wage growth between 1997 and 2017. This growth, however low, was seemingly unaffected by the Great Financial Crisis, since growth rates appeared to have increased following the 2008 recession. New Brunswick kept pace with the growth rates of average wages for Canadian and Ontario, both of which also experienced low growth. However, the \$5 hourly wage gap between New Brunswick and the Canadian aggregate still continues to exist.

Average hourly wages and weekly earnings in New Brunswick are similar to those of Nova Scotia and Prince Edward Island. However, while the growth of New Brunswick's average hourly wages for those below the age of 55 grew at a similar pace to those of the other Maritime Provinces, those aged 55 and older saw slower, albeit positive, growth after 2008. Of the Atlantic provinces, Newfoundland and Labrador saw the most volatile changes in the average growth rate of wages.

The analysis of the growth rates of average hourly wages and median hourly wages is more nuanced when broken down by sector, sex, and age group. For instance, workers in New Brunswick's public sector typically saw a higher average wage rate than those in the private sector. In addition, when we look at annualized growth rates, public-sector workers older than 55 saw a gradual decline in growth rates over the 20 years in question. However, these rates have always remained positive. The opposite is true for public-sector workers below the age of 25, suggesting those older than 55 saw lower growth post-2008. The same trend typically occurs when categories are broken down by sex, though magnitudes are often specific to the group of purpose and measure of interest.

For practical purposes, median weekly earnings and median hourly wages follow the same patterns as the average hourly wages and average weekly earnings. Notably, workers aged 15-24 did not see an increase in median weekly earnings that matched increases in median hourly wages. In short, the increase in labour productivity was not met with similar increases in the median number of hours worked weekly. This trend is more pronounced among men than women, as female median weekly earnings seem to follow the changes in median hourly wages. Other values associated with these measures are typically larger in magnitude, though not substantially so (less than 1%).

Our investigation into the responsiveness of New Brunswick's hourly wage rates relative to the Canadian aggregate shows that the former has half-life values usually less than or equal to 1. In other words, it takes less than or equal to one year to cut the average hourly wage difference between New Brunswick and Canada in half. In many cases, values are closer to a half-year or less. Hourly wages typically adjust much faster to the equilibrium differential than weekly earnings differentials, indicating that changes in hours worked take longer to return back to an equilibrium level.

Our main findings confirm that New Brunswick's labour market adjustments are consistent with those of a small open economy integrated with the labour markets of the other Canadian provinces. In other words, New Brunswick's labour market is best understood as part of the national labour market, and long-run wage growth is associated with productivity growth trends for the national economy, as opposed to factors specific to the provincial economy. The strong integration of provincial labour markets means that labour market adjustment is less visible in wage rates and earnings and is more apparent in employment changes. If labour

demand falls, we see a decrease in the number of employed workers, rather than a shrinking wage rate.

These results suggest that attempts to stimulate the economy should target growing labour demand, rather than pushing for isolated labour supply increases. Growing labour demand will lead to short-lived increases in average real wages and earnings but permanent increases in employment, increasing the aggregate wage bill for the province. Further, labour demand will grow alongside increases in non-residential capital stock and higher prices for provincial exports, both of which could be achieved through higher commodity prices or a lower exchange rate between the Canadian dollar and the currency of trading partners.

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