Changes in Wage Inequality in Canada: An Interprovincial Perspective

Nicole M. Fortin and Thomas Lemieux

At the national level, Canada, like many industrialized countries, has experienced changes in earnings inequality among various groups of workers. For example, there has been a large increase in the wages of high-income earners relative to those of low- and, especially, middle-income earners, who themselves have lost ground relative to low-income earners since 2005 (Fortin et al. 2012). This relative stagnation of middle incomes corresponds to a phenomenon called "wage polarization." Autor and Dorn (2013) argue that, in the United States, wage polarization stems from technological change, which is displacing workers performing "routine" tasks in manufacturing and clerical jobs, coupled with increases in low-wage jobs in the services sector. In this chapter, we provide a brief summary of Fortin and Lemieux (forthcoming), where we analyze interprovincial differences in the evolution of wage inequality over the past two decades to gain a better understanding of how certain factors specific to Canada have influenced these patterns. Using data from Statistics Canada's Labour Force Survey from 1997 to 2013, we examine why the level and dispersion of wages have evolved differently across provinces.[1] Our analysis thus precedes the substantial drop in oil prices that started in the third quarter of 2014.

We find that the growth of the extractive resources sector in Newfoundland and Labrador, Saskatchewan and Alberta accounts for the general increase in wages in these provinces. Since less-educated and younger workers have benefited disproportionally from the resources boom, the increase in their wages has also resulted in a decline in earnings inequality in these provinces. We also find that increases in the minimum wage, which were more substantial in some provinces than others for political reasons, are the main reason why wages at the very bottom of the income distribution have grown more than those in the middle. Our

findings complement those of Veall (2012), who shows that the income share of the top 1 percent is greater and has increased faster in Ontario, Alberta and British Columbia than in the rest of the country, and of Green and Sand (forthcoming), who also find important differences in wage trends across provinces. In particular, Green and Sand show that, relative to Ontario, Alberta experienced a dramatic increase in mean wages and a decline in income inequality between 2000 and 2011.

Before discussing wage changes at the provincial level, we present as a benchmark a few results for Canada as a whole. Figure 1 shows wage changes at each vingtile (the 5th percentile, the 10th percentile, the 15th percentile and so on) of the distribution for men and women separately, and compares wage trends based on pooled data over three periods: 1998-2002, 2003-07 and 2008-13; to simplify the discussion, however, we refer to these three periods as 2000, 2005 and 2010, respectively. For both men and women, the figure shows that inequality at the top end increased sharply between 2000 and 2005 (the dashed line) and more modestly between 2005 and 2010 (the dotted line). The changes are monotonic — that is, relative to the middle of the distribution (the 45th to 55th percentiles), there is progressively higher wage growth as we move toward

Figure 1
Wage changes by vingtile, by gender, Canada, 2000-2010

Source: Authors' calculations based on Statistics Canada, Labour Force Survey, 2000-2010.

the top of the distribution. In contrast, there is less of a clear pattern at the bottom end of the distribution. Substantial declines at the very bottom (the 5th percentile) from 2000 to 2005 were compensated by increases between 2005 and 2010. This is especially the case for women, who experienced a substantial increase in inequality at the bottom end of the earnings distribution in the first period and a substantial catch-up in the second period. Note also that, at all percentiles, wages increased more for women than for men in both periods, resulting in a small decline in the gender wage gap. The solid line in figure 1 shows changes in inequality in Canada over the entire 2000-10 period, and represents clear evidence, although mostly for men, of wage polarization similar to that observed in the United States during the 1990s (see, for example, Autor, Katz and Kearney 2006), with wages at both the bottom and the top end of the distribution increasing faster than wages in the middle. (This is also shown in figure 2, which displays the same data for men and women combined.)

In Fortin and Lemieux (forthcoming), we take a closer look at this polarization phenomenon at the level of the provinces. We find that relative wage growth at the bottom of the distribution since the mid-2000s occurred in most provinces, but with Alberta and British Columbia as notable exceptions, while relative wage growth in the top 10 percent of the distribution was concentrated in Ontario and British Columbia.

DiNardo, Fortin and Lemieux (1996), among others, suggest that one important determinant of wages at the lower end of the distribution is the minimum wage. This is a promising explanation in the Canadian context for two reasons. First, the increase in relative wages at the bottom of the distribution coincides with a sharp increase in the minimum wage in most provinces since the mid-2000s, following a long period of relative stability (Lemieux 2011). Second, the fact that British Columbia is the only province other than Alberta where relative wages at the bottom did not increase since the mid-2000s is consistent with the evolution of its minimum wage. Indeed, between 2005 and 2010 the real value of the minimum wage in British Columbia declined, though it started to increase again in 2011. As for Alberta, it used to have the lowest minimum wage in Canada but gradually increased it from 2005 onwards, perhaps as a result of growing labour demand pressures.

In Fortin and Lemieux (forthcoming), we explore the question of whether increases in the minimum wage can have substantial spillover effects on wages beyond the value of the minimum wage itself. We use a method proposed by Lee (1999) that

consists of evaluating the strength of the relationship between specific wage percentiles and the minimum wage, both expressed in deviations from the median (across years and provinces). Lee argues that, if the minimum wage "bites" at percentiles above the minimum wage, this relationship should be strong and close to the identity function (a 45º line). If the minimum wage does not "bite," the relationship should be flat and not significant. We find that this estimated relationship is strong and statistically significant for the 5th percentile; it remains significant, though weaker, at the 10th and 15th percentiles; but it is no longer significant at the 20th and 25th percentiles, which suggests that the minimum wage has limited spillover effects.

We use these estimates to examine how changes at the bottom of the wage distribution might be linked to movements in the real value of the minimum wage. To do so, we compute counterfactual wage percentiles that would have prevailed had the relative real minimum wage remained unchanged over time.[2] We then contrast the evolution of the actual and counterfactual wage distributions for each province, and show that most of the movement in the 10th percentile relative to the median can be explained by changes in the minimum wage. This suggests that recent changes in the minimum wage go a long way toward explaining why wages at the bottom of the distribution have grown faster than wages in the middle of the distribution since 2006, likely resulting in the wage polarization shown in figure 1. To explore this hypothesis more formally, we compare the average growth in wages at each percentile across provinces with the counterfactual growth that would have prevailed had the minimum wage remained constant in relative terms. Figure 2 shows the results of this exercise for all workers, men and women, combined, for the periods 2000-05, 2005-10 and 2000-10.

As figure 2 shows, the minimum wage had little impact between 2000 and 2005 (the dashed line), which is to be expected since it did not change much in real terms in most provinces during that period. In contrast, more recent increases in the minimum wage do explain why wages at the bottom of the distribution grew more than those in the middle of the distribution between 2005 and 2010 (the dotted line). After holding the minimum wage constant in relative terms, wage increases at the bottom of the distribution are in the 6-8 percent range, just as for other percentiles of the distribution. This suggests that recent increases in the minimum wage explain most of the modest decrease in wage inequality in Canada since the mid-2000s. Finally, when we combine the two periods (the solid line in figure 2), it is clear that the wage polarization observed since 2000 is

Figure 2
Wage changes by vingtile with minimum wage (MW) adjustment,[1] all workers, Canada, 2000-2010
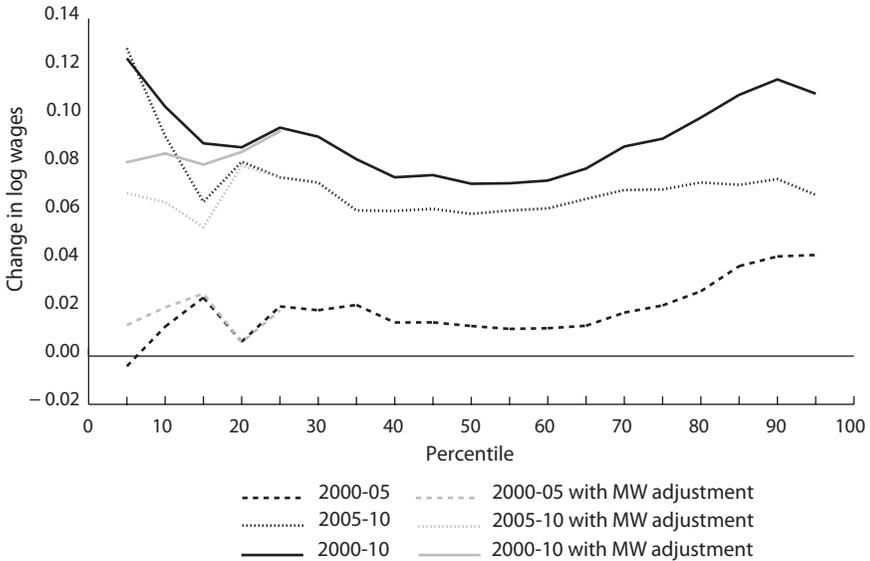
Source: Authors' calculations based on Statistics Canada, Labour Force Survey, 2000-2010.
[1] The minimum wage is held constant in real terms.

largely a consequence of changes in the minimum wage. Had the minimum wage remained constant over time, all wage percentiles up to the 70th percentile would have increased at a fairly flat rate of 7-9 percent. Only wages above the 70th percentile experienced faster growth. We also find that when we exclude teenage workers from the sample, the effect of the minimum wage remains important but it is smaller (Fortin and Lemieux, forthcoming).

To sum up, after adjusting for changes in the minimum wage, we are left with a clear, although relatively modest, increase in wage inequality over the past 15 years caused by increased wage dispersion at the top end. The wage polarization we observe in the raw data has been driven largely by increases in the minimum wage and their effect on wages at the bottom end, as opposed to other commonly cited explanations, such as the "routinization" of jobs in the middle of the wage distribution due to technological change and the growth of the services sector (see, for example, Autor and Dorn, 2013).

Still, although increases in the minimum wage explain much of the change in wages at the lower end of the distribution in several provinces, other factors must account for changes in the rest of the distribution. In particular, since the late 1990s, wages have grown much faster in some provinces than in others. As illustrated in column 1 of table 1, average wages in Newfoundland and Labrador, Saskatchewan and Alberta grew by an additional 22 to 25 percentage points relative to those in Ontario between 1999 and 2013[3] — a period that corresponds with the most recent boom in the extractive resources sector (mining and oil and gas extraction) in these three provinces. The resource boom could have increased provincial wages through a number of channels, the simplest of which is composition effects: since wages in the extractive resources sector are substantially higher than those in other sectors, increasing the share of workers in that sector would have a positive effect on average provincial wages. In Fortin and Lemieux (forthcoming) we show, however, that this channel accounts for only a very small share of the provincial wage change differences reported in table 1.

Indeed, looking just at composition effects likely understates the full wage impact of the growth of the extractive resources sector. For instance, in a

Table 1
Changes in provincial mean wages relative to Ontario, 1999-2013 (percentage points)

	Difference (percentage points)	
	Unadjusted **(1)**	**Adjusted** **(2)**
Newfoundland and Labrador	24.5	9.4
Prince Edward Island	13.7	9.1
Nova Scotia	12.1	13.6
New Brunswick	9.9	7.2
Quebec	0.8	1.4
Manitoba	8.4	8.8
Saskatchewan	22.2	11.4
Alberta	23.2	8.2
British Columbia	-3.4	-5.8

Source: Authors' calculations based on Statistics Canada, Labour Force Survey, 1999-2013.
Note: The figures in column 1 were obtained by estimating trend changes in mean wages in each province relative to those in Ontario using regression methods. Column 2 shows how much of the change remains after controlling for differences in the share of workers in the extractive resources sector, demographic characteristics and 43 industry dummies.

conventional neoclassical supply-and-demand setting, a boom in that sector should increase the demand for labour and raise wages in all sectors as firms bid up wages to retain workers who get better offers in the extractive resources sector. A related explanation, proposed by Beaudry, Green and Sand (2012), is that growth in "good" or high-paying jobs has spillover effects on other sectors because it improves the bargaining position of individuals who are looking for work. Using US data, the authors offer compelling evidence that a positive shock to employment in a high-wage sector has an effect on average wages in the local labour market that far exceeds simple composition effects. Closer to home, Marchand (forthcoming) uses differences in energy resources endowments across subregions of the western provinces to show that the energy boom has had spillover effects on other sectors such as construction, business services and retail trade, and has contributed to both an increase in income and a decrease in poverty.

We formally explore this hypothesis in our province-level analysis of wage growth in Fortin and Lemieux (forthcoming). First, we adjusted wages for composition effects linked to industry and demographics using a regression approach. We then ran a "second-step" regression where we looked for the impact of changes in the share of workers in the extractive resources sector on the adjusted mean provincial wage. A relatively higher share of workers in the sector can be interpreted as representing an overall labour demand shock due, for instance, to a resources boom that also affects workers in other sectors such as construction and business services. This is similar to the measure of labour market demand used by Beaudry, Green and Sand (2012), where regional variation in industry composition is used as an indicator of demand shocks.[4]

Our regression estimates indicate that changes in the share of workers in the extractive resources sector have spillover effects that go above and beyond simple composition effects. For instance, a 1 percentage point increase in the share of resource workers increases average wages by close to 5 percentage points. Using these regression estimates, we evaluate how much of the interprovincial differences in average wage growth can be accounted for by the broader labour market effects discussed above. The results reported in table 1 indicate that Newfoundland and Labrador, Saskatchewan and Alberta experienced wage growth that was 22 to 25 percentage points higher than that experienced by Ontario. As shown in column 2, half of that growth can be attributed to changes in the share of workers in the extractive resources

sector, as well as their spillover effects, after accounting for demographic and industrial composition effects.

We use a similar approach to look at the connection between the share of workers in the extractive resources sector and wage inequality in each province. We find that the wage gap between workers with a university education and those with a high school education increased less in Newfoundland and Labrador, Saskatchewan and Alberta than in other provinces. One possible explanation for this phenomenon is that, in terms of wage growth, less-educated workers have benefited more than better-educated workers from the resource boom. We explore this hypothesis by re-estimating the regression models separately by gender and education groups. The results indicate that the effect on wages of the share of workers in the extractive resources sector declined with the level of education, and was also larger for men than for women. This is not surprising, since most of the workers in that sector are men. We conclude from this exercise that the employment boom in the extractive resources sector contributed both to the large growth in mean wages in Newfoundland and Labrador, Alberta and Saskatchewan relative to other provinces, and to the reduction in wage inequality in these three provinces.

We reach two important conclusions. First, substantial increases in the minimum wage in most provinces starting around 2005 appear to be the main reason why wages at the bottom of the distribution have grown more than those in the middle of the distribution in recent years. Second, the fact that mean wages have grown much faster in Newfoundland and Labrador, Saskatchewan and Alberta than in the rest of the country between 1999 and 2013 is primarily a result of the boom in the extractive resources sector that occurred during that period. Interestingly, the resources boom appears to have lifted all boats, contributing to a small decline in inequality in those provinces. With wages of less-educated workers increasing more than those of university graduates, both returns to education and overall inequality were reduced.

Notes

1. Information about wages, union status, firm size and contract type (permanent versus temporary) was added to the Labour Force Survey in January 1997. These questions are directly asked of respondents when they are first interviewed for the survey (the incoming rotation group). During subsequent months, respondents are asked to update their answers only if they have changed jobs since the previous interview. A key advantage of the Labour Force Survey over other data sources is that it provides timely access to recent data. Furthermore, unlike the census, survey design and questions about wages and earnings have been stable over time. Details about the data and how they are used in our study are reported in Fortin and Lemieux (forthcoming).
2. We fix the relative minimum wage (relative to the median wage) to its average value of -0.8 (in logs), which corresponds to a ratio of 45 percent, and use estimated regression models to predict the counterfactual wage percentiles.
3. We start in 1999 instead of 1997 because of a major change in industry classification in the Labour Force Survey implemented in 1999.
4. In Fortin and Lemieux (forthcoming), we discuss this estimation approach, and present a number of robustness checks illustrating its validity.

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