

# The Role of Productivity in Long-Term Economic and Fiscal Projections for the Canadian Provinces and Territories, 2014-2038

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## ABSTRACT

This article presents long-term projections for labour productivity and labour supply growth for the provinces and the territories for the 2014-2038 period, and discusses their implications for budgetary balance at the provincial/territorial level. We find that under our realistic assumptions, most provinces and territories will not be able to meet the test of balancing revenue growth with growth in public spending without either raising taxes or cutting program spending. Given the relative distaste for higher taxes and spending cuts, provincial/territorial governments in Canada must find ways to boost productivity and labour supply growth, and hence revenue growth, to maintain fiscal balance to 2038.

AN AGEING POPULATION, RISING health care costs, and weak productivity growth have led some commentators to question the long-term fiscal sustainability of Canada's provincial/territorial governments.<sup>2</sup> This article presents a series of long-term projections of labour productivity, labour supply, real GDP, and provincial/territorial government revenues and

expenditures for the provinces and the territories for the 2014-2038 period to examine whether provincial/territorial revenue growth is likely to keep pace with expenditures. It is important to note that we are not making forecasts, but rather conditional projections based on certain assumptions regarding population growth, the evolution of participation rates and

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2 There has been less concern about the fiscal sustainability of the federal government because it currently has only a relatively modest debt burden and growth rates in two of its largest spending categories were to be restrained under the Conservative Government's fiscal plan by raising the age of entitlement for Old Age Security from 65 to 67 and limiting transfers to the provinces for health care to increase no faster than the pace of nominal GDP growth. During the 2015 election campaign, the Liberal Party referred to altering both policies. If these major federal spending categories undergo alteration, then the issue of federal fiscal sustainability will need to be re-visited.

average hours worked, labour productivity growth, and inflation.<sup>3</sup>

This article is organized into three sections. The first section presents the methodology and assumptions underlying the baseline projections. The second section presents the baseline economic projections for the provinces and territories for the 2014-2038 period. The third section examines the implications of these projections for budgetary balance in the provinces and territories. In particular, it considers whether the baseline projections for nominal GDP growth exceed the rate of nominal GDP growth required to finance expected growth in public spending. The fourth section concludes.

## Methodology: Overview of the Baseline Projections

Real GDP growth can be decomposed into two components: 1) labour productivity growth (that is, growth in real GDP per hour worked); and 2) growth in total hours worked. The relationship is represented by the following equation:

$$\Delta \ln(Y) = \Delta \ln\left(\frac{Y}{H}\right) + \Delta \ln(H)$$

where  $Y$  is real GDP,  $H$  is total hours worked, and  $Y/H$  is labour productivity. Therefore, to project real GDP growth, we developed projections for the future advance of total hours worked and labour productivity growth. Growth in total hours work can be further decomposed into employment growth and growth in average hours worked:

$$\Delta \ln(H) = \Delta \ln\left(\frac{H}{E}\right) + \Delta \ln(E)$$

where  $H/E$  is average hours worked and  $E$  is employment. Thus, to project growth in total hours worked, we made separate projections for the future paths of employment and average hours worked. We start by projecting labour force growth, since employment tends to grow in line with the supply of labour over the long run.<sup>4</sup> The projections for labour force growth are based on separate projections for working age population growth and growth in the labour force participation rate. The relationship between labour force growth, working age population growth and growth in the participation rate is represented by the following equation:

$$\Delta \ln(E) \approx \Delta \ln(L) = \Delta \ln\left(\frac{L}{N}\right) + \Delta \ln(N)$$

where  $L$  is the labour force,  $N$  is the working age population (15 years and over), and  $L/N$  is the participation rate.

## Working Age Population

To project growth in the working age population, we rely on Statistics Canada's official population projections for the 2014-2038 period (Statistics Canada, 2015). In particular, we adopt the medium (M1) scenario projection, which is based on demographic trends observed over the 1991-2011 period.<sup>5</sup> At the national level, this scenario projects working age population growth of 0.9 per cent per year between 2014 and 2038 (Table 1).<sup>6</sup>

3 Since these assumptions are subject to uncertainty, we have also conducted various sensitivity analyses to provide a range of plausible projections for economic growth. These alternative projections are briefly discussed in this article, but readers are referred to Drummond and Capeluck (2015) for detailed results.

4 This is based on the assumption that the unemployment rate will remain fixed at its 2014 level. The relationship between growth in the participation, employment and unemployment rates is as follows:

$$\Delta \ln(PR) = \Delta \ln(ER) + \Delta \ln(1 - UR)$$

where  $PR$  is the participation rate,  $ER$  is the employment rate, and  $UR$  is the unemployment rate.

5 The medium (M1) scenario is based on the following assumptions: interprovincial migration trends observed over the 1991-2011 period will persist in 2014-2038; the total fertility rate reaches 1.67 births per woman in 2021 and then remains constant; life expectancy reaches 89.1 years for females and 87.5 years for males in 2062; and the net international immigration rate reaches 0.56 per cent in 2022 and then remains constant.

**Table 1**  
**Working Age Population (15+), Canada,**  
**the Provinces and the Territories,**  
**2000-2014 and 2014-2038**

Average Annual Rate of Change

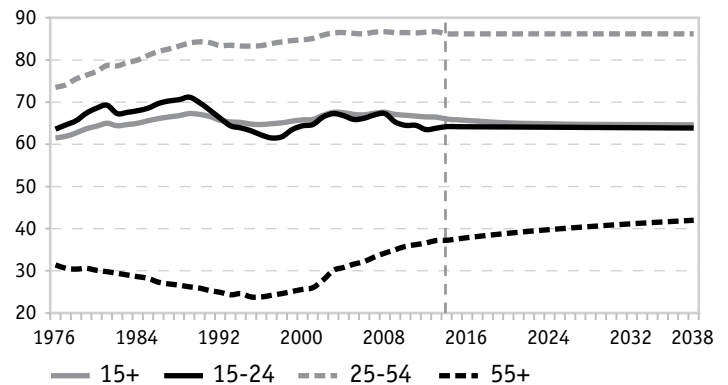
	2000-2014	2014-2038
Canada	1.33	0.88
Newfoundland and Labrador	0.24	-0.48
Prince Edward Island	0.87	0.87
Nova Scotia	0.41	0.03
New Brunswick	0.28	0.05
Quebec	1.04	0.58
Ontario	1.45	0.84
Manitoba	0.95	1.03
Saskatchewan	0.95	0.71
Alberta	2.55	1.77
British Columbia	1.27	1.05
Yukon	1.83	0.60
Northwest Territories	0.44	0.06
Nunavut	5.26	1.07

Source: CSLS calculations based on Statistics Canada data.

### Labour Force Participation Rates

The assumptions underlying the future path of participation rates are somewhat more complex. To project overall labour force growth for the provinces, the labour force is broken down into three age groups: young workers (aged 15-24 years), prime-age workers (aged 25-54 years), and older workers (aged 55+ years).<sup>7</sup> To project growth in the labour force, we made a series of assumptions regarding the future path of participation rates by age group and applied these participation rates to the official working age population projections by province from Statistics Canada.

**Chart 1**  
**Participation Rates by Age Group, Canada, 1976-2038**  
 (per cent)



Source: CSLS calculations based on Statistics Canada data.

In other words, trends in participation rates by age group in each province were assumed to be the same as trends in participation rates by age group for Canada as a whole. The different assumptions for the three age groups are briefly outlined below.

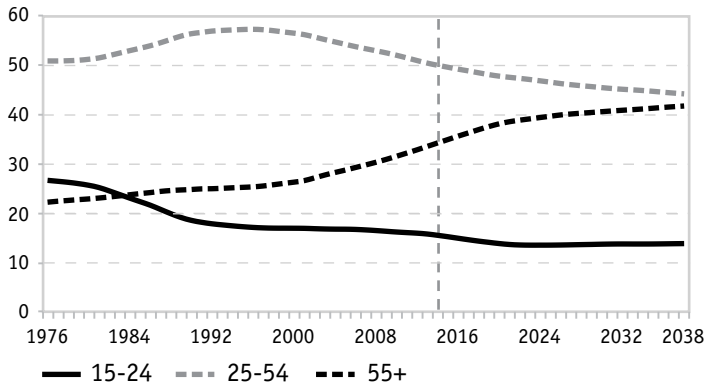
Chart 1 illustrates the underlying assumptions concerning the future path of participation rates in Canada for the three age groups. The participation rate for the young age group appears to be largely cyclically-driven, falling during economic slowdowns (such as the early 1990s and late 2000s) and rising again in more prosperous periods. However, we expect the participation rate for the young age group to continue its recent decline due to the increased emphasis on educational attainment and deteriorating prospects for low-skill workers. In particular, we assume that the participation rate for the young age group will decline in 2014-2038 at the same pace as in 2000-2014 (that is, -0.02 per cent per year).

6 As a sensitivity analysis, we also apply alternative population growth projections – namely, the high- and low-growth scenarios. The high-growth scenario projects working age population growth of 1.2 per cent per year for the 2014-2038 period, while the low-growth scenario projects working age population growth of 0.7 per cent per year. See Drummond and Capeluck (2015).

7 The methodologies used to project the future path of participation rates differ between the provinces and the territories due to data limitations for the territories. See Drummond and Capeluck (2015).

**Chart 2**  
**Shares of the Working Age Population by Age Group,**  
**Canada, 1976-2038**

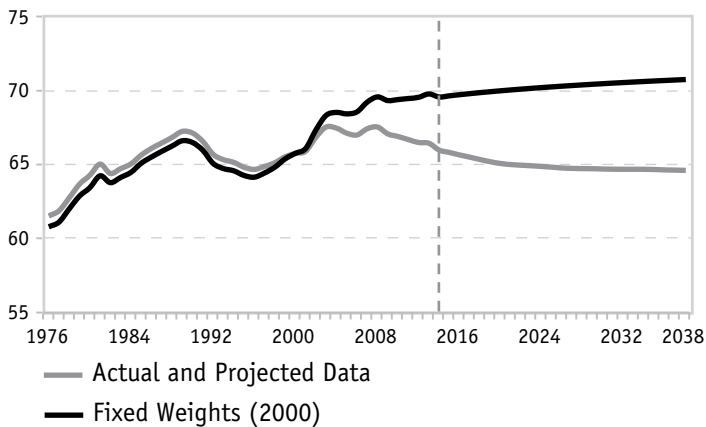
(per cent)



Source: CSLs calculations based on Statistics Canada data.

**Chart 3**  
**The Effect of the Age Structure on the Aggregate**  
**Participation Rate (15+), Canada, 1976-2038**

(per cent)



Note: The 'Fixed Weights (2000)' series shows how the overall participation rate would evolve if the shares of young, prime-age and older age groups in the working age population were fixed at their 2000 level.

Source: CSLs calculations based on Statistics Canada data.

The participation rate for the prime-age age group is expected to remain constant over the projection period, as the historical gains in the participation rate for this group, which were driven by an increase in the participation of women, appear to have been fully realized in the

mid-2000s (Chart 1). More specifically, the participation rate for the prime-age age group is assumed to remain at its 2014 level over the 2014-2038 period.

The participation rate for the older age group is assumed to increase over time, but at a diminishing rate, driven by changes to pension systems and increases in average life expectancy, among other factors. The projection for the older age group is based on an equation for a trend line for the national participation rate of the older age group in 2000-2014. In every province, the participation rate for the older age group is projected to increase at an average annual rate of 0.63 per cent in 2014-2026 and 0.37 per cent in 2026-2038.

Even though we expect relatively stable participation rates for the young and prime-age age groups and an increase in the participation rate of the older age group, the overall participation rate is expected to decline over the 2014-2038 period (-0.09 per cent per year), driven by compositional changes in the labour force (Chart 2). In particular, the share of the older age group (55+) in the working age population is expected to increase markedly from 34.3 per cent in 2014 to 41.9 per cent in 2038, while the shares of the younger (15-24) and prime-age (25-54) age groups are expected to decline from 15.4 per cent to 13.7 per cent and from 50.2 to 44.4 per cent, respectively.

Chart 3 shows how the aggregate participation rate would evolve if the shares of the young, prime-age and older age groups in the working age population were fixed at their 2000 level. As expected, the aggregate participation rate would increase, driven by increases in the participation rate for the older age group. In particular, the participation rate would increase from 65.8 per cent in 2000 to 69.6 per cent in 2014 to 70.8 per cent in 2038. However, after allowing for changes in working age population shares, the participation rate only increases from 65.8 per

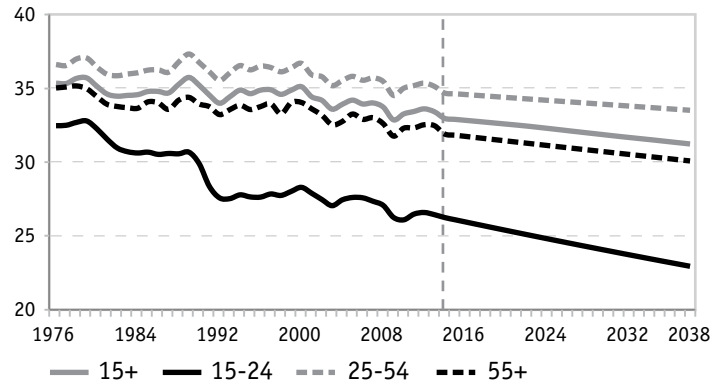
cent in 2000 to 66.0 per cent in 2014 and is expected to fall to 64.6 per cent in 2038. It is important to note that more than half of the contribution of ageing to the evolution of the aggregate participation rate – as shown by the gap between the two series in Chart 3 – had already taken place between 2000 and 2014. In fact, the gap between the two series was 3.6 percentage points in 2014, 58.4 per cent of the projected gap in 2038 (6.2 percentage points).

### Average Hours Worked

After projecting labour force participation rates, the next step in projecting the growth in total hours worked is to determine future trends in average hours worked. To do this, we projected growth in average hours worked by age group at the national level and applied these growth rates to the projections for labour force growth. Growth in average hours worked by age group in each province was assumed to be the same as the growth exhibited at the national level.<sup>8</sup> In particular, average hours worked were assumed to evolve in 2014-2038 at the same pace as in 1976-2014; that is, -0.56 per cent per year for the young age group, -0.14 per cent per year for the prime-age age group, and -0.25 per cent per year for the older age group. These assumptions are illustrated in Chart 4.

At the national level, growth in aggregate average hours worked is projected at -0.22 per cent per year for the 2014-2038 period, driven by falling average hours worked for every age group. This decline is expected to be affected by a continuation of the historical shift from full-time to part-time work arrangements, which is in large part attributable to the evolution of the industrial composition of the economy (i.e. the servicification of the economy).

**Chart 4**  
Average Hours Worked Per Worker by Age Group, Weekly Hours, Canada, 1976-2038



Source: CSLS calculations based on LFS Statistics Canada data.

### Labour Productivity Growth

Compared with projecting future developments in the participation rate and total hours worked, projecting the future pace of labour productivity growth is considerably more difficult and uncertain. Therefore, in the base-line projections, we assume that total economy labour productivity growth will be the same as the growth rates by province and territory observed for the 2000-2014 period. The 2000-2014 period was chosen to project labour productivity growth for three reasons: 1) it is a fairly long period; 2) it covers almost two complete business cycles, with one complete cycle in 2000-2007 and seven years of another cycle in 2007-2014, which may have ended in a peak (for at least some provinces) in 2014; and 3) the labour productivity growth experienced over this period at the national level was fairly similar to what was experienced over longer periods (e.g. 1.0 per cent per year in 2000-2014 versus 1.4 per cent per year in 1981-2000 and 1.2 per cent per year in 1981-2014).

<sup>8</sup> The method for projecting growth in average hours worked by age group is somewhat different for the territories, as hours worked data from the LFS are not available for the territories. See Drummond and Capeluck (2015).

**Table 2****Summary of Assumptions Behind the Baseline Projections for Economic Growth, 2014-2038**

Variable	Assumption
Working age population	The M1 scenario from Statistics Canada's official population projections is used for Canada and the provinces and territories.
Participation rates	In every province, the participation rate for the 15-24 age group will decline at the same pace as at the national level in 2000-2014 (-0.02 per cent); that the participation rate for the 25-54 age group will remain at its 2014 level; and that the participation rate for the 55+ age group will increase over time, but at a diminishing rate, based on trends observed at the national level in 2000-2014.
Average hours worked	Average hours worked in every province will decline at the same pace as at the national level in 1976-2014 (that is, -0.56 per cent for the 15-24 age group, -0.14 per cent for the 25-54 age group, and -0.25 per cent for the 55+ age group).
Labour productivity	Total economy labour productivity growth will be the same as the historical growth rates by province and territory observed over the 2000-2014 period.
GDP deflator (inflation)	All of the provinces and territories will experience GDP deflator growth of 2.0 per cent per year.

Labour productivity growth was calculated using total economy estimates of real GDP from the expenditure accounts.<sup>9</sup> Total economy estimates of hours worked were taken from the Canadian Productivity Accounts (CPA) instead of the LFS, as the former generates more accurate estimates of labour productivity growth.

**Inflation Rate**

The nominal GDP projections are based on the assumption that all of the provinces and territories will experience inflation (defined as growth in the GDP deflator) of 2.0 per cent per annum over the 2014-2038 period. We assumed an inflation rate of 2.0 per cent because this is the current target rate of inflation agreed upon by the Bank of Canada and the Minister of Finance, and we believe that

this target will be maintained and broadly achieved until 2038.<sup>10</sup>

All the assumptions underlying our baseline estimates of real and nominal GDP growth are summarized in Table 2.

**Economic Results  
Baseline Projections**

Table 3 presents trends for the 2000-2014 period and baseline projections for the 2014-2038 period for hours worked, labour productivity, real GDP, the GDP deflator and nominal GDP.<sup>11</sup>

From 2014-2038, we project that Canada will experience growth in real GDP of 1.56 per cent annually on average (Table 3, Panel B). About two-thirds of this growth can be attributed to the 0.99 per cent expected annual growth in

9 Productivity analysts usually focus on the business sector because of issues with the measurement of real output and productivity in the non-business sector. This report focuses on total economy productivity for consistency with macroeconomic modeling exercises which cover the total economy. See Smith (2004) for a discussion of the issues involved in the use of total economy and business sector productivity.

10 While the Bank of Canada targets a growth rate for the Consumer Price Index (CPI) rather than a growth rate for the GDP deflator, we believe that these two inflation measures will move in line with each other over much of the 2014-2038 period. In 2000-2014, growth in the GDP deflator was slightly higher than growth in the CPI at the national level (2.2 per cent per year versus 2.0 per cent per year) due to increases in commodity prices. As a sensitivity analysis, we use historical inflation rates by province and territory from the 2000-2014 period, which ranged from 1.8 per cent per year in British Columbia to 4.1 per cent per year in Newfoundland and Labrador (see Drummond and Capeluck, 2015).

11 Generally speaking, our projections for the 2014-2026 and 2026-2038 subperiods are very similar to those over the 2014-2038 period and for that reason this article only provide total period estimates. See Drummond and Capeluck (2015) for separate 2014-2026 and 2026-2038 estimates.

**Table 3****Trends and Projections in Hours Worked, Labour Productivity, Real GDP, the GDP Deflator and Nominal GDP for Canada and the Provinces and Territories, 2000-2014 and 2014-2038**

(average annual per cent change)

Panel A: 2000-2014

	Hours worked	Labour productivity	Real GDP	GDP Deflator	Nominal GDP
Canada	1.03	0.99	2.03	2.21	4.29
Newfoundland and Labrador	0.87	1.66	2.54	4.06	6.95
Prince Edward Island	0.81	1.01	1.82	2.26	4.13
Nova Scotia	0.29	1.11	1.40	1.94	3.37
New Brunswick	-0.03	1.16	1.14	2.14	3.37
Quebec	0.62	0.96	1.59	1.90	3.54
Ontario	0.78	0.88	1.67	1.78	3.48
Manitoba	0.62	1.54	2.17	2.17	4.43
Saskatchewan	0.91	1.42	2.35	4.17	6.60
Alberta	2.39	0.80	3.21	3.37	6.64
British Columbia	1.02	1.40	2.44	1.77	4.25
Yukon	2.27	1.20	3.49	2.03	5.60
Northwest Territories	2.41	-0.50	1.90	2.06	4.00
Nunavut	3.36	0.97	4.36	3.53	8.04

Panel B: 2014-2038

	Hours worked	Labour productivity	Real GDP	GDP Deflator	Nominal GDP
Canada	0.56	0.99	1.56	2.00	3.59
Newfoundland and Labrador	-1.09	1.66	0.55	2.00	2.56
Prince Edward Island	0.58	1.01	1.60	2.00	3.63
Nova Scotia	-0.41	1.11	0.70	2.00	2.71
New Brunswick	-0.40	1.16	0.76	2.00	2.78
Quebec	0.24	0.96	1.20	2.00	3.22
Ontario	0.53	0.88	1.42	2.00	3.44
Manitoba	0.78	1.54	2.33	2.00	4.38
Saskatchewan	0.44	1.42	1.87	2.00	3.90
Alberta	1.49	0.80	2.30	2.00	4.35
British Columbia	0.73	1.40	2.14	2.00	4.18
Yukon	0.29	1.20	1.49	2.00	3.52
Northwest Territories	-0.24	-0.50	-0.74	2.00	1.25
Nunavut	0.75	0.97	1.73	2.00	3.76

Note: Labour productivity is defined as real GDP per hour worked.

Source: CSLS calculations based on Statistics Canada data.

labour productivity and the other third to the 0.56 per cent expected annual growth in hours worked. This rate of real GDP growth is about 0.5 percentage points or 25 per cent slower than the 2.03 per cent growth observed on average

from 2000 to 2014. The difference is entirely attributable to an expected reduction in growth of hours worked, as we are assuming that labour productivity growth will remain unchanged. Given the expected trend in hours worked,

labour productivity growth will account for an increasing proportion of GDP growth.

We project that there will be considerable variation in GDP growth across the provinces and territories. Manitoba, Alberta, and British Columbia are the only three jurisdictions which we project will have GDP growth rates between 2014 and 2038 which exceed the national average of 2.03 per cent observed between 2000 and 2014. We project that GDP growth will slow going forward in every province with the exception of Manitoba. The Atlantic provinces and Quebec are projected to have the weakest growth among the provinces, with rates between 2014 and 2038 as low as 0.55 per cent in Newfoundland and Labrador, 0.70 per cent in Nova Scotia, 0.76 per cent in New Brunswick, and 0.96 per cent in Quebec. Note that this relatively poor real GDP performance in the Atlantic provinces, excluding Prince Edward Island, is the result of expected falls in total hours worked, as these provinces are all projected to have above-average labour productivity growth.

The projections for smaller and less diversified jurisdictions are much more uncertain than those for larger and more diversified jurisdictions. For example, the outlook for small, resource-dependent jurisdictions like Newfoundland and Labrador is greatly dependent on the performance of a small number of sectors (e.g. mining and oil and gas extraction) and even projects. In particular, the projections for resource-dependent jurisdictions do not take into account the sectoral composition of the economy or the outlook for particular projects and sectors. The addition of a small number of natural resource projects to such an economy may have significant implications for both labour productivity growth and labour input growth. Unfortunately, we are not in a position to make meaningful forecasts

about the future trends of these sectors, as their outlook is extremely uncertain.

### **Sensitivity of Projections**

In addition to the baseline projections for nominal GDP growth, we have developed six alternative economic scenarios to compare with the projections for public spending growth (Table 4). Each scenario only changes one assumption at a time relative to the baseline projections. Even wider ranges of nominal GDP growth rates could be generated by combining the various assumptions. However, even without combining these assumptions, the range for the projections is already quite large in some provinces. This highlights the uncertainty surrounding the projections for the future path of nominal GDP growth. Nevertheless, despite the wide ranges under all scenarios, projected nominal GDP growth rates are lower than the historical growth rates observed over the 2000-2014 period for almost every jurisdiction due to slower working age population growth.

We have also compared our baseline projections to those produced by several professional forecasters. Our projection of 1.6 per cent annual growth in real GDP is very similar to those of TD Economics (Bartlett *et al.*, 2015) and the Parliamentary Budget Office (Cameron *et al.*, 2015) both of which project growth of about 1.7 per cent. Our projections are somewhat more pessimistic than the 1.9 per cent growth forecast by the Conference Board of Canada (Beckman *et al.*, 2014) or the 2.2 per cent growth forecast by the Policy and Economic Analysis Program at the University of Toronto (Dungan and Murphy, 2013). The major difference in these latter projections is that they assume labour productivity growth will recover to pre-2000 rates, while the projections showing lower growth rates assume that the relatively low productivity rates observed since 2000 will persist.<sup>12</sup>

12 We also compared our projections at the provincial level to those of Bartlett *et al.* (2015) and found that they were reasonably similar for most provinces. For further details, see Drummond and Capeluck (2015).



**Table 4****Range of Projections for Nominal GDP Growth Under Alternative Economic Scenarios, Canada and the Provinces and Territories, 2014-2038**

(average annual per cent change)

	2000-2014	2014-2038								
		Base Case	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Average	Coefficient of Variation
Canada	4.29	3.59	3.80	3.36	3.59	3.92	3.19	3.59	3.58	6.34
Newfoundland and Labrador	6.95	2.56	4.63	2.33	1.88	2.71	2.43	2.57	2.73	29.80
Prince Edward Island	4.13	3.63	3.88	3.40	3.61	3.91	3.25	3.58	3.61	6.11
Nova Scotia	3.37	2.71	2.65	2.49	2.59	2.90	2.53	2.74	2.66	4.87
New Brunswick	3.37	2.78	2.92	2.55	2.60	2.95	2.61	2.86	2.75	5.47
Quebec	3.54	3.22	3.12	2.99	3.25	3.49	2.92	3.10	3.16	5.51
Ontario	3.48	3.44	3.22	3.21	3.56	3.79	3.02	3.48	3.39	6.98
Manitoba	4.43	4.38	4.55	4.15	3.81	4.71	3.92	4.39	4.27	7.07
Saskatchewan	6.60	3.90	6.11	3.68	3.46	4.17	3.58	3.79	4.10	20.70
Alberta	6.64	4.35	5.74	4.12	4.54	4.66	3.97	4.37	4.54	11.88
British Columbia	4.25	4.18	3.95	3.95	3.76	4.64	3.64	4.25	4.06	7.65
Yukon	5.60	3.52	3.55	3.29	3.30	3.80	3.13	n.a	3.43	6.36
Northwest Territories	4.00	1.33	1.31	1.02	2.76	1.44	1.05	n.a	1.49	39.77
Nunavut	8.04	5.25	5.31	3.54	3.79	3.98	3.61	n.a	4.25	17.54

Source: CSLS calculations based on Statistics Canada data.

**Descriptions of Alternative Scenarios for Economic Growth**

Alternative Scenario	Assumption
1	Instead of applying the same GDP deflator growth rate to every province, we use historical GDP deflator growth rates by province from the 2000-2014 period.
2	Instead of using the national growth rates in average hours worked by age group from the 1976-2014 period, we use the national growth rates in average hours worked by age group from the 2000-2014 period.
3	Rather than applying the historical labour productivity growth rates by province from the 2000-2014 period, we use the national labour productivity growth rate from the 2000-2014 period (0.99 per cent) for every province.
4	Instead of applying the M1 growth scenario, we use the high-growth scenario from Statistics Canada's official population projections.
5	In place of the M1 growth scenario, we use the low-growth scenario from Statistics Canada's official population projections.
6	Rather than using the national growth rates in average hours worked by age group from 1976-2014, we use the provincial growth rates in average hours worked by age group from 1976-2014.

**Implications of Economic Projections for Fiscal Balance**

This section examines the implications of the baseline projections for public sector balance in the provinces and territories. In particular, we look at the nominal GDP growth rates required for revenues to keep pace with expected growth in public expenditures, and then determine whether the baseline projec-

tions for nominal GDP growth exceed the required nominal GDP growth rates. Two different scenarios for growth in public spending are considered:<sup>13</sup>

- Base case: constant real per capita public spending with 2.0 per cent growth in the deflator for public spending;
- Alternative fiscal scenario: historical growth in nominal per capita health spending and

constant real per capita non-health spending with 2.0 per cent growth in the deflator for non-health spending.<sup>14</sup>

### Base Case

We will now examine whether nominal GDP growth in the provinces and territories is likely to be strong enough to finance public expenditures that are constant in real per capita terms. To do this, we assume that government revenues grow in line with nominal GDP.<sup>15</sup> The nominal GDP growth rates required for revenues to keep pace with growth in public expenditures are calculated as follows:

$$\begin{aligned}\Delta \ln(PY) &\approx \Delta \ln(R) = \Delta \ln(G) \\ &= \Delta \ln\left(\frac{G}{N}\right) + \Delta \ln(N)\end{aligned}$$

where  $PY$  is nominal GDP,  $R$  is nominal government revenues,  $G$  is nominal government expenditure,  $G/N$  is nominal per capita government expenditure, and  $N$  is the total population. Therefore, the growth in nominal GDP required to maintain spending that is constant in real per capita terms is simply equal to future growth in nominal per capita government

expenditure ( $G/N$ ), which is equivalent to the projected inflation rate (2.0 per cent) in this case, plus total population growth ( $N$ ).<sup>16</sup>

We use Statistics Canada's medium (M1) scenario population to project total population growth for the 2014-2038 period.

We assume that provincial/territorial governments begin with balanced budgets in 2014, which is true for some (but not all) jurisdictions. If (1) a government is in budgetary balance at the beginning of the period and (2) public spending and nominal GDP (and hence revenues) are growing at the same pace, then the budget would remain in balance over the entire 2014-2036 period. However, if (1) the budget is in deficit (or surplus) at the beginning of the period and (2) public spending and nominal GDP are growing at the same pace, then the deficit (or surplus) would continuously grow over time.<sup>17</sup> Since almost all provinces have presented budgets showing that balance will be restored within the next few years, this assumption is not particularly worrisome.

Panel A of Table 5 shows the nominal GDP growth rates required for revenues to keep pace with growth in public expenditures that are assumed constant in real per capita terms

13 All of the results presented in this section use our baseline projections of nominal GDP growth. Drummond and Capeluck (2015:Table 31) lists the provinces and territories for which revenue growth is likely to fall short of public spending growth using the six alternative GDP growth projection methodologies summarized in the previous subsection. The results are generally quite similar across projection methodologies for most provinces.

14 Drummond and Capeluck (2015) refer to this scenario as Alternative Scenario B. They develop an additional scenario, alternative Scenario A, which assumes that public spending – divided into health and non-health spending – will be constant in real per capita terms, but with growth in nominal per capita non-health spending at the assumed inflation rate (2.0 per cent) and nominal per capita health spending at the historical growth rates by province and territory in the deflator for health spending from the 2000-2014 period (which range from 2.2 to 3.6 per cent). Alternative Scenario A produces results which are broadly similar qualitatively to those in the Base case scenario.

15 In other words, we assume that the elasticity of total revenues with respect to nominal GDP growth is equal to one. The elasticity was calculated in detail for Ontario by the Commission on the Reform of Ontario's Public Services (2012) and was found to be slightly below one. In particular, personal income taxes were found to have an elasticity above one, corporate income and sales taxes were found to have elasticities of one, and specific taxes (applied to volumes rather than values) as well as user fees were found to have elasticities of well below one.

16 We assume that the deflator for government expenditure will grow in line with the inflation rate during the 2014-2038 period. Therefore, if growth in nominal per capita government expenditure is equal to the inflation rate (2.0 per cent), then this corresponds to growth in real per capita government expenditure that is equal to zero.

**Table 5**

**Nominal GDP Growth Required for Government Revenues to Grow in Line with Government Expenditures, Provinces and Territories, Compound Annual Average Growth Rates, Per Cent, 2014-2038**

(average annual per cent change)

Panel A: Base Case

	Nominal Per Capita Expenditure	Total Population	Required Nominal GDP	Projected Nominal GDP (Baseline)	Difference Between Projected and Required Nominal GDP Growth
All provinces and territories aggregate	2.00	0.85	2.86	3.59	0.73
Newfoundland and Labrador	2.00	-0.59	1.40	2.56	1.16
Prince Edward Island	2.00	0.83	2.83	3.63	0.80
Nova Scotia	2.00	-0.04	1.96	2.71	0.75
New Brunswick	2.00	-0.02	1.97	2.78	0.81
Quebec	2.00	0.56	2.58	3.22	0.65
Ontario	2.00	0.80	2.82	3.44	0.63
Manitoba	2.00	1.00	3.02	4.38	1.36
Saskatchewan	2.00	0.68	2.70	3.90	1.21
Alberta	2.00	1.75	3.78	4.35	0.56
British Columbia	2.00	1.02	3.04	4.18	1.14
Yukon	2.00	0.70	2.65	3.52	0.87
Northwest Territories	2.00	-0.10	2.06	1.33	-0.73
Nunavut	2.00	1.04	3.09	5.25	2.16

Panel A: Alternative Fiscal Scenario

	Nominal Per Capita Expenditure			Total Population	Required Nominal GDP	Projected Nominal GDP (Baseline)	Difference Between Projected and Required Nominal GDP Growth
	Health	Non-Health	Total				
All provinces and territories aggregate	4.56	2.00	3.07	0.85	3.92	3.59	-0.33
Newfoundland and Labrador	5.64	2.00	3.69	-0.59	3.10	2.56	-0.54
Prince Edward Island	5.88	2.00	3.83	0.83	4.66	3.63	-1.03
Nova Scotia	6.07	2.00	4.20	-0.04	4.16	2.71	-1.45
New Brunswick	5.34	2.00	3.50	-0.02	3.47	2.78	-0.70
Quebec	4.35	2.00	2.76	0.56	3.33	3.22	-0.10
Ontario	4.26	2.00	2.99	0.80	3.79	3.44	-0.35
Manitoba	4.66	2.00	3.26	1.00	4.26	4.38	0.12
Saskatchewan	5.46	2.00	3.61	0.68	4.29	3.90	-0.39
Alberta	5.90	2.00	3.90	1.75	5.65	4.35	-1.30
British Columbia	3.56	2.00	2.70	1.02	3.72	4.18	0.46
Yukon	5.77	2.00	3.09	0.70	3.80	3.52	-0.27
Northwest Territories	5.37	2.00	2.98	-0.10	2.88	1.33	-1.56
Nunavut	5.32	2.00	3.29	1.04	4.34	5.25	0.92

Source: CSLs calculations based on Statistics Canada and CIHI data.

for the 2014-2038 period (the base case). At the national level, the total population is projected to increase by 0.9 per cent per year in 2014-2026, while the deflator for public expenditure is assumed to exhibit annual growth of 2.0 per cent. Thus, nominal GDP must grow at an average annual pace of 2.9 per cent in 2014-2038 in order to finance spending that is constant in real per capita terms.

For the 2014-2038 period, required annual growth in nominal GDP ranges from 1.4 per cent for Newfoundland and Labrador to 3.8 per cent for Alberta due to differences in projected total population growth across the provinces and territories.

Required growth in nominal GDP is lower than the baseline projection for nominal GDP growth for the 2014-2038 period for all jurisdictions, except the Northwest Territories. This means that almost all jurisdictions are expected to be able to fund public expenditures that are constant in real per capita terms (Table 5).

### Alternative Fiscal Scenario

In the alternative fiscal scenario, we allow for positive growth in health spending in real per capita terms, as we believe that the assumption of zero growth in real per capita spending for health is overly restrictive. Indeed, this assumption implies: 1) that there is no real enrichment in programs over a twenty-four-year period; 2) that none of the gains from productivity growth will go to augmenting public services; 3) that the ageing of the population will not exert any upward pressure on real per capita health spending; and 4) that we will observe a persistent decline in the ratio of provincial/territorial spending to GDP.<sup>18</sup> Therefore, this assumption is inconsistent with recent history other than periods of fiscal austerity.<sup>19</sup> Furthermore, it would likely be extremely difficult to keep unchanged overall real per capita spending given the tendency of health spending, which accounts for a large proportion of provincial/territorial program spending, to exhibit strong growth in real per capita terms. Several studies

17 If (1) the budget is in deficit at the beginning of the period and (2) public spending and nominal GDP are growing at the same pace, then the debt-to-GDP ratio would converge toward a certain level which depends on both the size of the deficit (as a share of GDP) and the nominal GDP growth rate. This debt-to-GDP ratio is equal to:  $(debt/GDP) = (deficit_t/GDP_t)/(\Delta GDP/GDP)$

where  $(debt/GDP)$  is the debt-to-GDP ratio,  $deficit_t$  is the deficit in period  $t$ ,  $GDP_t$  is nominal GDP in period  $t$ , and  $(\Delta GDP/GDP)$  is the nominal GDP growth rate. Therefore, for example, if (1) a government started with a deficit-to-GDP ratio of 1.75 per cent and (2) the nominal GDP growth rate was 3.5 per cent per year, then the debt-to-GDP ratio would converge to 50 per cent (50 per cent = 1.75 per cent/3.5 per cent). Given the size of provincial government deficits in 2014-15 and the baseline projections for nominal GDP growth, only two provinces (Newfoundland and Labrador and Ontario) had fiscal deficits in 2014-15 large enough to lead to an increase in their debt-to-GDP ratio over the 2014-2038 period.

18 If real per capita health spending on each age group were fixed over time, then the ageing of the population would necessitate an increase in aggregate real per capita health spending given that health spending is, on average, over five times higher for persons 75 years and over (CIHI, 2015). In particular, per capita health spending this group was \$17,428 in 2012, compared to \$2,981 for individuals aged 0-74 years (calculated from CIHI (2015) data on total provincial/territorial government per capita health expenditures by age in current dollars using the Canadian age distribution from CANSIM 051-0001). Therefore, zero growth in real per capita health spending would require a decrease in real per capita spending on some (or all) age groups, as the share of the population aged 75+ is projected to increase from 7 per cent in 2014 (CANSIM 051-0001) to 13 per cent in 2036 (CANSIM 052-0005).

19 It is true that health spending has been constrained in recent years, with negative growth in real per capita health spending in most provinces between 2011 and 2014. This was largely driven by conditions that are unlikely to continue over the 2014-2038 period, including: 1) the widespread implementation of fiscal austerity policies; and 2) special circumstances related to drug costs (e.g. common expensive drugs coming off patent; slowdown in the emergence of new drugs; and implementation of policies aimed at obtaining lower drug prices).

suggest that “status quo” growth in nominal health spending will be in the range of 6.0 to 6.5 per cent, roughly half of which is due to real enrichment of health programs.<sup>20</sup>

In this alternative fiscal scenario, over the projection horizon, nominal per capita health expenditures are assumed to grow at the historical growth rates observed over the 2000-2014 period by province and territory, which ranged from 3.6 to 6.1 per cent, based on growth in the deflator for health spending of 2.2 to 3.5 per cent per year and growth in real per capita health spending of 1.3 to 3.2 per cent per year. Therefore, after including population growth, growth in nominal health spending for the provinces and territories was in the range of 4.7 to 7.9 per cent per year during the 2000-2014 period, which is similar to the “status quo” range of 6.0 to 6.5 per cent. Growth in health spending could be even higher in the coming years due to large increases in the population aged 75 years and over if governments do not find ways to lower health costs. As before, growth in the deflator for non-health spending is set at 2.0 per cent. Therefore, we assume that there is no real enrichment in non-health programs over the 2014-2038 period.

Panel B of Table 5 presents this alternative fiscal scenario for the provinces and territories for the 2014-2038 period. More specifically, it provides the growth in nominal GDP required for revenues to keep pace with growth in total government expenditures; however, unlike the base case, government expenditures are allowed to increase in real per capita terms. At the aggregate level for the provinces and territories, nominal per capita total spending is assumed to grow by 3.1 per cent per year in 2014-2038. After adding population growth (0.9 per cent per year), we determine that nominal total spending for all

provinces and territories will increase by 3.9 per cent per year in 2014-2038. Therefore, nominal GDP must grow by 3.9 per cent per year in 2014-2038 in order for revenues to grow in line with total spending.

In contrast to the base case, required nominal GDP growth is well above the baseline projections for nominal GDP growth for almost every jurisdiction in 2014-2038. Required annual growth in nominal GDP for the provinces and territories ranges from 3.1 per cent for Newfoundland and Labrador to 5.7 per cent for Alberta. In other words, almost every jurisdiction is expected to be unable to finance public expenditures under the baseline GDP projections, unless they raise taxes, cut non-health expenditure programs in real per capita terms, manage health spending more efficiently, obtain more federal transfers, or are successful in accelerating employment and productivity growth through appropriate economic and fiscal measures. The only exceptions are Manitoba, British Columbia and Nunavut, which are projected to experience annual nominal GDP growth rates that are 0.1, 0.5 and 0.9 percentage point (respectively) above what is required for revenues to keep pace with growth in total spending in 2014-2038.

The unweighted average projected shortfall between required nominal GDP growth and the base case projections for nominal GDP growth in the remaining provinces is 0.7 percentage point in 2014-2038. The Northwest Territories are expected to exhibit the largest shortfall (1.8 percentage points), followed by Nova Scotia (1.6 percentage points), Alberta (1.3 percentage points), and Prince Edward Island (1.0 percentage point). For Alberta, Nova Scotia and Prince Edward Island, the projected shortfalls are primarily driven by above-average growth in nom-

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20 See Clavet *et al.*, 2014; Drummond, 2011; Drummond and Burleton, 2010; Dodge and Dion, 2011; Godbout *et al.*, 2007; and Godbout *et al.*, 2014.

inal per capita health spending (5.9 per cent, 6.1 per cent and 5.9 per cent per year, respectively), which will almost certainly have to be trimmed throughout the 2014-2038 period.

## Conclusion

The results of our baseline projections for nominal GDP growth based on recent trends in labour productivity, hours worked, participation rates, inflation, and working age population growth indicate that, by and large, provincial/territorial governments are able to meet the test of balancing revenue growth with growth in expenditures on public services over the 2014-2038 period, but only provided that the latter is unchanged in real per capita terms (i.e. grows in line with inflation and the population) and that the provinces return to fiscal balance quickly.<sup>21</sup>

In particular, the nominal GDP growth rates required for revenues to keep pace with growth in public spending are lower than the baseline projections for nominal GDP growth for almost every province and territory, indicating that almost all provincial/territorial governments are expected to be able to fund public expenditures that are constant in real per capita terms.

However, it may not be reasonable to assume that public spending will grow in line with inflation and population growth. We believe that there will be more spending pressure than that consistent with keeping real per capita spending constant. Historically, we have consistently seen significant real enrichment in health spending. Furthermore, the ageing of the population alone is expected to add considerably to growth in

health care costs. Consequently, to maintain health care quality there will be additional cost pressures in addition to those associated with inflation and population growth.

To recognize these real demand pressures, we developed an alternative fiscal scenario, which assumes that health spending will grow at the historical per capita nominal rate observed between 2000-2014. With this higher rate of growth for health expenditure, revenues must grow faster than the rate of inflation and population growth for provincial/territorial governments to balance their budgets.

Our research suggests that under this scenario almost every provincial/territorial government would be unable to maintain fiscal balance over the 2014-2038 period, unless they raise taxes, cut non-health expenditure programs in real per capita terms, manage health spending more efficiently, obtain more federal transfers, or are successful in accelerating economic growth through appropriate fiscal measures which improve Canada's productivity performance or increase total hours worked.

While addressing health care costs is undoubtedly an important part of the solution, we think the greatest potential to address this fiscal challenge lies in increasing Canada's productivity growth. The large gap in aggregate labour productivity between Canada and the United States, which has widened considerably since 2000, suggests that there exist significant opportunities for improving Canada's productivity performance by adopting best practices internationally (Drummond, Capeluck and Calver, 2015).

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21 One factor that the report does not explicitly discuss is the implications of the rising share of the labour force accounted for by Aboriginal Canadians. This is particularly relevant in Western Canada, especially in Manitoba and Saskatchewan. If the labour market performance of the Aboriginal population, both in terms of employment and productivity continues to be poor, then economic growth may be weaker than found in these projections. For a detailed analysis of the potential contribution of Aboriginal Canadians to productivity and output growth in Canada for the 2014-2036 period, see Calver (2015).

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