

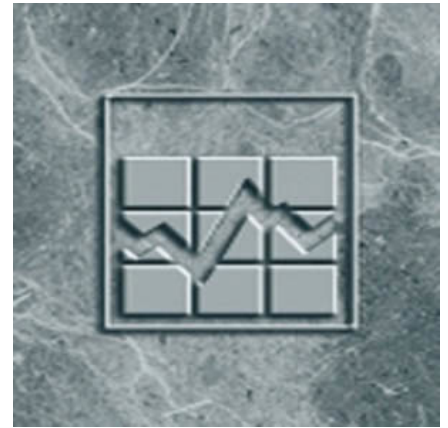
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## Income Research Paper Series

# Low-income persistence in Canada and the provinces

by Xuelin Zhang

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# Low-income persistence in Canada and the provinces

by Xuelin Zhang

## Abstract

Cross-sectional data show that poverty and low-income in Canada were trending downwards prior to the start of the COVID-19 pandemic. What about the dynamics of poverty and low income? How did poverty and low-income evolve in Canada for the same persons over time? To help answer those questions, Statistics Canada disseminates three aggregate tables every year that describe low-income dynamics and transitions for the same tax filers. The tables contain rich details on low-income persistence for different groups of Canadian tax filers at both the national and sub-national levels. Based on data from these tables, the study finds that low-income became more persistent in the 2000s than in the 1990s at the national level. But it became less persistent since mid-2010s, suggesting that the cross-sectional decline in poverty and low income prior to the pandemic likely resulted from lowering persistence – people who fell in poverty and low income moved out of these states faster than before. However, the changes in low-income persistence at the national level were largely accounted by changes in the three largest provinces – Ontario, Quebec and British Columbia, and to a lesser extent by economic fluctuations that occurred in Alberta, Saskatchewan and Newfoundland and Labrador.

## Acknowledgements

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## 1. Introduction

Prior to the start of the COVID-19 pandemic, between 2015 and 2018, poverty and low-income were on the decline in Canada. According to the official poverty line -- the 2018 Market Basket Measure (MBM) -- poverty rate dropped 3.5 percentage points, from 14.5% in 2015 to 11.0% in 2018. The same trend was observed under the after-tax Low Income Measure (LIM): the low-income rate fell from 14.2% in 2015 to 12.3% in 2018, a decrease of 1.9 percentage points.<sup>1</sup>

While these declines in poverty are a positive development, the above statistics are all based on cross-sectional data with which an important dimension – the persistence dimension of poverty and low income - cannot be seen: among people who were in poverty in a given year, their poverty status in the years before and in the years thereafter are unobservable. Likewise, among people who were not in poverty in a given year, it is not known if that occurrence was just a pause after being in poverty for several years or if it marked the start of a “non-poor” spell. In other words, these data do not illuminate the dynamics of poverty and cannot answer questions such as how long people will stay in poverty after they fall in poverty and how long people will stay away from poverty after they rise out of poverty.

The persistence dimension of poverty and low income is important. The impacts of being in poverty for many years differ from the impacts of being in poverty just once or twice over the life course. Being in poverty for five out of ten years might permanently change a person’s life as well as that of their children, while being poor once or twice along one’s life path may not be a consequential event to many people. The causes and remedies may also differ. Temporary or transitory poverty may often be associated with a random shock that could happen to anyone. A short-term income support may be sufficient to mediate the impacts of those who fall in poverty temporarily. On the other hand, persistent poverty may be associated with structural issues such as the lack of education or skills. To cope with persistent poverty, different tools might be more appropriate.

To understand poverty and low-income persistence, it is ideal to have access to longitudinal data (also known as panel data) at the individual level. For nearly twenty years, from 1993 to 2011, Statistics Canada had relied on a longitudinal survey called the Survey of Labour and Income Dynamics (SLID) to document the persistence of low income and poverty in Canada. When the SLID was replaced by the Canadian Income Survey (a cross-sectional household survey), a knowledge gap on poverty dynamics emerged. To fill this gap, Statistics Canada developed several aggregate data tables to help shed light on poverty and low-income dynamics in Canada using data from the Longitudinal Administrative Databank (LAD). The LAD is a subset of the T1 Family File (T1FF) while the T1FF is an annual cross-sectional file of all tax filers and their families based on personal income tax returns. The LAD draws a 20% random sample of tax filers from the T1FF and links them over time to form a longitudinal database of Canadian tax filers. Although the LAD does not contain the necessary data to measure poverty using the MBM, it does include data to measure low income longitudinally using the after-tax LIM threshold.

One advantage of the LAD is its very large sample size. As of 2018, data on more than 5.6 million tax filers are available from the LAD. This facilitates studies on low-income persistence for small groups of tax filers at a subnational level. Previous Canadian studies on poverty and low-income persistence mostly focused on individual characteristics at the national level and rarely examined the geographical aspect of poverty persistence.<sup>2</sup> This was primarily due to the small sample size of the SLID (approximately one percent of the LAD sample size). This report takes advantage of the large sample size of the LAD and examines the evolution of low-income persistence in Canada and the provinces using the after-tax LIM.

For many researchers and policy makers interested in low-income dynamics in Canada, accessing a large longitudinal administrative database such as the LAD is not an easy undertaking. Thus, this report sheds light on low-income persistence using an in-depth examination of aggregate data included in published tables. The rest of the report is organized along the following lines. Section 2 explores low-income persistence from the year-over-year perspective. Section 3 examines low-income persistence over various eight-year periods while Section 4 looks at the distribution of low-income spells experienced by Canadian tax filers. Section 5 provides a summary of findings and conclusions.

1. Statistics Canada CANSIM table 11-10-0135-01

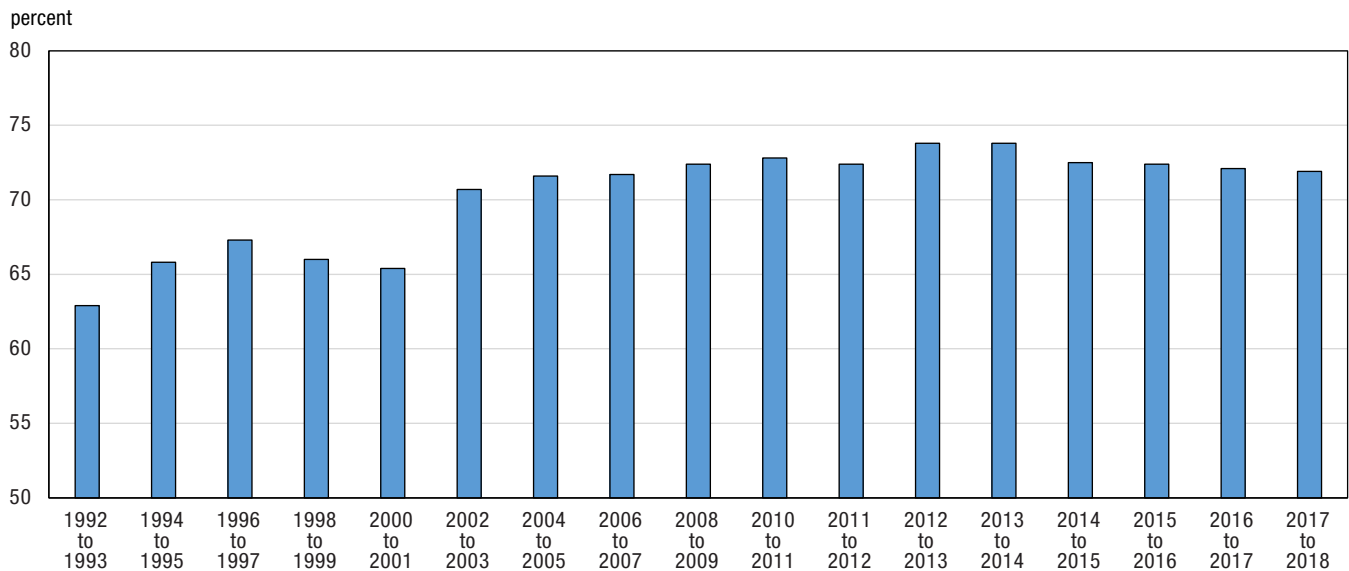
2. See for examples Zhang (2014), Fang and Gunderson (2016), Xu and Ren (2016).

## 2. Trends in low-income persistence: The year-over-year perspective

Statistics Canada’s table 11-10-0024-01 contains several statistics that describe the transition paths of Canadian tax filers from one year to another. The low-income entry rate shows the probability that a tax filer will enter low income in the next year, given that they are not in low income in the current year. The low-income exit rate estimates the probability that a tax filer will exit low income in the next year, given that they are currently in a low-income situation. The mirror images of these two statistics are the low-income resistance rate and the immobility rate. The resistance rate shows, of those tax filers who are not in low income in a given year, the probability that they will continue to stay out of a low-income situation next year. Conversely, the immobility rate indicates, among tax filers who are in low income in a given year, the probability that they will continue to stay in low income the year after.

The low-income immobility rate can be used to gauge the extent of poverty persistence over a given two-year window. Figure 1 illustrates the evolution of the low-income immobility rate over various two-year periods since the early 1990s.<sup>3</sup> The data suggest that low-income immobility generally increased over time and its turning points were generally tied to variations in the labour market. For example, just 62.9% of Canadian tax filers continued to stay in low income in 1993 after being in the situation in 1992 as the economy transitioning out of the early 1990s recession. By 2018, as many as 71.9% of Canadian tax filers continued to stay in low income after being in the situation in 2017. Over the 27-year span (1992 to 2018), a peak immobility rate of 73.8% was observed in the 2012 to 2013 period and the 2013 to 2014 period after which, the immobility lowered continuously in each of the following four two-year periods to a level of 71.9% in the 2017 to 2018 period. The immobility rate reached to a trough in the early 2000s when employment growth, particularly the strength of employment in the manufacture sectors exceeded expectations. The recent declines in the low-income immobility rate, though small, corroborated well with the declines in the cross-sectional poverty and low-income rates observed between 2015 and 2018 amid new record low of unemployment rate achieved in several consecutive years before the COVID-19 pandemic hit.

**Figure 1**  
**Low-income immobility rate, selected periods, Canada 1992-2018**



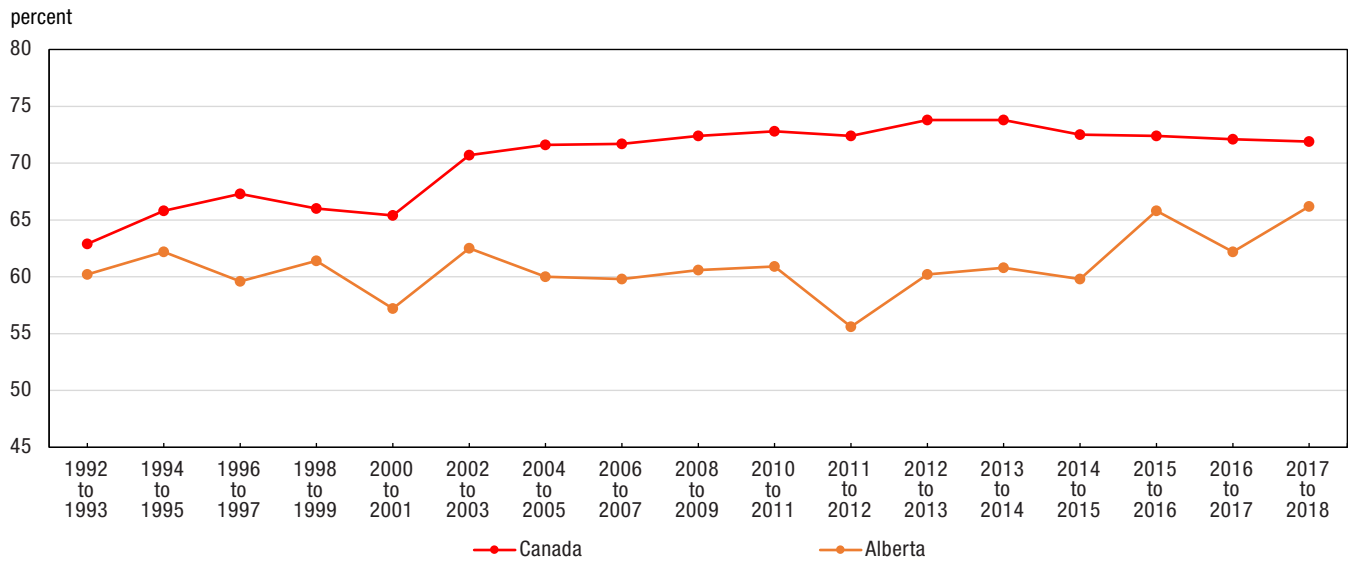
Source: Statistics Canada Table 11-10-0024-01.

However, low-income persistence varied substantially at the provincial level in the past 27 years. Based on differences in magnitude and trend in their low-income immobility rates, the ten provinces can be classified into three groups. The first group consists of Alberta only. It can be seen from Figure 2 that low-income immobility rate in Alberta differed from the national immobility rate in both the magnitude and the underlying trend. In magnitude,

3. To save space, only selected periods are shown in the 1990s and the 2000s.

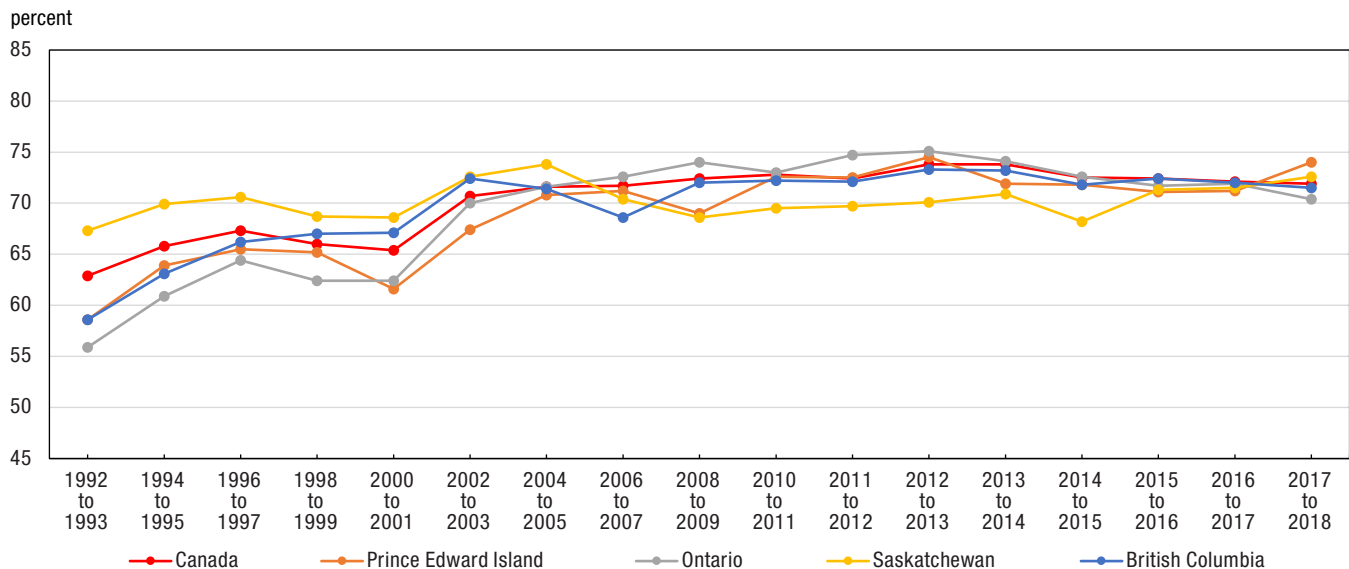
low-income immobility rate in Alberta was lower than the national immobility rate in all of the two-year periods between 1992 and 2018. Over these periods, Alberta had an average immobility rate of 61.1% while the national average was 70.1%. This means that in Alberta, tax filers on average had a chance of 38.9% to rise out of low income the next year after being in the situation in a given year, while at the national level, that chance was only 29.9%. Low-income immobility in Alberta also differed from the national immobility in the underlying trend. Indeed, they generally moved in the opposite directions since the early 2000s. From the 2002 to 2003 period to the 2011 to 2012 period, the immobility rate followed a weak upward trend at the national level, while in Alberta, it declined from 62.5% to 55.6% between the two periods. In contrast, between the 2012 to 2013 period and the 2017 to 2018 period, while the immobility rate declined slowly at the national level, in Alberta, low-income immobility rate rose from 60.8% to 66.2% between the two periods.

**Figure 2a**  
**Low-income immobility rate: Alberta vs. Canada**



Source: Statistics Canada Table 11-10-0024-01.

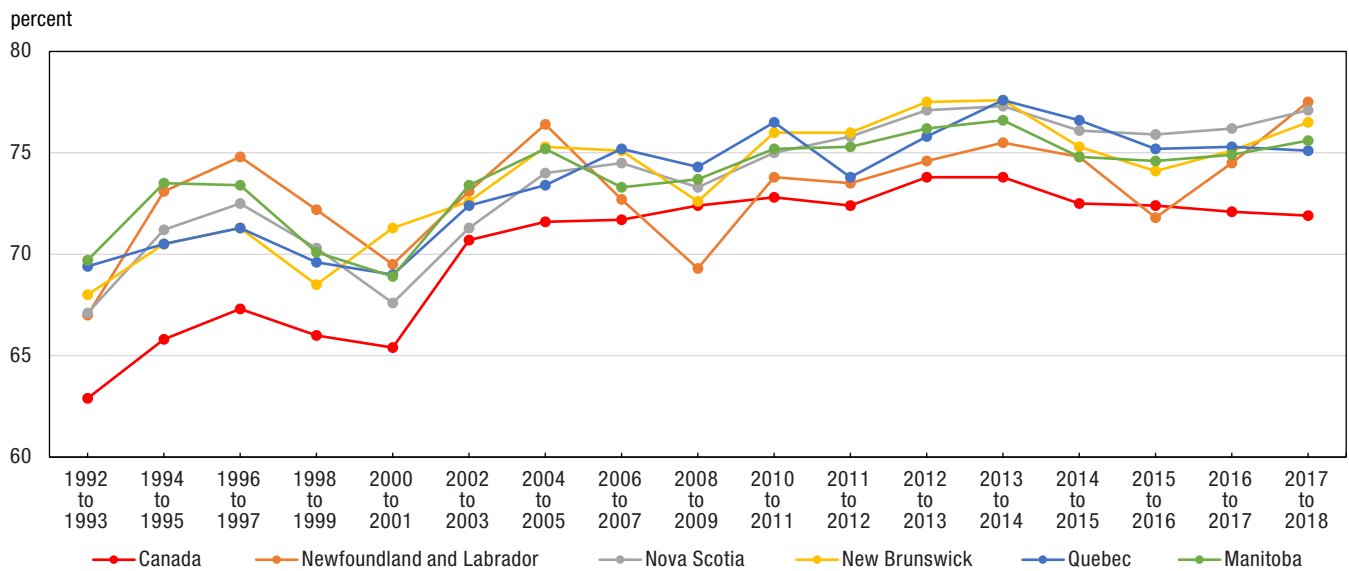
**Figure 2b**  
**Provinces with similar immobility rate as at the national level**



Source: Statistics Canada Table 11-10-0024-01.

The second group consists of Prince Edward Island, Ontario, Saskatchewan and British Columbia (Figure 2b). In these provinces, low-income immobility rates were similar to the national immobility rate in magnitude, ranging from 69.0% to 70.3%. The underlying trends in the immobility rates in these provinces were also similar to the national trend with one exception -- Saskatchewan. Over the 26 two-year periods between 1992 and 2018, the average immobility rate in Saskatchewan was identical to the national average (70.3%), thus, in magnitude, Saskatchewan was similar to the other three provinces in the second group. However, the trend in low-income immobility in Saskatchewan differed from the national trend starting from the early 2000s. Before the 2004 to 2005 period, low-income immobility rate in Saskatchewan evolved similarly to national immobility rate. But it started to fall since then while at the national level, the immobility rate continued to increase slowly. In contrast, starting from the 2014 to 2015 period, low-income immobility rate started to edge up in Saskatchewan while at the national level, immobility continued to edge down.

**Figure 2c**  
**Provinces with higher immobility rate than at the national level**



Source: Statistics Canada Table 11-10-0024-01.

The third group consists of the remaining five provinces: Newfoundland and Labrador, Nova Scotia, New Brunswick, Quebec and Manitoba (Figure 2c). In the 26 two-year periods, the average low-income immobility rates in these provinces varied between 73.2% and 73.8%, while at the national level the average was 70.3%. This suggests that tax filers in these provinces were less likely to bounce back from a low-income situation than did tax filers in the other provinces. Figure 2c also shows that low-income immobility rates evolved along the same trend in all but the province of Newfoundland and Labrador where low-income immobility rate fluctuated much more, partially because of a relatively small population making its economy more sensitive to fluctuations in the energy sector. Between the 2004 to 2005 period and the 2008 to 2009 period, immobility rate in Newfoundland and Labrador dropped from 76.4% to 69.3%, while the national rate edged up from 71.6% to 72.4%. Conversely, the national rate edged down from 72.4% to 71.9% between the 2015 to 2016 and 2017 to 2018 periods, while the immobility rate in Newfoundland and Labrador rose from 71.8% to 77.5% between these two periods.



Provincial immobility rates not only indicate differences in low-income persistence among residents in different parts of Canada. They are also important for understanding how the national immobility rate itself changes over time in response to provincial variations. For example, as shown in Figure 2a and Figure 2c, between the 2014 to 2015 period and the 2017 to 2018 period, the immobility rate in Alberta went up while in Quebec, it went down, and thus the change in the national immobility rate between the two periods was pulled and pushed by opposite changes at the provincial level. Driven by opposite changes like these from provinces, the national immobility rate edged down from 72.4% to 71.9%.

To understand how each province contributed to the change in low-income persistence at the national level, a decomposition analysis can be performed. Let  $LI_s$  be the number of tax filers in low income in year  $s$  and  $LI_{s \cap t}$  the number of tax filers in low income in both year  $s$  and year  $t$ , then the national low-income immobility rate  $IMR_{s \rightarrow t}$  in the period from years  $s$  to  $t$  can be written as:

$$IMR_{s \rightarrow t} = \frac{LI_{s \cap t}}{LI_s} \quad (1)$$

Let  $IMR_{s \rightarrow t}^p$ ,  $LI_s^p$ ,  $LI_{s \cap t}^p$  be the immobility rate, number of tax filers in low income in year  $s$  and the number of tax filers in low income in both years at the provincial level. The numerator of Equation (1), the number of tax filers in low income in both years at the national level, is equal to the sum of the corresponding provincial counts ( $LI_{s \cap t}^p$ ). Thus, the national immobility rate can be decomposed into the product of the provincial immobility rate and the share of provincial low income tax filers in year  $s$  as:

$$IMR_{s \rightarrow t} = \sum_p \frac{LI_{s \cap t}^p}{LI_s} = \sum_p \frac{LI_{s \cap t}^p}{LI_s^p} \frac{LI_s^p}{LI_s} = \sum_p IMR_{s \rightarrow t}^p \frac{LI_s^p}{LI_s} \quad (2)$$

The change in the national immobility rate between one period from years  $s$  to  $t$  and another period from years  $i$  to  $j$  can then be decomposed into the sum of the contribution from each province:

$$IMR_{s \rightarrow t} - IMR_{i \rightarrow j} = \sum_p \left( IMR_{s \rightarrow t}^p \frac{LI_s^p}{LI_s} - IMR_{i \rightarrow j}^p \frac{LI_i^p}{LI_i} \right) \quad (3)$$

That is, the contribution of each province is equal to the change of the weighted provincial immobility rate between the two periods.<sup>4</sup>

As discussed before, at the national level low-income immobility became stronger until the early 2010s but weakened more recently. Table 1 contains the decomposition results for these changes. Between the 1992 to 1993 and the 2002 to 2003 periods over which national low-income immobility rose 7.8 percentage points, from 62.9% to 70.7%. Column 1 of the table shows that Ontario alone accounted for 104.3% (or 8.1 percentage points) of the total change while British Columbia accounted for an additional 51.1% (or 4.0 percentage points). In other words, the two provinces would have pushed the national immobility rate up by 12.1 percentage points if no changes occurred in the other provinces. Of course, changes did occur in the other provinces and these provinces actually contributed negatively. Quebec helped reduce the national immobility rate by 34.2% (or 2.7 percentage points). Quebec and the other seven provinces together pulled down the national immobility rate by 55.7% (or 4.3 percentage points), resulting a net increase of 7.8 percentage points at the national level between the 1992 to 1993 period and the 2002 to 2003 period.

4. Notice that the contribution to the national change from a province can be negative if the weighted immobility rate of the province evolves in an opposite direction relative to the national immobility rate. It can also be greater than 100% (in absolute term). For example, if the contribution of one province is positive while the contributions of other provinces were negative, then the contribution of the province in question must be greater than 100% according to Equation (3).

**Table 1**  
**Decomposition of changes in national immobility rate**

	1992-1993 to 2002-2003	2002-2003 to 2012-2013	2013-2014 to 2017-2018
	percent		
<b>Changes at national level</b>	<b>7.8</b>	<b>3.1</b>	<b>-1.9</b>
Newfoundland and Labrador	-3.1	-16.1	1.6
Prince Edward Island	Nil	Nil	Nil
Nova Scotia	-1.5	-3.2	-4.0
New Brunswick	-2.2	-6.2	5.8
Quebec	-34.2	6.3	23.1
Ontario	104.3	157.0	135.9
Manitoba	-4.8	2.5	-2.4
Saskatchewan	-4.1	-17.5	-12.1
Alberta	-5.8	-13.4	-48.7
British Columbia	51.1	-10.3	1.5

**Note(s):** Changes at national level are expressed in percentage points.

"Nil" indicates a contribution less than one percent, positive or negative.

**Source:** Statistics Canada Table 11-10-0024-01.

Moving forward a decade, between the 2002 to 2003 period and the 2012 to 2013 period, low-income immobility rate at the national level rose 3.1 percentage points. Column 2 of Table 1 shows the contribution by each province to this increase. Ontario alone accounted for 157.0% or 4.9 percentage points, likely driven by the continuing weakness in its manufacturing sector. Its contribution again exceeded total change at the national level. Quebec and Manitoba were the only other provinces that contributed positively to the change but together they helped push up the national immobility rate by just 8.8% (or 0.3 percentage points). On the other hand, the remaining provinces helped to reduce the national immobility rate by 66.7% or 2.1 percentage points, resulting a net increase of 3.1 percentage points at the national level between the two two-year periods.

Turning now to the change in national immobility rate between the 2013 to 2014 period and the 2017 to 2018 period over which the previous upward trend reversed. Column 3 shows that between these two periods, low-income immobility rate decreased by 1.9 percentage points at the national level. The national change was again overwhelmingly driven by what happened in Ontario – the province alone drove down the national immobility rate by 135.9% (or just under 2.6 percentage points). Quebec, New Brunswick, Newfoundland and Labrador and British Columbia also helped reduce the national immobility rate. Together they helped decrease the national rate by 32.0% (or just under 0.6 percentage points). The other provinces, led by Alberta, helped push up the national immobility rate by 67.2% or 1.3 percentage points, resulting a net decrease of 1.9 percentage points at the national level between the two periods.

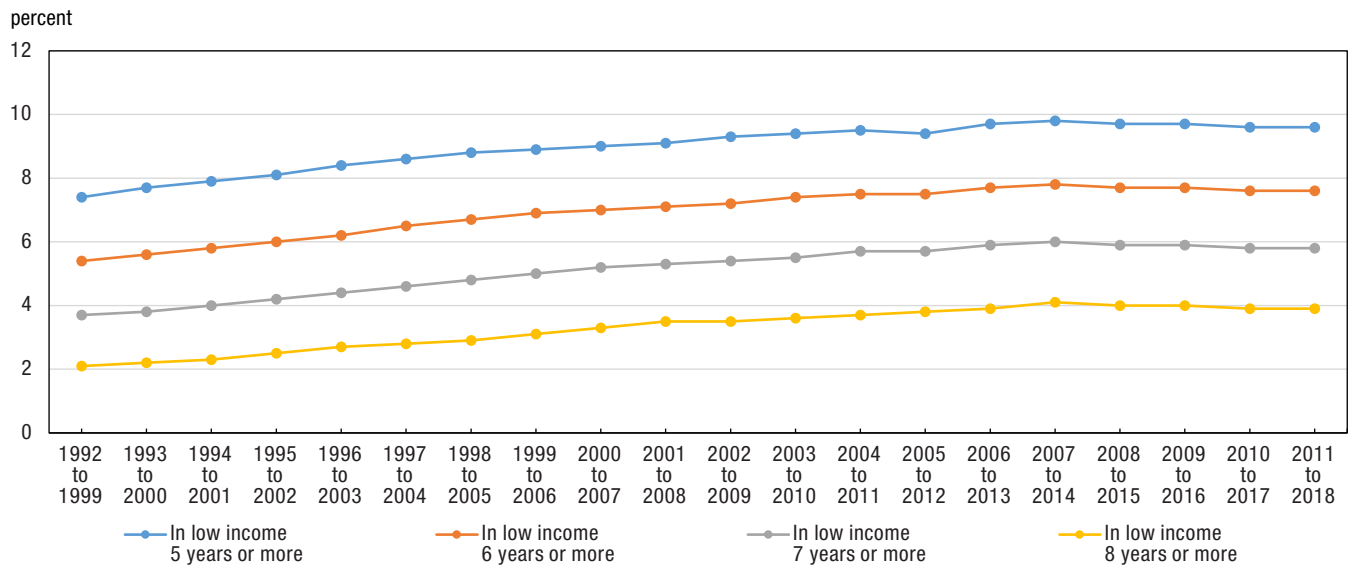
Overall, the decomposition exercise suggested that the change in low-income immobility in Canada was mainly driven by the changes in the largest provinces while the smaller resource based provinces significantly attenuated the effect of the large provinces on low-income immobility.

Nevertheless, the findings that low-income persistence has been strong in Canada must be put in a broader context. On the one hand, the immobility rate itself was based on a subgroup of tax filers—those who were in low income in the first year of a given two-year period. On the other hand, the two-year period is a simple, but not necessarily an ideal window of time within which to examine low-income persistence. There are two main reasons for this. Intuitively, over a longer time period, say eight or ten years, a person in poverty for two years may not qualify as being persistently poor, especially if the incidences of being in poverty occur in years which are relatively far apart from one other. In addition, within a short time window, the observed data are more likely to be “censored”: a person observed in poverty in the first year in the two-year window might have been in poverty in year(s) before, while a person observed in poverty in the second year might continue to be poor in the year(s) after. Within a short time window, this “censoring” of information is more likely to happen and may lead to a biased estimate of low-income persistence. In the next two sections, attempts will be made to deal with these issues by extending the length of the window of observation.

### 3. Trend in persistence: counting the number of years in low income over an eight-year period

Most researchers consider a person as persistently poor if the person falls in poverty multiple times within a given period that lasts for several years.<sup>5</sup> They differ according to how they quantify the “multiple times”. Statistics Canada Table 11-10-0025-01 contains data indicating the proportions of tax filers who are in low income for one year only, for two years, three years and up to eight years over an eight-year window of observation. It allows one to characterize persistence low income with different quantifications of the term “multiple times”.

**Figure 3**  
Tax filers in low income “multiple times” in an eight-year period, Canada



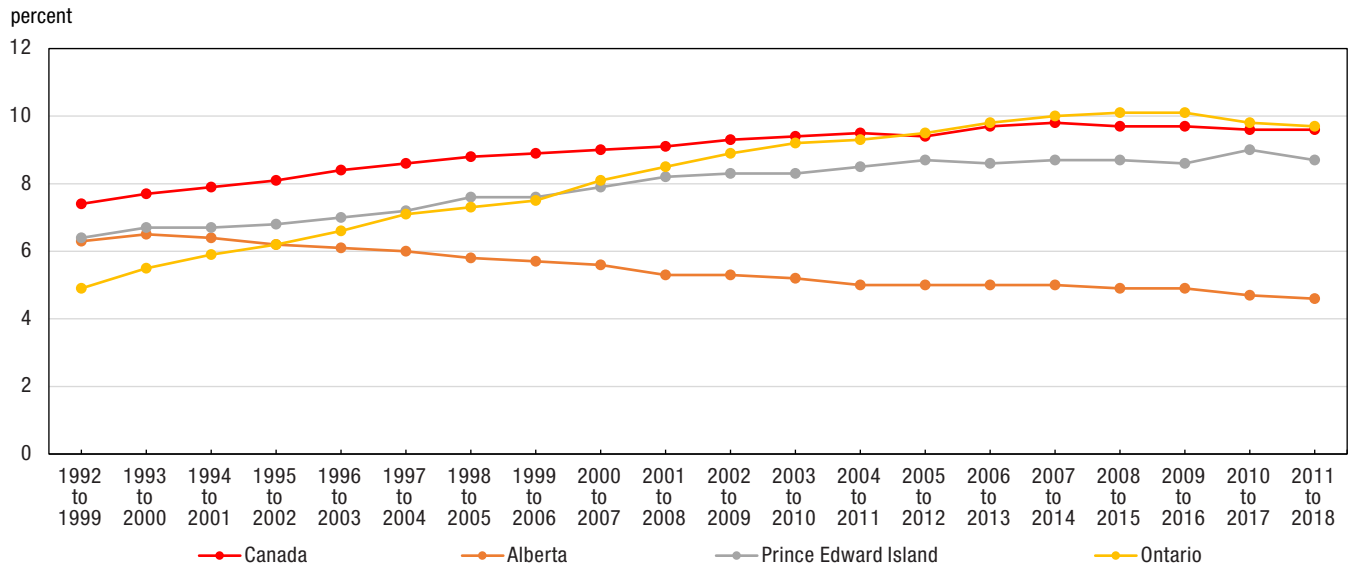
Source: Statistics Canada Table 11-10-0025-01.

Intuitively, one may say that a person is in low income persistently if the person is in low income more than half of the time in a given period. Then in a given period of eight years, the proportion of tax filers who fall in low income in five years or more would be a plausible measure of low-income persistence. Figure 3 illustrates the intuitive quantification under which one would observe 9.6% Canadian tax filers to be in low income persistently in the 2011 to 2018 period. In an extreme case, one may consider a tax filer as persistently in low income if the filer is in the situation in all eight years. Under this consideration, one would see 3.9% Canadian taxers were persistently in low income during the 2011 to 2018 period. The figure also shows the evolution of low-income persistence under two other metrics. It is easy to see that no matter which metrics one uses, low-income persistence in Canada peaked in the 2007 to 2014 period when the 2008-2009 recession hit. The collapse of the oil price and the prices of other commodities following the global financial crisis hit provinces with resource based economies especially hard. The following analyses of the provincial differences in low-income persistence shall focus on the intuitive quantification while the decomposition exercise shall take the 2007 to 2014 peak as the central divider.

The data suggested that low-income persistence differed in both the magnitude and the trend between provinces. In Alberta, Prince Edward Island and Ontario, low-income persistence was less severe than at the national level (Figure 4a). At the national level, the proportion of tax filers who fell in low income in five or more years out of an eight-year period was on average 9.0% between 1992 and 2018. In these three provinces, the averages were 5.5%, 7.9% and 8.2%, respectively. Within the three provinces, there were also important differences. The persistence rates in Alberta and PEI were consistently below the national level while in Ontario, it had been below the national level in the 1990s and the early 2000s, but more recently, it approached the national level.

5. See for example, Biewen (2014). In practice, the choice is often based on data available. For example, most Canadian studies on low-income persistence that used data from the SLID examined low-income persistence over six-year periods because each SLID panel lasted for six years.

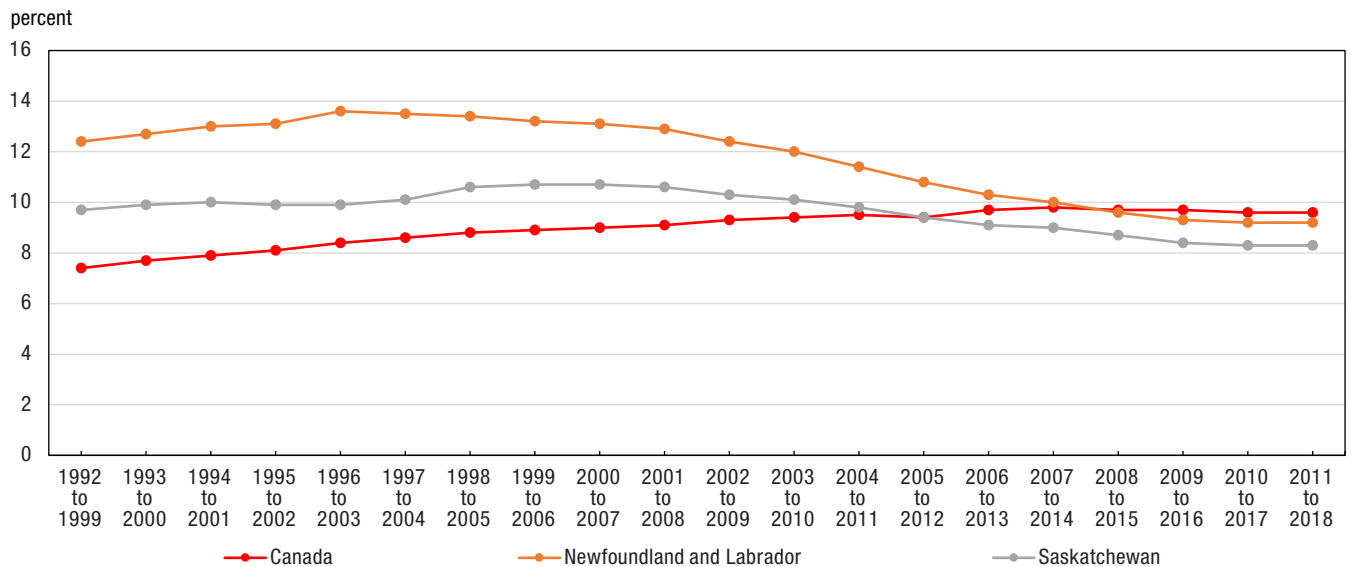
**Figure 4a**  
**Provinces with lower persistence of low income than at national level: 1992-2018**



Source: Statistics Canada Table 11-10-0025-01.

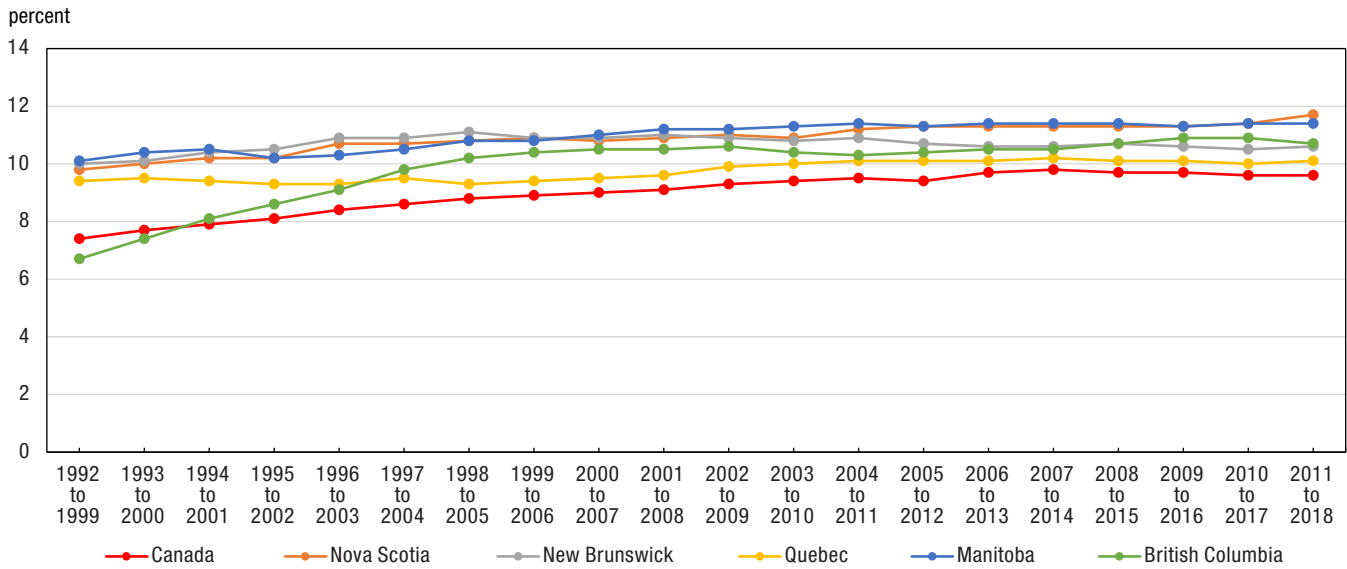
However, low-income persistence evolved along different trends across the three provinces. In Alberta, low-income persistence continuously declined or stayed flat from one eight-year period to another, the deterioration of the resource sector in Alberta did not seem to have serious impacts on the long-term persistence in this province. On the other hand, low-income persistence in Prince Edward Island followed the same trend as that for the national persistence in all eight-year periods, while in Ontario, it increased faster than the national persistence rate in the 1990s and the early 2000s. Since the mid-2000s, low-income persistence in Ontario evolved in the same way as at the national level.

**Figure 4b**  
**Provinces with higher but declining persistence rate of low income**



Source: Statistics Canada Table 11-10-0025-01.

**Figure 4c**  
**Provinces with higher persistence of low income than at national level**



Source: Statistics Canada Table 11-10-0025-01.

The other seven provinces all had higher persistence of low income than at the national level (Figures 4b and 4c). Newfoundland and Labrador had the highest persistence rate among all provinces. Over the various eight-year periods since 1992, it ranged between 9.2% and 13.6%, and on average 11.8% tax filers in this province were in low income more than half of the time. Newfoundland and Labrador was followed with lower persistence rates by Manitoba (11.0%), Nova Scotia (10.9%) and New Brunswick (10.7%), British Columbia (9.9%), Quebec (9.7%) and Saskatchewan (9.7%).

**Table 2**  
**Decomposition of changes in national low-income persistence rate**

	1992-1999 to 2007-2014	2007-2014 to 2011-2018
	percent	
<b>Changes at national level</b>	<b>2.3</b>	<b>-0.2</b>
Newfoundland and Labrador	-3.1	9.4%
Prince Edward Island	Nil	Nil
Nova Scotia	Nil	2.1
New Brunswick	Nil	5.5
Quebec	4.1	21.9
Ontario	80.8	61.5
Manitoba	Nil	Nil
Saskatchewan	-2.5	7.8
Alberta	-2.5	7.6
British Columbia	23.5	-16.8

Note(s): Changes are expressed in percentage points.

"Nil" indicates a contribution less than 1%.

Source: Statistics Canada Table 11-10-0025-01.

The trends of low-income persistence also differed between these provinces. As can be seen from Figure 4b, low-income persistence, measured by the proportion of tax filers who fell in low-income for five years or more within an eight-year period, followed a strong downward trend since the mid-1990s in Newfoundland and Labrador and Saskatchewan. In Newfoundland and Labrador, the rate of low-income persistence went as high as 13.6% during the 1996 to 2003 period. Since then, it went down steadfastly by each period, and dropped below the national level as of the 2009 to 2016 period and thereafter. Similarly, in Saskatchewan, the persistence rate went as high as 10.7% in the 1999 to 2006 period and since then, it went down steadily and by the 2005 to 2012 period, it dropped below the national level. In contrast, low-income persistence evolved similarly as it did at the national level in Nova Scotia, New Brunswick, Quebec and Manitoba (Figure 4c). While British Columbia differed from these provinces

in the 1990s when the increase in their persistence rate was much more dramatic than in the other provinces. However, since the early 2000s, low-income persistence in British Columbia evolved more in line with the national persistence rate.

As mentioned earlier, the national low-income persistence rate rose 2.3 percentage points from the 1992 to 1997 period to the 2007 to 2014 peak and more recently it decreased by 0.2 percentage points. Following the procedure for decomposing the low-income immobility rate described through Equations (1) and (3), the changes in national low-income persistence rate can also be decomposed into the contribution by each province through changes of the provincial persistence rate and changes in the province's share of tax filers who experienced low-income for five or more years.

Table 2 shows the contribution to these changes by each province. Again, it can be seen that changes in low-income persistence at the national level were mainly driven by changes in Ontario. Of the 2.3 percentage point increase between the 1992 to 1997 period and the 2007 to 2014 period, Ontario accounted for 80.8% or just under 1.9 percentage points, while British Columbia contributed 23.5% or just above half of a percentage point. These two provinces, together with Quebec, pushed the national low-income persistence rate up by 2.5 percentage points between the two periods. But the other provinces helped pulling down the national low-income persistence rate by 0.2 percentage points. The second column of the Table shows the contribution from each province to the 0.2 percentage point decrease between the 2007 to 2014 period and the 2011 to 2018 period. Of this small change, Ontario accounted for 61.5% of the decrease. Quebec, and to a lesser extent Newfoundland and Labrador, Saskatchewan, and Alberta also contributed to the decrease. British Columbia was the only province to have helped to reduce the decline, accounting for a 16.8% increase.

#### 4. Low-income persistence: a look at the distribution of the spells

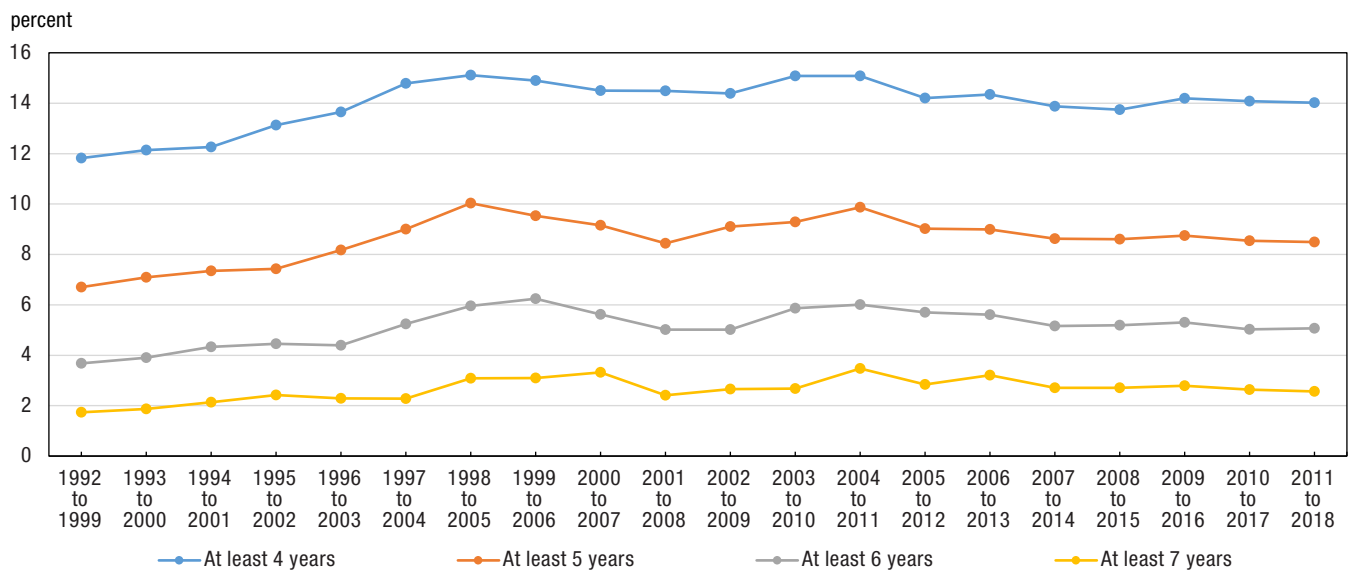
The previous sections examined low-income persistence by counting the number of years a tax filer falls in low income within an eight-year period. One caveat of that approach is that it ignored the successiveness of the low-income experience. In particular, it did not differ between one tax filer who was in low income for several years successively and another who was in low income for the same number of years, but who experienced low income sporadically. For example, in the eight-year period from 2010 to 2018, a tax filer might fall in low income in 2010, 2014 and 2018, while another tax filer might fall in low income in 2016, 2017 and 2018. Both filers had low income in three years, but their experience differed because the first filer had low income sporadically while the second had low income in three successive years. If low income exemplifies a positive duration dependence, then the second filer would experience a higher persistence of low income and a harder time to rise out of low income than would the first filer.

In duration data analysis, the first filer would be identified as someone who experienced three separate spells of low income with each spell had a duration of one year. In contrast, the second filer would be identified as someone who experienced one low-income spell and that spell had a duration of three years. Table 10-11-0026-01 contains various estimates to help characterize the distribution of low-income spells by their durations. To simplify, the table restricts the samples to tax filers who were not in low income in the first year of a given eight-year period. Under this restriction, all low-income spells would have a known starting point--any year but the first in the given eight-year period.<sup>6</sup> This restriction essentially limits the maximum duration of a low-income spell to be seven years in an eight-year window of observation.

The restriction has implications for how one would characterize low-income persistence by the distribution of low-income spells. In the previous section, an intuitive quantification of low-income persistence was employed to describe the proportion of tax filers who were in low income for more than half of the time (five or more years) within an eight-year period. Now since the maximum duration of a low-income spell is seven years within an eight-year period, an intuitive quantification of low-income persistence can be the proportion of low-income spells that lasted for at least four years. Similar to the previous section, alternative quantifications, including proportions of low-income spells lasted for at least five years, at least six years or at least seven years, are also possible.

6. Without this restriction, a tax filer can be observed in low income in the first year of an eight-year period. It then will be unclear if their low-income spell started from the first year or if the spell started earlier.

**Figure 5**  
**Low-income spells with long durations, Canada, 1992-2018**



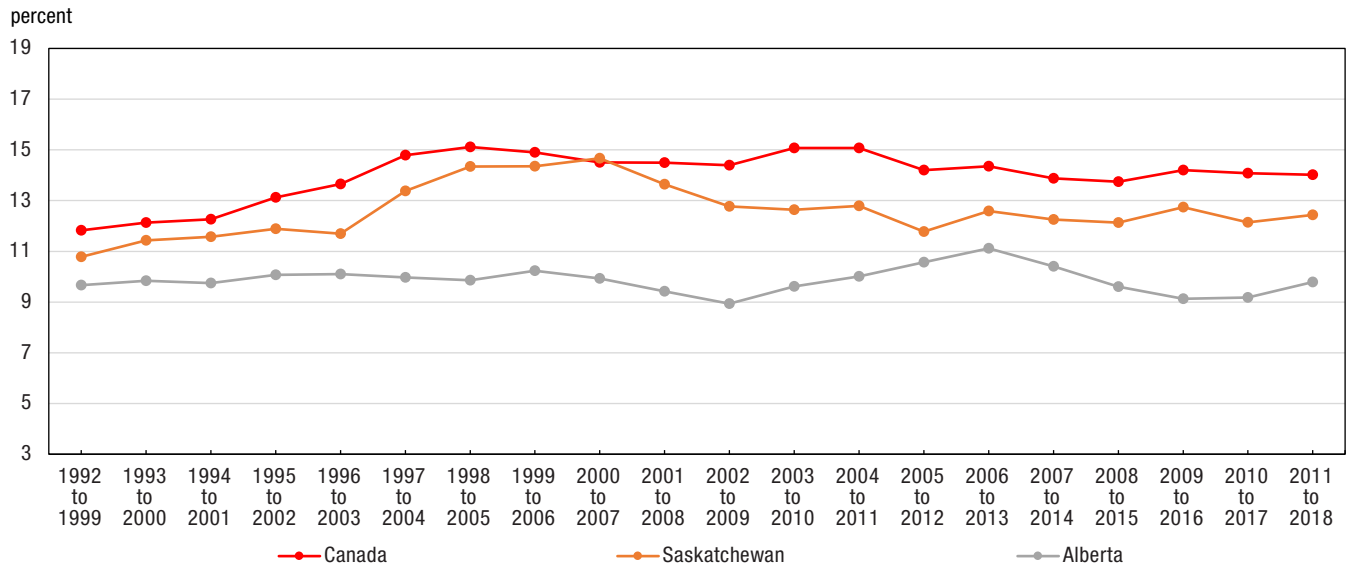
Source: Statistics Canada Table 11-10-0026-01.

The results can be seen from Figure 5. Under different quantifications, the magnitude in low income persistence differed but the underlying trends were the same: low-income persistence followed an upward trend from the early 1990s to peak by the 1998 to 2005 period. It varied around the peak in the mid-2000s and more recently, the trend reversed from the peak in the 2004 to 2011 period. Thus, like in the previous section, the intuitive measure of persistence – the proportion of low-income spells lasted for at least four years in an eight-year period -- shall be focused. Under this quantification, between 11.8% and 12.3% of all low-income spells in the early 1990s were persistent spells. The proportion rose to the peak of 15.1% by the 1998 to 2005 period, declined slightly for several periods and went back to another peak in the 2004 to 2011 period. It then reversed to decline slowly but consistently to 13.7% by the 2008 to 2015 period and stayed flat thereafter.

Like in the previous section, provincial differences in low-income persistence gauged by the distribution of the spells also existed. Figure 6a presents the results for provinces with low-income persistence lower than at the national level. It can be seen that Alberta led all provinces with the lowest proportion of low-income that lasted for at least four years. The national average was 14.0% over the eight-year periods between 1992 and 2018. The corresponding average was only 9.9% in Alberta. Saskatchewan also had lower proportion of persistent low-income spells with an average of 12.6%. In contrast, New Brunswick (15.8%), Nova Scotia (15.7%), Newfoundland and Labrador (15.5%) and Quebec (15.0%) all had higher proportion of persistent low-income spells than the national average (Figure 6b).

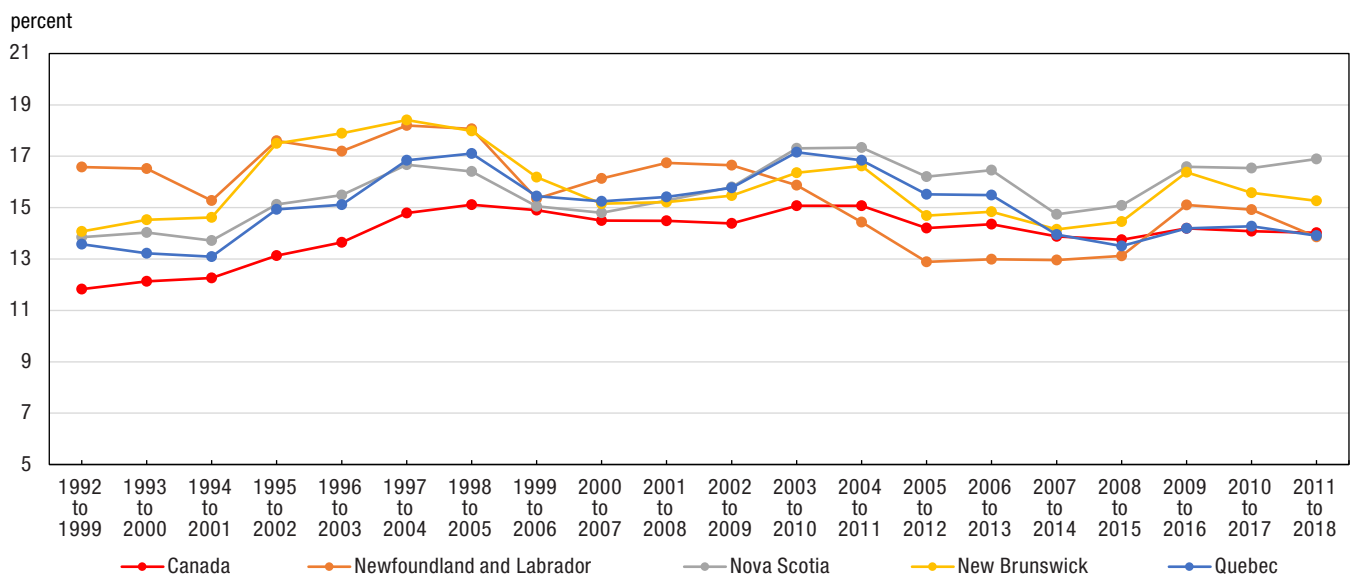
However, there were some differences between these provinces. The proportion in New Brunswick and Nova Scotia were consistently above the national level over all of the eight-year periods since 1992, while in Quebec and Newfoundland and Labrador, the persistence was much stronger than the national level in the 1990s. Since the early 2000s in Newfoundland and Labrador and since the late 2000s in Quebec, the proportion of persistent low-income spells in these two provinces converged to the national level. On the other hand, in Prince Edward Island, Ontario, Manitoba and British Columbia, low-income persistence evolved similarly to the national persistence through all eight-year period between 1992 and 2018 (Figure 6c).

**Figure 6a**  
**Provinces with low-income persistence of lower than national level**



Source: Statistics Canada Table 11-10-0026-01.

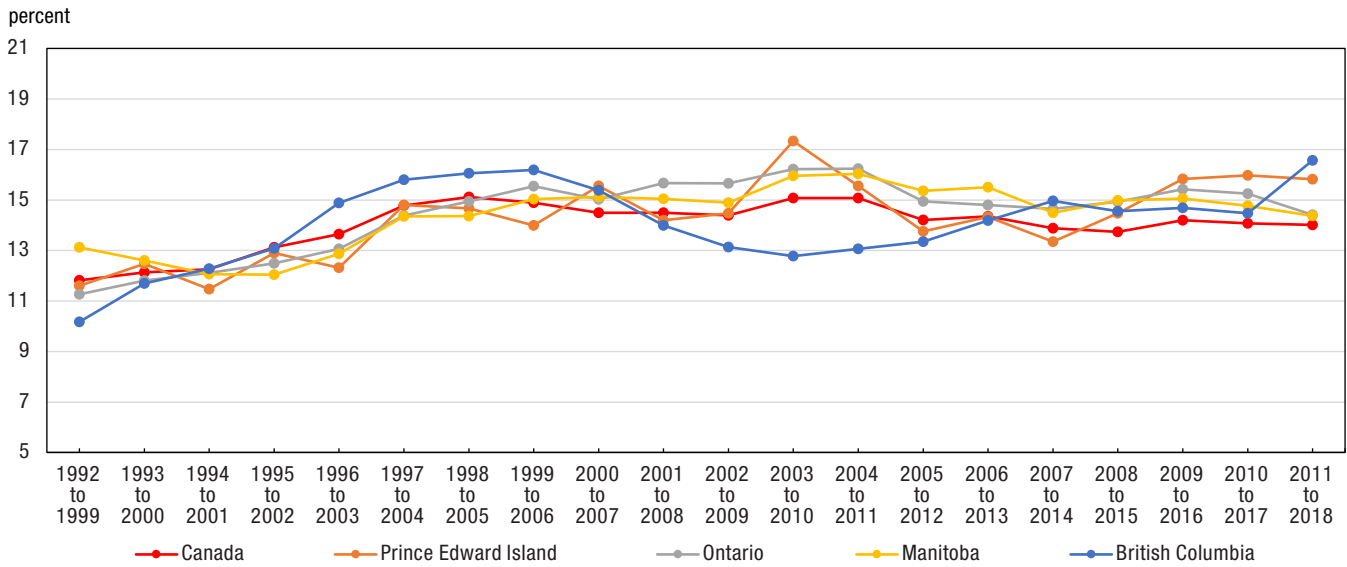
**Figure 6b**  
**Provinces with low-income persistence higher than national level**



Source: Statistics Canada Table 11-10-0026-01.



**Figure 6c**  
**Provinces with low-income persistence similar to national level**



Source: Statistics Canada Table 11-10-0026-01.

At the national level, the changes in the proportion of persistent low-income spells can also be decomposed into the contributions by the provinces through the changes in provincial persistence rate and their share of low-income spells using the procedures described in Equations (1) to (3). As mentioned before, there were two distinguishable trends in the persistent low-income spells at the national level. From the 1992 to 1999 period to the 1998 to 2005 period, the proportion of persistent spells rose by 3.3 percentage points, while from the 2004 to 2011 period to the 2008 to 2015 period, it decreased 1.4 percentage points. The decomposition exercise attempts to quantify the contribution by each province to those changes.

Table 3 contains the decomposition results. It was found that when persistence was measured through the distribution of low-income spells, the three largest provinces, Ontario, Quebec and British Columbia showed to have large impacts to the changes in the proportion of persistent low-income spells at the national level. For the 3.3 percentage points increase in the proportion of persistent low-income spells at the national level between the 1992 to 1999 period and the 1998 to 2005 period, these provinces together contributed 100.2%. Only Alberta and Newfoundland and Labrador helped slowing the upward movement, but their impacts were not notable. From the 2004 to 2011 period to the 2008 to 2015 period, the proportion of persistent low-income spells decreased by 1.4 percentage points. Quebec alone led to a decrease close 1.7 percentage points. Ontario also contributed to the decrease, but by less than half of a percentage point. British Columbia and to a lesser extent Alberta, contributed to the increase in the proportion of persistent low-income spells by just under one percentage point.

**Table 3**  
**Decomposition of changes in low-income persistence by spell distribution**

	1992-1999 to 1998-2005	2004-2011 to 2008-2015
	percent	
<b>Changes at national level</b>	<b>3.3</b>	<b>-1.4</b>
Newfoundland and Labrador	-2.9	3.0
Prince Edward Island	Nil	Nil
Nova Scotia	1.0	8.8
New Brunswick	2.6	7.0
Quebec	26.5	108.4
Ontario	38.7	29.5
Manitoba	Nil	1.9
Saskatchewan	4.3	Nil
Alberta	-5.0	-5.4
British Columbia	35.0	-54.4

**Note(s):** Changes at national level are expressed in percentage points.

"Nil" indicates a contribution less than 1%.

**Source:** Statistics Canada Table 11-10-0026-01.

In the previous sections, it was found that the three largest provinces were the main driving force behind the changes in low-income persistence at the national level, while smaller provinces with a resource based economy played a secondary role. Yet in this section, it was exclusively the largest provinces that drove the changes in low-income persistence gauged by the distribution of low-income spells. These seemingly contradicting findings suggested that large provinces contributed to the changes in low-income persistence more by the successive low-income experience of tax filers from these provinces, while smaller provinces contributed primarily through tax filers who transitioned in and out of low income frequently.

## 5. Summary and conclusions

Limited by sample size, past studies on poverty and low-income persistence in Canada have rarely ventured below the national level. Taking advantage of the very large sample size of the Longitudinal Administrative Databank and the many available aggregate statistics on low-income dynamics recently disseminated, this study looks at low-income persistence at both the national and the provincial levels and over short transition periods as well as relatively long transition periods.

At the national level, it was found that low-income persistence worsened in the 2000s than in the 1990s, but it became less persistent since the mid-2010s amid improving labour market conditions before the pandemic. The finding is robust across different measurements, be it the low-income immobility rate in a two-year period, years being in low income in an eight-year period, or years being in low income in successive years in an eight-year period.

Comparing low-income persistence across the provinces from different angles indicated that resource based provinces, including Alberta, Newfoundland and Labrador and Saskatchewan, tended to have lower persistence than at the national level. Nova Scotia, New Brunswick, Quebec and Manitoba often had stronger persistence of low income. While in Ontario, BC and Prince Edward Island, low-income persistence varied around the national average, particularly in recent years.

Decomposition analyses suggested that tax filers in larger provinces, including Ontario, Quebec and British Columbia, were the main drivers behind the changes in low-income persistence at the national level. Tax filers from smaller provinces with a resource based economy, including Alberta, Newfoundland and Labrador and Saskatchewan, also played important roles but they likely contributed more by frequent transitions into and out of low income. In contrast, tax filers from the largest provinces contributed more by staying in or out of low income for consecutive years.

In this study, the impacts of COVID-19 on low-income persistence in Canada were not examined since the necessary data are still not available. But the methods and results can be useful as a basis for that purpose in the future.

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