OFFICE OF THE PARLIAMENTARY BUDGET OFFICER

BUREAU DU DIRECTEUR PARLEMENTAIRE DU BUDGET

Fiscal Sustainability Report 2013

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The mandate of the Parliamentary Budget Officer (PBO) is to provide independent analysis to the Senate and to the House of Commons about the state of the nation's finances, the estimates of the government and trends in the national economy; and upon request from a committee or parliamentarian, to estimate the financial cost of any proposal for matters over which Parliament has jurisdiction.

This report provides PBO's assessment of the long-term sustainability of government finances for three government sub-sectors: the federal government; other levels of government consisting of provinces, territories, local, and aboriginal governments; and the Canada and Quebec Pension Plans. PBO will be providing an update of the medium-term fiscal outlook for the federal government in October 2013.

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Summary

The annual Fiscal Sustainability Report (FSR) of the Parliamentary Budget Officer (PBO) extends PBO's medium-term economic and fiscal outlook to provide a projection of current fiscal policy 75 years into the future to assess the implications of demographic and structural pressures on government financing.[1] FSR 2013 assesses the long-run sustainability of the federal government as well as an aggregated sector of other governments which includes provinces, territories, local, and aboriginal (PTLA) governments. FSR 2013 also includes a sustainability assessment of the Canada and Quebec Pension Plans (CPP and QPP).

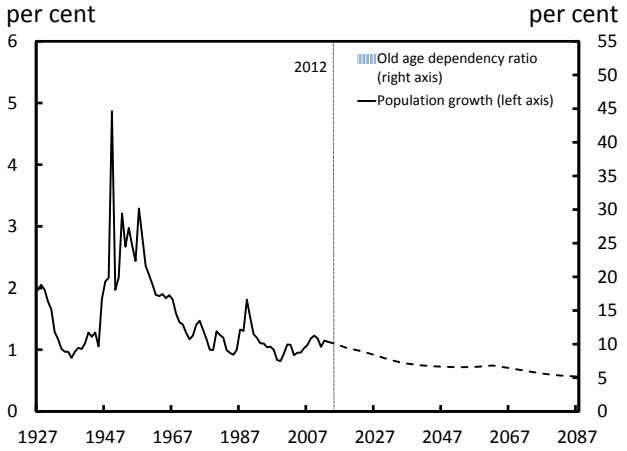
Long-term economic and fiscal projections and fiscal sustainability assessments are useful for analyzing trends in the national economy and government finances. Both the International Monetary Fund (IMF) and the Organization for Economic Cooperation and Development (OECD) recommend that their members provide long-term fiscal sustainability reports on a regular basis. According to the OECD, such reports "offer invaluable signposts to help current governments to respond to known fiscal pressures and risks in a gradual manner, earlier rather than later, and help future governments avoid being forced to adopt sudden policy changes."[2]

PBO's annual Fiscal Sustainability Reports, along with recommendations from the Auditor General, arguably "helped to motivate the government of Canada to fulfill its 2007 promise and to produce its own fiscal sustainability report,"[3] which it released in October 2012 and committed to update annually.[4] PBO's Fiscal Sustainability Reports offer not only a comparison to Finance Canada's long-term federal fiscal projections, but also a broader sustainability assessment including PTLA governments and public pensions which recognizes the collective policies and interactions between levels of Canadian government.[5]

The demographic structure of the Canadian population is one of the key drivers of PBO's long-term economic and fiscal projections. The ratio of Canada's population 65 years of age and over relative to the population 15 to 64 years of age (the old age dependency ratio) will rise dramatically due to the continued decline in the total fertility rate observed since the late 1950s and increases in life expectancies observed over the last 80 years (Summary Figure 1).

Summary Figure 1

Population growth and the old age dependency ratio, 1927 to 2087



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.
Note: Growth rates prior to 1971 are taken from CANSIM table 051-0026.

[1] PBO's medium-term outlook is published twice annually in the Economic and Fiscal Outlook (EFO) and EFO Update. For details of the latest EFO, see Parliamentary Budget Officer (2013b). *Economic and Fiscal Outlook*. http://www.pbo-dpb.gc.ca/files/files/EFO_April_2013.pdf.

[2] Organisation for Economic Co-operation and Development (2009). *The Benefits of Long-term Fiscal Projections*. www.oecd.org/governance/budgetingandpublicexpenditures/43836144.pdf.

[3] International Monetary Fund (2013b). *Case Studies of Fiscal Councils—Functions and Impact*. p. 17. http://www.imf.org/external/np/pp/eng/2013/071613a.pdf.

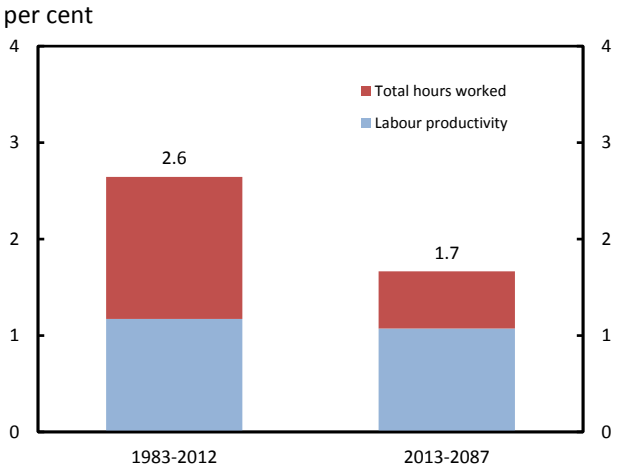
[4] Department of Finance Canada (2012b). *Economic and Fiscal Implications of Canada's Aging Population*. http://www.fin.gc.ca/pub/eficap-rebvpc/eficap-rebvpc-eng.pdf.

[5] For a comparison of long-term assessment methodologies, see PBO (2013a). *Comparing the Federal Fiscal Sustainability Analyses of PBO and Finance Canada.* http://www.pbo-dpb.gc.ca/files/files/FSR_comparison_2012.pdf.

The expected change in the composition and growth of the population will lead to slower growth in the labour force and total hours worked. Growth in potential real gross domestic product (real GDP) is equal to growth in labour input (total hours worked) plus labour productivity growth. Consistent with past FSR reports, PBO assumes that labour productivity growth will return to its long-term historical average of about 1.1 per cent per year. This, together with the weaker growth in labour input, will lead to projected average real GDP growth of 1.7 per cent over 2013-2087, down significantly from the average growth of 2.6 per cent over the past 30 years (Summary Figure 2).

Summary Figure 2

Average annual real GDP growth



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

An ageing population will have many public finance consequences. Weaker growth of nominal GDP—the broadest measure of the tax base—slows the growth of revenues of all levels of government. At the same time, population ageing raises spending pressure on government programs whose benefits go mainly to those in older age groups, such as health care, elderly benefits, and public pension programs. The age-related increase in spending is greater than the downward pressure on spending programs for younger age groups, such as education, children's benefits, and social assistance programs.

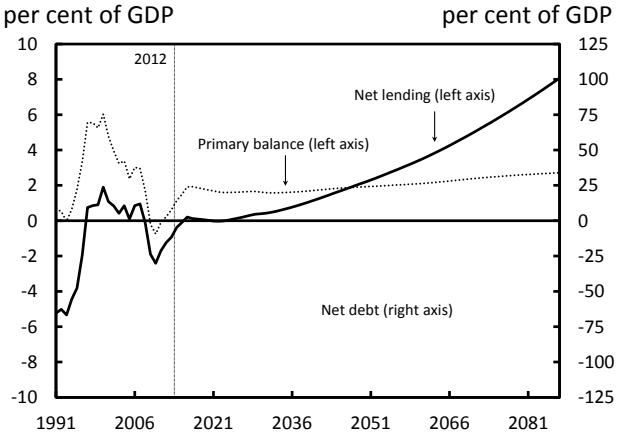
Fiscal sustainability assessment

To assess the financial sustainability of governments, PBO projects the flows of revenues and expenses over the long-term, incorporating pressures from population ageing and other economic and policy considerations. PBO defines a government's fiscal structure as sustainable if the financial flows evolve so that the ratio of government debt to GDP returns to its current level over a 75-year horizon.

Using the latest fiscal and economic data and Economic Action Plan 2013 (EAP 2013) measures, PBO estimates that the federal finances are sustainable.[6] The federal government's net debt as a share of GDP declines over the projection, reaching 27.8 per cent of GDP in 2021 and a net asset position in 2044 (Summary Figure 3). PBO's projection of net debt suggests federal debt (accumulated deficit) is on track to achieve the government's G20 commitment to a debt-to-GDP ratio of 25 per cent by 2021.[7]

Summary Figure 3

Federal government primary balance, net lending, and net debt, 1991 to 2087



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

[6] Department of Finance Canada (2013). *Economic Action Plan 2013*. http://www.budget.gc.ca/2013/doc/plan/budget2013-eng.pdf.

[7] See the 5 September, 2013 announcement, available at: http://www.pm.gc.ca/eng/media.asp?category=1&featureId=6&pageId=26&id=5653. PBO's long-term sustainability assessment projects the stock of net debt (liabilities less financial assets), while the 25 per cent target refers to the accumulated deficit. The accumulated deficit is equal to net debt less nonfinancial assets. Nonfinancial assets were equal to $67 billion, or 9.9 per cent of net debt in 2012.

PBO estimates that the federal government has fiscal room (a negative fiscal gap) of 1.3 per cent of GDP (or $24.8 billion) in 2013. This means that if the federal government reduces taxes, increases program spending, or a combination of both by an amount equivalent to 1.3 per cent of GDP in 2013 and allows the cost of the measures to grow with nominal GDP over the next 75 years, the net debt to GDP ratio will return to its current level of 37.4 per cent by 2087.[8]

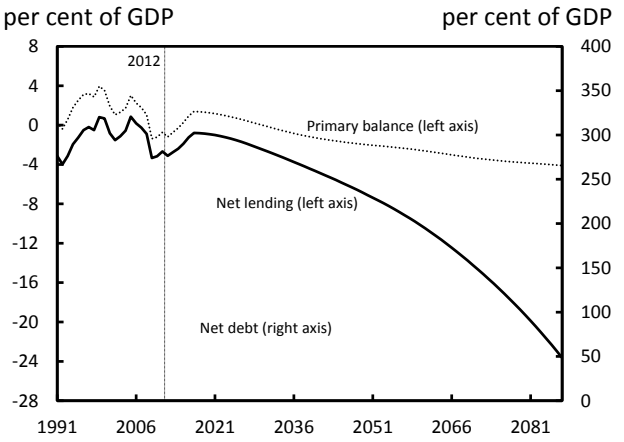
The federal fiscal structure has been transformed from unsustainable in 2011 to sustainable—with substantial fiscal room—largely through spending restraint and reform of the Canada Health Transfer (CHT) escalator. However, the federal fiscal room created by the change in the CHT escalator has transferred the fiscal burden to provinces and territories and raised the fiscal gap of the PTLA sector under PBO's baseline spending assumptions.

PBO estimates that the debt path of other levels of government is not sustainable and will continue to rise, reaching 359.9 per cent of GDP by 2087 (Summary Figure 4). PTLA governments have a fiscal gap of 1.9 per cent of GDP and would have to increase revenues or reduce spending (or a combination of the two) by an amount equivalent to $36.2 billion in 2013 to ensure the ratio of net debt to GDP returns to its current level of 31.5 per cent in 75 years.

The fiscal gap measures the permanent action required in 2013 to stabilise the ratio of net debt to GDP; however, consolidation can be implemented gradually over a longer period. Delays will require greater adjustments the longer changes are postponed. PBO estimates that delaying fiscal actions by 5, 10, 20 and 30 years will raise the size of the 75-year PTLA fiscal gap to 2.2, 2.5, 3.3, and 4.6 per cent of GDP, respectively.

Summary Figure 4

Other levels of government primary balance and net debt, 1991 to 2087

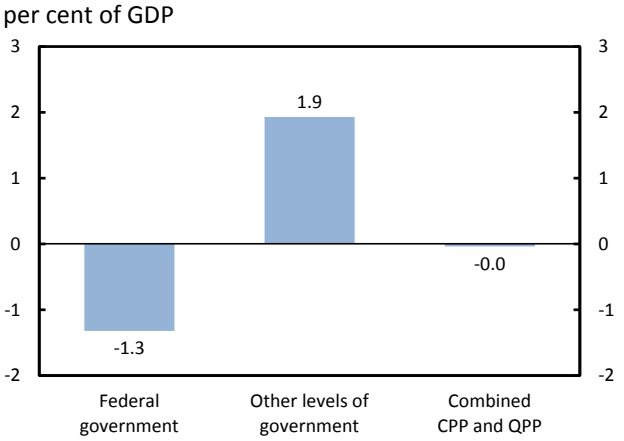


Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

The CPP and QPP are projected to be sustainable according to the same assessment criteria as the federal and PTLA governments. Fiscal gaps for all three government subsector accounts are given in Summary Figure 5.

Summary Figure 5

Fiscal gap estimates



Source: Office of the Parliamentary Budget Officer.

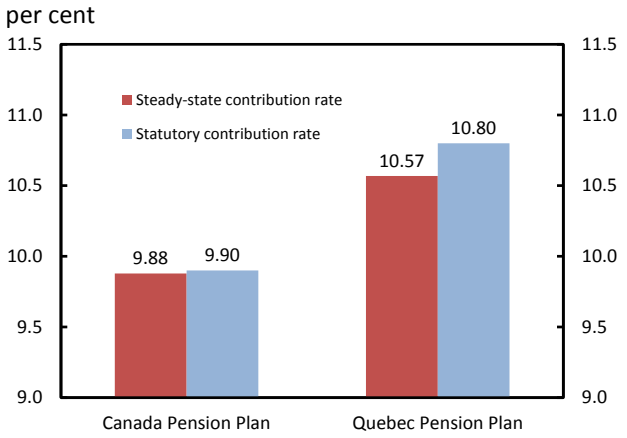
PBO also assesses the pension plans according to an alternative criteria which is comparable to government actuarial assessments—the steady state contribution rate. The steady state contribution rates ensure the asset-to-expenditure ratio at the end of the projection period is equal to the current level, using PBO's projection of

[8] Although PBO's baseline fiscal gap for each sector targets a return to the 2012 ratio of net debt to GDP (net assets to GDP for the CPP and QPP), this is not necessarily the preferred ratio. No consensus on an optimal debt ratio has emerged from research; however, Canada's total government net debt in 2012 was relatively low when compared across other advanced economies. See IMF (2013c). *Fiscal Monitor April 2013*. http://www.imf.org/external/pubs/ft/fm/2013/01/pdf/fm1301.pdf.

contributory earnings, expenditures, and rates of return. PBO estimates the steady state contribution rate for the CPP to be 9.88 per cent beginning in 2013, while the QPP steady state contribution rate is estimated to be 10.57 per cent. The statutory rates for the CPP and QPP are currently above the steady-state rates, meaning both plans are also sustainable by this criterion (Summary Figure 6).

Summary Figure 6

Statutory and steady-state contribution rates



Source: Office of the Parliamentary Budget Officer.
Note: The QPP statutory contribution rate increases from 9.9 per cent in 2011 to an ultimate rate of 10.8 per cent in 2017.

PBO is not recommending that contribution rates for the CPP and QPP be lowered from their legislated levels. PBO only provides these estimates as summary indicators of the sustainability of the plans.

Sensitivity analysis – key findings

To assess the sensitivity of PBO's fiscal gap and steady-state contribution rate estimates, alternative scenarios are considered based on different fiscal, demographic, and economic assumptions and projections. Based on the scenarios examined, PBO finds:

- The federal government has sustainable financing without changes to current policy, even under scenarios of more costly demographics, slower GDP growth, higher interest rates, or higher enrichment of elderly benefits (when considered individually). The federal government has fiscal room to increase spending, decrease revenues, or some combination of both under all sensitivity scenarios.
- Other levels of government have unsustainable financing even under the best case alternative scenarios. Even if growth in health care costs—the main driver of PTLA spending—is restricted to population ageing and income growth, other levels of government will continue to have an unsustainable debt position (a fiscal gap of 1.0 per cent of GDP). Worse, if health care cost growth cannot be reduced relative to recent history, provinces face a particularly daunting fiscal gap of 3.4 per cent of GDP.
- The CPP and QPP have sustainable financing under alternative scenarios with a younger population, higher GDP growth, and higher rates of return. The plans are most sensitive to demographics, and are both unsustainable under the higher cost older demographics scenario. The QPP will remain sustainable under the economic scenarios with lower GDP growth and a lower rate of return. The CPP will not be sustainable under conditions of lower growth and a lower rate of return.

Caveats

PBO's long-term projections are best viewed as illustrative "what if" scenarios that quantify the implications of leaving a government's current fiscal structure unchanged over long periods of time. As such, these scenarios should not be interpreted as predictions of the most likely outcomes.

Several important issues are beyond the scope of this report and have not been incorporated in the analysis. This report does not project assessments for individual provinces or territories; it does not suggest which fiscal actions should be taken or what a government's long-term debt-to-GDP objective should be; it does not capture interaction between government debt levels and economic activity; and it does not assess the implications for intergenerational equity.

1 Fiscal sustainability reporting

PBO has prepared long-term sustainability reports annually since 2010, according to its legislated mandate and OECD lessons for good practices of independent fiscal institutions which recommend periodic "computation of numerical long-term scenarios, based on prudent macroeconomic and demographic assumptions."[9] PBO's commitment to sustainability reporting places it among the majority of the growing number of independent fiscal councils, over 75 per cent of which provide long-term sustainability assessments.[10]

FSR 2013 assesses the long-run sustainability of the federal government as well as an aggregated sector of other governments which includes provinces, territories, local, and aboriginal governments (the PTLA sector). FSR 2013 also includes a sustainability assessment of the Canada Pension Plan (CPP) and Quebec Pension Plan (QPP).

PBO's sustainability assessment is calculated over a 75-year projection using the fiscal gap. The fiscal gap is the permanent change in the path of the government's primary balance which would need to be made immediately so that government debt as a share of GDP is the same at the beginning and end of the projection.[11] The change in the primary balance could come from increasing revenues, reducing non-interest spending, or a combination of both. PBO's assessment of the CPP and QPP determines whether the legislated contribution rates ensure the asset-to-expenditure ratio at the end of the projection is equal to its current value.

The paths of the economy and government finances are uncertain. PBO's long-term projections are not a prediction of the most likely outcome, but rather a formal analytical framework that extends revenues and spending so PBO can assess the long-term fiscal sustainability of current government policy and the implications of demographic dynamics.

The ageing of Canada's population will significantly affect the economy and public finances. The growth of the economy and tax base will slow as the post-war birth boom cohort moves out of the labour force. Program expenses will increase as a share of GDP with growth in the segment of the population that receives retirement and elderly benefits and consumes the greatest value per capita of health care services. These demographic effects outweigh the boosts to the public finances from reductions in spending on youth and working age programs such as children's benefits, education spending, and social benefits. By projecting these trends in a formal sustainability framework, PBO can quantify spending challenges so that preventative action can be taken early to avoid sudden and dramatic policy changes in the future. PBO does not recommend or comment on specific corrective policies.

Independent analysis of fiscal sustainability can complement official estimates. A comprehensive survey by the IMF on the influence of fiscal councils on fiscal performance suggests independent estimates such as PBO's can reduce the forecast errors and bias of government projections, and "raise public awareness about the consequences of certain policy paths".[12]

In October 2012, the Department of Finance Canada released a report on the impact of population ageing on federal finances, which it committed to update annually. Although there are differences in the coverage and the accounting frameworks of the two reports, PBO's long-term sustainability analysis can provide a valuable comparison of assumptions and projections. Finance Canada's assumptions and results for the federal government closely matched those in PBO's FSR 2012.[13]

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[9] Kopits, George (2011). Independent Fiscal Institutions: Developing Good Practices. *OECD Journal on Budgeting*, Vol. 11/3. http://dx.doi.org/10.1787/budget-11-5kg3pdgcpn42.

[10] IMF (2013d). *The Functions and Impact of Fiscal Councils*. http://www.imf.org/external/np/pp/eng/2013/071613.pdf. From discussions with IMF staff, the fiscal council database lists 29 independent fiscal councils as of January 2013, 22 of which assess long-term fiscal sustainability.

[11] For PBO's calculation of fiscal gaps, the primary balance is defined as revenues less non-interest spending, where non-interest spending is gross expenses (i.e. expenses excluding consumption of fixed capital) plus the acquisition of nonfinancial capital.

[12] IMF (2013d), p. 7.

[13] PBO (2013a).

The FSR 2013 fiscal gap results are only roughly comparable to previous projections due to recent changes to the National Accounts framework (see Box 1). Additionally, while previous FSRs presented trends back to 1961, consistent historical data is now available only back to 1981.

2 Demographics

Canada, like most industrialized countries, is undergoing a demographic transition that will have profound impacts on the labour market and economy. The ratio of Canada's population that is 65 years of age and over relative to the population 15 to 64 years of age will rise dramatically due to the decline in the total fertility rate observed since the late 1950s and increases in life expectancies observed over the last 80 years. This transition will intensify over the next 20 years as the baby boomers—those born between 1946 and 1964—make the transition into their retirement years.

The demographic structure of the Canadian population is one of the key drivers of PBO's long-term economic and fiscal projection. PBO's baseline population projection presented in this section was produced by Statistics Canada's Demography Division using assumptions provided by PBO, which are consistent with Statistics Canada (2010) until 2061.[14] Specifically, PBO's demographic projection is driven by three key assumptions regarding the total fertility rate, life expectancy at birth, and the immigration rate.

Total fertility rate

The total fertility rate, defined as the number of children born per woman of child bearing age, peaked at 3.9 children per woman in 1959 and has declined significantly since then, remaining well

[14] This approach is the same as that used in FSR 2011 and FSR 2012, but updated to include Statistics Canada's current population estimates for 2012. Beyond 2012, single year age and sex groups are extrapolated using Statistics Canada (2010) imputed growth rates. Annex A provides a summary of the demographic projections in FSR 2012 and FSR 2013.

Box 1: Revisions to the national accounting framework since FSR 2012

Fiscal flows and stocks in FSR 2012 and earlier were calculated using Government Financial Statistics Manual 2001 (GFS2001) classifications from Statistics Canada GFS series and PBO calculations consistent with the Canadian System of National Accounts 1997 (CSNA97).[a] In October 2012, Statistics Canada updated the Canadian System of National Accounts and Canadian GFS data to the CSNA2012 national accounting system.[b] FSR 2013 has been prepared according to the updated CSNA2012 framework.

The new framework resulted in major historical revisions to GDP and government sector accounts in the initial release of historical data as well as in subsequent quarterly releases.[c]

While the new system of accounts will improve sustainability calculations and international comparisons in the future, comparative historical analysis in FSR 2013 is limited. Consequently, results in FSR 2013 are not directly comparable to previous FSR reports.

The table below shows a rough indication of the magnitude of the changes for the federal fiscal aggregates. Both revenues and program spending are lower as a share of GDP in the revised accounts, and consumption of fixed capital and nonfinancial capital acquisition have increased. These changes result in lower historical net lending and lower net financial liabilities as a share of GDP. Although the quantitative impact of the changes to the accounts are small, they can significantly affect the sustainability assessment over long horizons.

10-year average changes to federal financial flows and the stock of net financial liabilities, 2002-2011

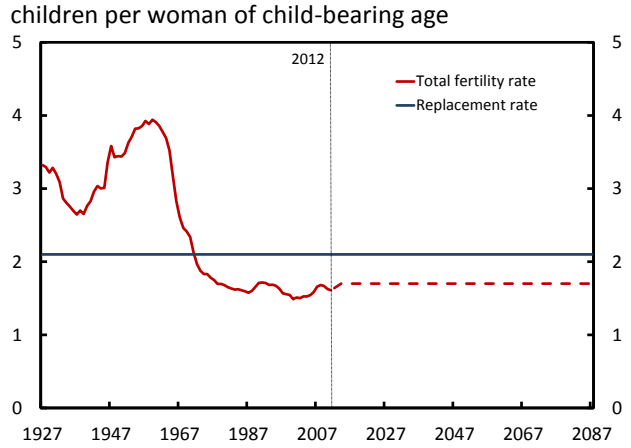
(per cent of GDP)	CSNA 97	CSNA 2012
Revenues	15.3	15.0
Non-interest spending	13.5	13.2
Capital consumption	0.3	0.5
Nonfinancial capital acquisition	0.3	0.5
Net lending	-0.4	-0.3
Net financial liabilities	37.7	37.1

[a] CSNA97 is in turn based on the United Nations SNA 1993.
[b] CSNA2012 is in turn based on the United Nations SNA 2008.
[c] For an analysis of the impact of the initial transition and subsequent revisions, see: http://www.statcan.gc.ca/pub/13-605-x/2013003/article/11816-eng.htm and http://www.statcan.gc.ca/pub/13-605-x/2012002/article/11718-eng.htm.

below the replacement rate of 2.1 children per woman since the 1970s (Figure 2-1). Over the projection horizon, PBO assumes that the fertility rate will return to 1.7 children per woman of child bearing age, which is consistent with the medium scenario in Statistics Canada (2010).

Figure 2-1

Total fertility rate, 1927 to 2087



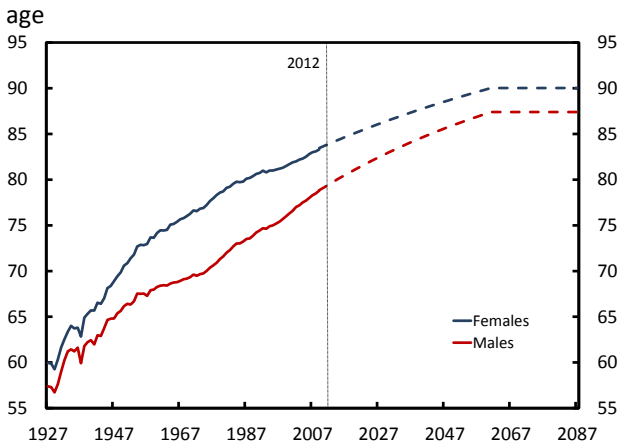
Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Life expectancy at birth

Life expectancy at birth increased significantly over the last 80 years, rising from approximately 58 years in 1926 to 81.1 years in 2009—an improvement of 23 years (Figure 2-2). Women have always had higher average life expectancies at birth relative to males, although the gap between the two sexes has varied over time. For example, a woman born in 1926 could be expected to live approximately 2.3 years longer than a man born in the same year. While life expectancies of both sexes improved over the next 50 years, those of females rose at a faster rate than those of males and a life expectancy gap of 7.4 years opened by 1978. Life expectancies of both females and males continued to improve from 1978 to 2009, but male life expectancies increased at a faster rate than those of females, narrowing the gap between female and male life expectancies to 4.5 years.

Figure 2-2

Life expectancy at birth, 1927 to 2087



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

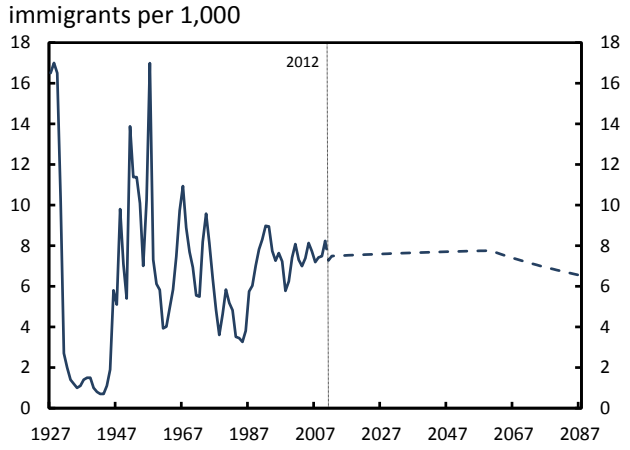
Going forward, PBO uses assumptions consistent with the medium scenario in Statistics Canada (2010). Life expectancies at birth are projected to continue to improve for both males and females until 2061, after which PBO assumes that they will remain stable until 2087. Specifically, life expectancy at birth for males and females is projected to improve to 87.4 years and 90.0 years, respectively.

Immigration rate

The third assumption affecting PBO's population projection is the rate of immigration to Canada. The immigration rate has fluctuated significantly since 1926, reflecting different immigration policies over time (Figure 2-3). Since the mid-1990s, immigration rates have been stable, averaging approximately 7.3 immigrants per 1,000 persons in the population. Going forward, PBO assumes that the immigration rate will average 7.6 per 1,000 persons from 2012 to 2061, after which the level of immigration is assumed to remain constant, implying a falling immigration rate beyond 2061.

Figure 2-3

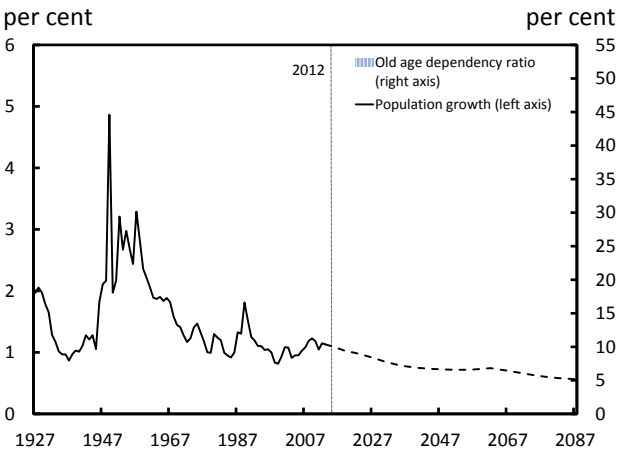
Immigration rate, 1927 to 2087



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Figure 2-4

Population growth and the old age dependency ratio, 1927 to 2087



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.
Note: Growth rates prior to 1971 are taken from CANSIM table 051-0026.

The composition and size of the Canadian population

Given the three assumptions discussed above, a detailed age and sex projection of the Canadian population has been produced. Figure 2-4 shows that population growth is expected to decline steadily throughout the projection horizon and that the old age dependency ratio (the number of individuals 65 years of age and over divided by the population between 15 to 64 years of age) is projected to increase significantly over the coming decades. The old age dependency ratio is projected to increase by 7.9 percentage points, from 21.6 per cent in 2012 to 29.5 per cent by 2022, which is only slightly less than the total increase observed over the last four decades. After 2022 the pace of increase is expected to gain momentum, pushing the dependency ratio to 37.9 per cent by 2032. Growth slows after 2032 but the ratio continues to rise, reaching 43.4 per cent by 2062 and 44.3 per cent by 2087. Said differently, in 1972 there were approximately 7.8 persons between the ages of 15 to 64 for every individual 65 years of age and over (i.e. the traditional retirement age group). By 2012 this ratio had fallen to 4.6 persons and is projected to continue falling, stabilizing at around 2.3 persons after 2060.

3 Long-term economic projection

The second component of PBO's fiscal projection is its economic outlook. Over the 2013 to 2017 period the economic projection is taken from PBO's April 2013 Economic and Fiscal Outlook (EFO), updated for recent economic data. Beyond 2017, the economic projection is based on PBO's current estimate of potential GDP growth[15] and long-term assumptions for Consumer Price Index (CPI) inflation, GDP inflation, the 3-month Treasury bill rate, and the 10-year Government of Canada bond rate.[16] Annex A provides a summary of the long-term economic projections in FSR 2013 and FSR 2012.

PBO's April 2013 EFO provides a natural starting point for the long-term projection since, based on

[15] Following the April 2013 EFO, PBO updated the estimate of potential GDP to reflect 2012 productivity and labour force data.

[16] Over the long term, PBO assumes CPI and GDP inflation are at 2 per cent annually, consistent with the Bank of Canada's target inflation rate. The 3-month treasury bill rate and the 10-year Government of Canada bond rate are assumed to be 4.2 and 5.3 per cent respectively. These assumptions are consistent with inflation-adjusted interest rates of 2.2 and 3.3 per cent respectively, which are equal to the average ex post real interest rates observed over the 1993 to 2007 period (this period was chosen to reflect the current monetary policy regime, but also to abstract from the recent financial crisis).

the April 2013 EFO, the output gap (i.e., the level of real GDP relative to potential GDP) is closed by 2017 and therefore beyond the medium term, real GDP should grow, on average, at its potential growth rate. While it is inevitable that the economy will be subject to both positive and negative shocks going forward, the economy can reasonably be expected to return to its potential level following such shocks. As a result, average real GDP growth should equal average potential GDP growth over a long horizon, which is consistent with simply assuming that real GDP will grow at the same rate as potential GDP over the long term.

Potential GDP

PBO's projection of real GDP growth beyond 2017 is based on its estimate of potential GDP growth.[17] Potential GDP is the amount of output that an economy can produce when capital, labour and technology are at their respective trends. PBO's measure of potential GDP is calculated from the supply side of the economy using the following identity:

$$Y = L \cdot (\frac{Y}{L})$$

This identity states that real GDP (Y) is equal to labour input (L) multiplied by labour productivity (Y/L). PBO projects a trend for labour input and labour productivity separately and then combines their respective trends to construct its measure of potential GDP.

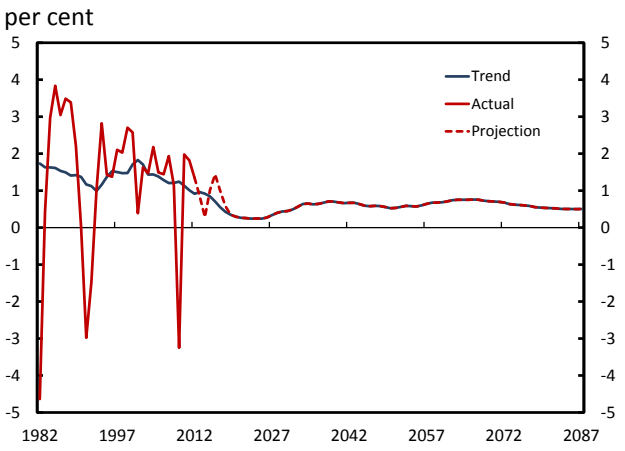
Labour input

Labour input (i.e., total hours worked) is determined by the size of the working age population, the aggregate employment rate, and the average weekly number of hours worked by an employed individual in a given week. Each component is projected separately in PBO's projection in order to capture the different factors affecting their respective profiles (the projection of each component of labour input is discussed in detail in Annex B).

In the near term, labour input growth is projected to remain volatile, being driven primarily by the economic cycle. However, beyond 2017 labour input growth is projected to be lower than over history due to the slowdown in the growth of the working age population and the projected decline in the aggregate employment rate (Figure 3-1). Specifically, labour input growth is projected to fall from 1.3 per cent in 2012 to 0.3 per cent in 2022, but is then projected to average 0.6 per cent over the remainder of the projection horizon.

Figure 3-1

Labour input growth, 1982 to 2087



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Labour productivity

Growth in labour productivity, measured as GDP per hour worked, reflects capital deepening (i.e., increases in capital relative to labour) as well as technological improvements (typically referred to as total factor productivity).

Labour productivity growth has fluctuated significantly over the last 30 years, averaging 1.1 per cent since 1982. However, since 2002 Canada's labour productivity performance has been particularly weak, having averaged only 0.7 per cent, coinciding with a period of relative strength in the Canadian labour market.

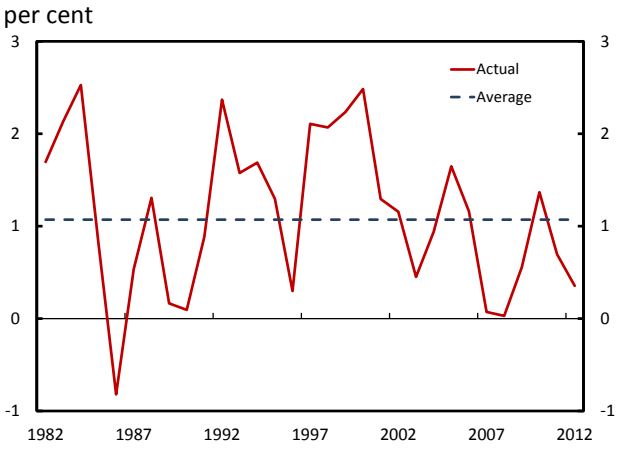
Beyond 2017, PBO has assumed that labour productivity growth will return to 1.1 per cent—the

[17] For additional detail on the methodology and assumptions used to construct estimates of potential GDP, see PBO (2010a). *Estimating Potential GDP and the Government's Structural Budget Balance*. http://www.pbo-dpb.gc.ca/files/files/Publications/Potential_CABB_EN.pdf.

average rate observed since 1982 (Figure 3-2). PBO believes that this is a reasonable assumption given Canada's recent productivity performance. Although some research suggests that labour productivity growth should rise due to capital deepening and increased incentives for younger workers to invest in human capital, other research finds that labour productivity declines across older age groups, suggesting that population ageing will put downward pressure on productivity.[18] Therefore, consistent with FSR 2010, FSR 2011 and FSR 2012, PBO has taken a neutral assumption with respect to the impact of population ageing on labour productivity growth by assuming that labour productivity growth returns to its long-term historical average.

Figure 3-2

Labour productivity growth, 1982 to 2012



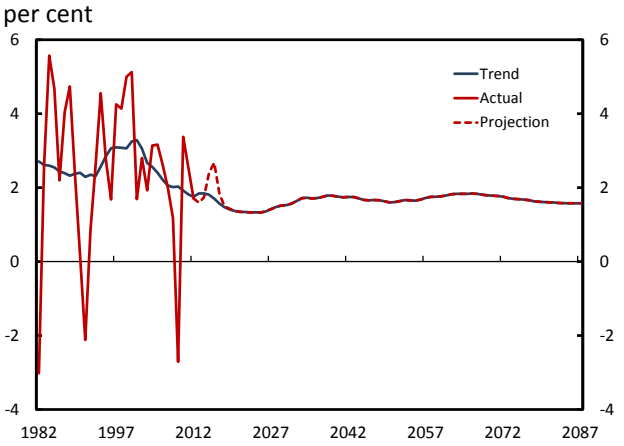
Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Real GDP growth

Real GDP is expected to grow faster than potential GDP through 2017 as the output gap closes (Figure 3-3). Over the long term, real GDP is projected to grow at the same rate as potential GDP, which declines over the projection horizon in line with the decline in labour input growth. More precisely, real GDP growth is projected to fall from 2.7 per cent, on average, over the last 20 years to average growth of only 1.6 per cent over the next two decades.

Figure 3-3

Real GDP growth, 1982 to 2087



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Real GDP per capita

Real GDP per capita is one of the most commonly used measures of increases in living standards, and its growth is used in PBO's analysis to enrich elderly benefits in alternative sensitivity scenarios. Real GDP per capita can be expressed as:

$$\frac{Y}{POP} = \frac{L}{POP} \cdot \frac{Y}{L}$$

where Y is real GDP, L is labour input, and POP is the total population. This identity shows that living standards are driven by two factors: the fraction of the population that is employed in the production process (abstracting from movements in average hours worked) and the efficiency with which those workers are able to produce goods and services (i.e., labour productivity).

Over the last 30 years, growth in real GDP per capita has exceeded growth in labour productivity. This has occurred because labour input growth exceeded growth in the total population thus contributing positively to the growth in real GDP per capita. This stronger labour input growth relative to total population growth was the result of two factors. First, growth of the working age population, those 15 years of age and over, exceeded total population growth throughout

[18] For a review of the research on the effects of ageing on labour productivity see Beach, C.M. (2008). *Canada's Aging Workforce: Participation, Productivity, and Living Standards.* Proceedings of a conference held by the Bank of Canada. http://www.bankofcanada.ca/wp-content/uploads/2010/09/beach.pdf.

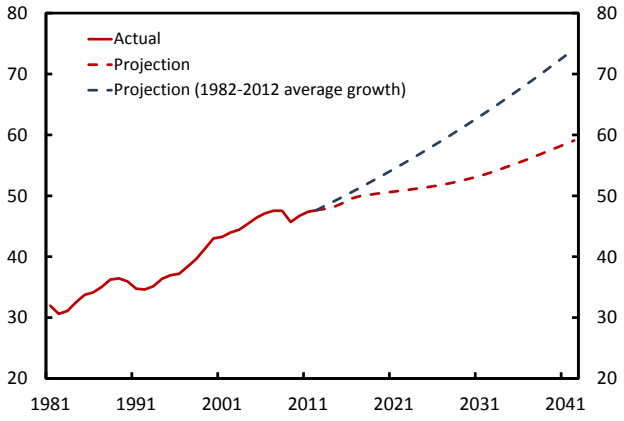
most of this period. Second, the aggregate employment rate trended upwards throughout this period as female participation in the labour market increased significantly. These two factors were partially offset by the trend decline in average hours worked throughout this period.

Going forward, PBO's long-term projection suggests that growth in real GDP per capita will fall significantly over the next 30 years. Real GDP per capita grew by 1.5 per cent annually, on average, since 1983, but is projected to grow only 0.7 per cent annually from 2013 to 2042. The decline is being driven by the relative slowdown in labour input growth. The decline in the aggregate employment rate stemming from population ageing will put downward pressure on the fraction of the population that is involved in market production and consequently on real GDP per capita. As the result of an ageing population, real GDP per capita in 2042 is projected to be nearly 19.1 per cent (nearly $14,000) less than if real GDP per capita were to grow at the same rate it did over the last 30 years (Figure 3-4).

Figure 3-4

Real GDP per capita, 1981 to 2042

thousands, chained 2007 dollars



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

4 Federal government operations

Further to the impact on the economy described above, Canada's changing demographics will significantly affect government spending and the government's ability to finance its operations. Costs of health care and benefits which are used intensively by older cohorts will rise, while growth in the tax base will slow as the growth of the labour force and economic output slows.

The following three sections describe PBO's projections of the revenues and program spending of Canada's governments given anticipated demographics. Federal fiscal aggregates are discussed in the remainder of this section. Section 5 describes the financial flows aggregated in the other levels of government sector consisting of the provincial, territorial, local and aboriginal governments, and Section 6 presents the projections of the CPP and QPP. A summary of fiscal projections from FSR 2013 and FSR 2012 is provided in Annex C.

For the federal government and other levels of government, these flows—along with interest payments on the public debt—will form the government's net lending, which will contribute to or subtract from net debt, the path of which will determine whether or not government finances are sustainable. For the CPP and QPP, sustainability is assessed by projecting asset accumulation relative to planned benefits and administration expenses and determining the steady-state contribution rate. Sustainability calculations for all government sectors are presented in Section 7.

Historical revenues and expenses data are from the CSNA2012 current and capital accounts for General Government, which are consistent with the GFS2001 framework.[19] The projection over 2013-2017 uses PBO's medium-term framework from the April 2013 EFO, updated with an additional quarter of national economic accounts data and fiscal monitor results. The projection of health spending by other levels of government is an exception, which instead uses data from the Canadian Institute for Health Information (CIHI), as spending on health is not given as a separate category in the national accounts.

[19] Statistics Canada uses CSNA2012 national accounts to produce GFS statistics under a temporary framework until GFS statistics are published in 2014.

Federal policy assumptions and new measures since FSR 2012

PBO projects financial flows under a current policy framework based on announced policies and current and historical ratios of revenue and spending in the economy.[20] Where policies are not yet in place or set to expire, PBO assumes that established programs are likely to persist.

EAP 2013 measures were discussed in the April 2013 EFO and are reflected in the medium-term fiscal outlook. Implications to the long-term projections were minor relative to EAP 2012, with program spending in 2017-18 reduced by $0.5 billion (new spending of $1.7 billion offset by $2.2 billion of reductions to direct program expenses) and a $2.1 billion increase in revenues from tax compliance programs, closing tax loopholes, and changes to the General Preferential Tariff regime. The net fiscal impact increased the primary balance by $2.7 billion in 2017-18.[21]

Federal government revenues

Federal government revenues consist of taxes on income (PIT, CIT, and non-residents income tax), taxes on consumption (GST and the federal allocation of HST, excise taxes and duties, and taxes on imports), EI premiums, sales of goods and services, and capital transfers.

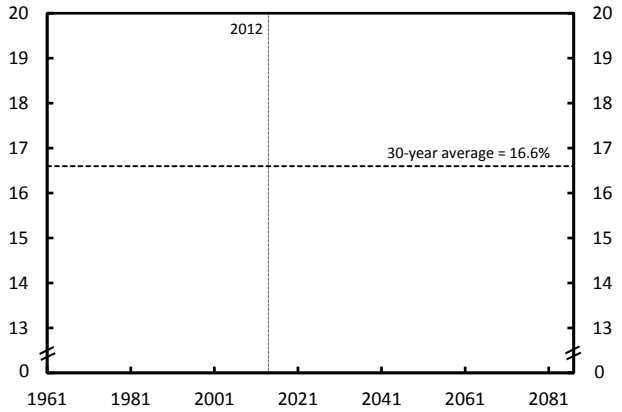
PBO projects revenues will recover over the medium term as the output gap closes, from 13.9 per cent of GDP in 2012, peaking at 14.6 per cent of GDP in 2016 before decreasing to 14.5 per cent in 2017 with a reduction in the EI premium rate from $2.03 to $1.62 triggered by the balancing of the EI operating account.

PBO projects revenues beyond 2017 by assuming the tax burden will remain a constant 14.5 per cent of GDP (Figure 4-1). This tax burden is well below the 30-year historical average of 16.6 per cent of GDP.

Figure 4-1

Federal revenues, 1961 to 2087

per cent of GDP



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.
Note: Revenues prior to 1981 are shown using historical CSNA97 shares of GDP.

Maintaining a constant tax burden requires active management. For example, under the progressive personal income tax system the share of revenues would increase as a share of GDP as real incomes increase (statutory thresholds and personal allowances are indexed to inflation, rather than earnings). PBO's implicit assumption is that PIT rates would be reduced, thresholds increased with earnings, or the tax mix would be adjusted in other ways to maintain a constant relative tax burden. This assumption is a popular treatment of revenues in the long-term projections of fiscal councils.[22]

Federal government program spending

Federal program spending includes transfers to persons, transfers to other levels of government, and direct program expenses. For fiscal sustainability analysis and the calculation of the fiscal gap, program spending is broadened to non-interest total expenditure, which is expenses on a

[20] FSR 2013 includes policy measures announced as of September 1, 2013. Notably, the analysis excludes the recent announcement of a three-year freeze of EI premium rates: http://www.fin.gc.ca/n13/13-114-eng.asp. The freeze will be assessed in PBO's 2013 EFO Update.

[21] The given impact of budget measures is on a public accounts basis. The medium term projection including budget measures is then converted to the CSNA2012 accounting system using known accounting differences and a statistical discrepancy.

[22] For examples, see Office for Budget Responsibility (2013). *Fiscal Sustainability Report.* http://cdn.budgetresponsibility.independent.gov.uk/2013-FSR_OBR_web.pdf or Congressional Budget Office (2012). *The 2012 Long-Term Budget Outlook.* http://www.cbo.gov/sites/default/files/cbofiles/attachments/06-05-Long-Term_Budget_Outlook_2.pdf.

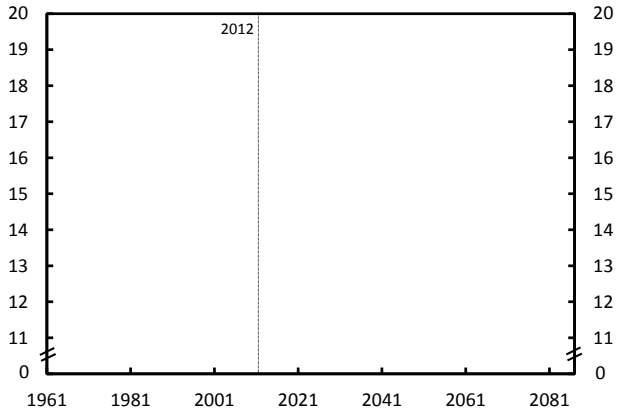
gross basis (i.e. expenses excluding consumption of fixed capital) and including the acquisition of nonfinancial capital.

In the aggregate, the projected ratio of federal program spending to GDP peaks at 12.9 per cent in 2032, declining afterward as the baby boom cohort moves past its life expectancy and as GDP growth surpasses spending growth in programs which are not fully indexed to growth in the economy (Figure 4-2).

Figure 4-2

Federal program spending, 1961 to 2087

per cent of GDP



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.
Notes: Spending prior to 1981 is shown using historical CSNA97 shares of GDP.

To model long-term program spending, PBO projects each category separately so that the effects of demographics on the eligible populations, program enrichment, and cost growth can be implemented in the framework. These spending categories are discussed below.

Elderly benefits

PBO projects old age security (OAS), guaranteed income supplement (GIS), and the allowances (spousal Allowance and Allowance for the Survivor) by growing benefits at the end of the medium term with the projected eligible population and projected average benefit payments. The eligible population is those aged 65 and above until 2023, after which a legislated gradual escalation of the age of eligibility increases the age to 67 over the period 2023-2029. The change to the eligible population was introduced in EAP 2012[23] and previously assessed by PBO.[24]

In previous FSRs, baseline average benefit payments were indexed to CPI inflation and were assumed also to be enriched over the long-term by half the growth in real GDP per capita, i.e., benefits would partially track increases in real per capita incomes. In FSR 2013, the baseline projection assumes no enrichment related to earnings or real GDP growth per capita, i.e. average benefit payments are indexed only to PBO's projection of CPI inflation. This treatment of elderly benefits enrichment is more consistent with PBO's baseline assumptions for other transfers, which maintain policies unchanged over the projection. It is also consistent with the enrichment assumption in Finance Canada (2012b). Alternative elderly benefits enrichment scenarios—including the enrichment assumption used in past FSRs—are provided in Section 8.

The change in the age of eligibility is responsible for a temporary decline in spending on elderly benefits as a share of GDP in 2023, which expands again to a maximum of 2.8 per cent of GDP in 2033 (Figure 4-3). Elderly benefits spending declines as a share of GDP beginning in 2034 as the high birth rate cohorts reach their life expectancy and GDP growth exceeds growth in baseline benefits.

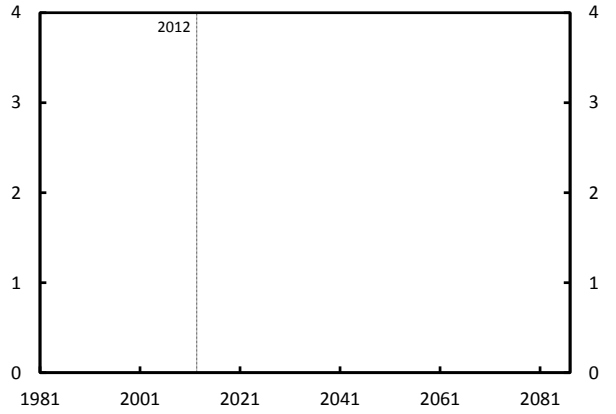
[23] Department of Finance Canada (2012). *Economic Action Plan 2012*. http://www.budget.gc.ca/2012/plan/pdf/Plan2012-eng.pdf.

[24] See PBO (2012a). *Federal Fiscal Sustainability and Elderly Benefits.* http://pbo-dpb.gc.ca/files/files/Publications/Sustainability_OAS.pdf and PBO (2012b). *Fiscal Sustainability Report 2012*. http://www.pbo-dpb.gc.ca/files/files/FSR_2012.pdf.

Figure 4-3

Elderly benefits, 1981 to 2087

per cent of GDP



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

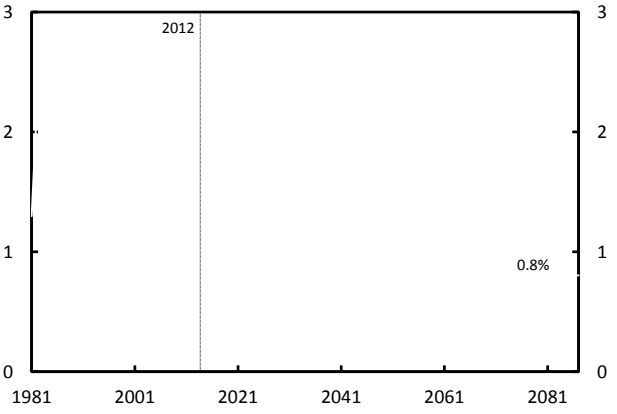
Employment Insurance

Employment Insurance (EI) benefits are projected in line with average wages and the number of beneficiaries, which is assumed to grow with the labour force.[25] Because average wages are tied to labour productivity (which is assumed to stay constant over the long term), and potential GDP grows with labour productivity and labour input, EI benefits remain a constant 0.8 per cent of GDP over the long term (Figure 4-4).

Figure 4-4

Employment Insurance benefits, 1981 to 2087

per cent of GDP



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

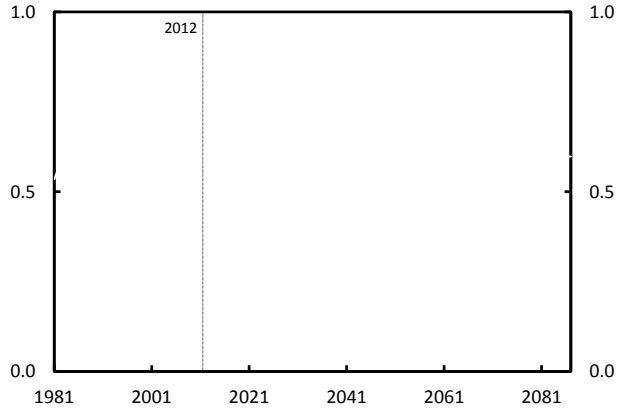
Children's benefits

PBO grows children's benefits (Canada Child Tax Benefit and Universal Child Care Benefits) with nominal GDP and the share of the population under 18 years of age. The decline of the population under 18 over the projection reduces spending marginally from 0.7 per cent of GDP in 2012 to 0.6 per cent in 2087 (Figure 4-5).

Figure 4-5

Children's benefits, 1981 to 2087

per cent of GDP



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Transfers to other levels of government

Transfers to PTLA governments are a major expense of the federal government, representing 30.7 per cent of non-interest spending in 2012. Federal transfers to provinces include the Canada Health Transfer (CHT), the Canada Social Transfer (CST), the Equalization program, Territorial Formula Financing, offshore accords, the Gas Tax Fund, and other transfers.[26]

Most transfers are allocated and escalated by established formulas which were last reformed in EAP 2012.[27] The most significant change was to the CHT escalator, which was announced in 2011

[25] This approach assumes that the share of wages and salaries in GDP remains stable over the long-term projection horizon.

[26] The CSNA2012 sequence of accounts classification of transfers to other levels of government includes transfers to provinces which are listed as direct program expenses in the public accounts (rather than Major Transfers to Other Levels of Government). The difference between CSNA2012 transfers to other levels of government and public accounts Major Transfers to Other Levels of Government was $19.3 billion in 2012.

[27] EAP 2013 proposed changes to the Canada Job Grant which would not affect levels of federal spending if implemented.

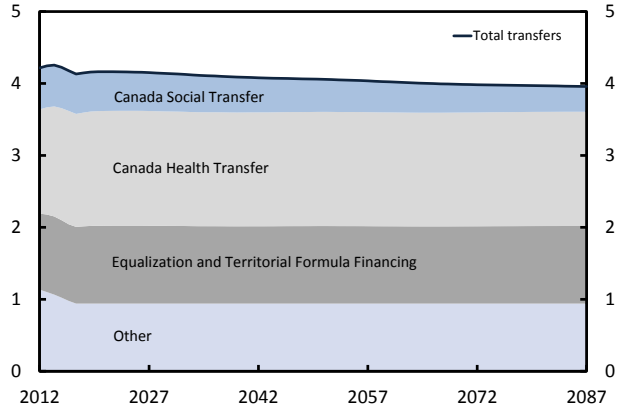
and included in PBO's FSR 2012 estimates. PBO assumes transfer formulas continue unchanged beyond their scheduled review period.

CHT, Equalization, and Territorial Formula Financing will remain stable as a share of GDP because their escalators are formally tied to GDP. PBO assumes other transfers to provinces by individual federal departments to support specific program areas (such as labour market development programs, criminal, and immigration and refugee legal aid, and public trusts for transit investment) also grow with GDP. CST—and therefore total transfers to other levels of government—will decline as a share of GDP because the CST escalator of 3 per cent is lower than projected GDP growth (Figure 4-6).

Figure 4-6

Federal transfers to other levels of government, 2012 to 2087

per cent of GDP



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

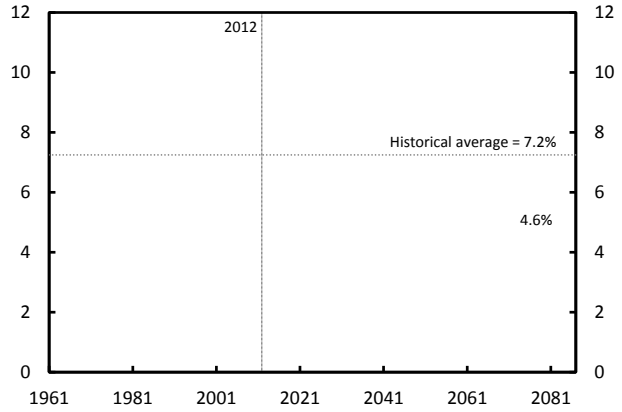
Other program spending

The government plan in EAP 2013 is used for other program spending over the medium term (2013-2017). Beyond 2017, other program spending is projected to grow with the economy, maintaining a constant share of 4.6 per cent of GDP. This is well below spending observed over the last 50 years and below the historical average of 7.5 per cent of GDP (Figure 4-7).

Figure 4-7

Federal other program spending, 1961 to 2087

per cent of GDP



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.
Note: Other program spending prior to 1981 is shown using historical CSNA97 shares of GDP.

5 Operations of other levels of government

To determine the revenues and spending of aggregated other levels of government (PTLA governments), PBO adds the revenues and spending from provincial, territorial, local, and aboriginal governments, subtracting transfers between governments. The aboriginal general government (AGG) was added as a government subsector in CSNA2012 and was not included in previous FSRs (see Box 2).

Own-source revenues

Own-source revenues exclude federal transfers (which are projected in detail in federal program spending in Section 4) and subtract intergovernmental transfers between PTLA governments. Federal transfers are added back to own-source revenues for the calculation of PTLA government total revenues and fiscal gap.[28]

[28] EAP 2013 proposed changes affecting the Canada Jobs Grant. Because an official agreement is to be determined, PBO has made a neutral current policy assumption that the federal government will continue to transfer $500 million to the provinces without increased spending by provinces.

Box 2: Aboriginal general governments

Statistics Canada's CSNA2012 framework introduced a government subsector sequence of accounts for aboriginal general governments (AGGs). The AGG sector includes First Nations governments, tribal councils, representative First Nations organizations, and governments of Metis settlements, but excludes the economic activity of Nunavut communities which have been and will continue to be included in the local government subsector. The income, expenditure, and balance sheet assets and liabilities of the AGG subsector were previously included in the persons and unincorporated business sector.

Over the last ten years, AGG non-interest spending averaged 2.0 per cent of total other levels of government non-interest spending. AGG non-interest spending in 2012 was $8.2 billion. AGG spending is financed by federal transfers (82.3 per cent on average over the last ten years), provincial transfers (12.4 per cent) and own-source revenues (5.3 per cent). Because the AGG sector runs a balanced budget with no debt financing in markets, the AGG sector has no effect on net lending and no impact on the sustainability assessment of other levels of government relative to FSR 2012.

Including the AGG sector does, however, increase the flows of revenues and expenses of other levels of government. Revenues of other levels of government increase by the amount of federal transfers to the AGG sector and AGG own-source revenues (which combined averaged 1.7 per cent of total revenues over the past ten years) and increase non-interest spending by the same amount. Although the increases offset each other with a zero net impact on the primary balance and net lending, inclusion of the AGG sector limits the comparability of revenues and non-interest spending with the projections in FSR 2012.

The federal projection is largely unaffected. Transfers to AGG were previously classified as transfers to persons within direct program expenses, and now fall within transfers to other levels of government, with no net impact on expenses or the fiscal gap.

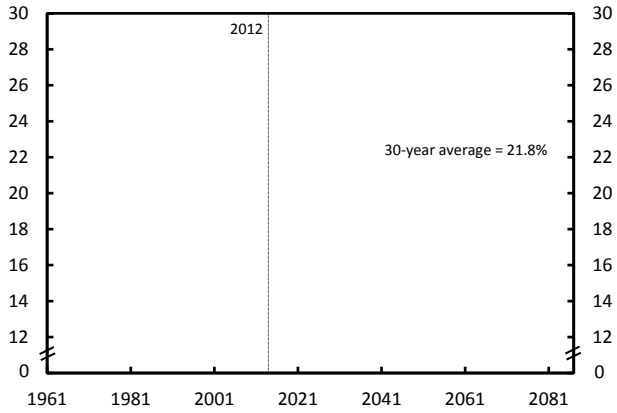
Statistics Canada describes the AGG sector here: http://www.statcan.gc.ca/nea-cen/hr2012-rh2012/papers-articles/agg-aga/agg-aga-eng.htm

PBO assumes that over the medium term revenues will recover from a low of 20.9 per cent of GDP in 2012 (matching the 30-year low) to 21.8 per cent in 2017 when output returns to potential, which is the long-run historical average observed over the last three decades. Like federal revenues, own-source revenues of other levels of government are projected under the assumption that over the long term the tax burden will be constant at the share of GDP achieved at the end of the medium-term outlook (Figure 5-1).

Figure 5-1

Other levels of government own-source revenues, 1961 to 2087

per cent of GDP



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.
Note: Revenues prior to 1981 are shown using historical CSNA97 shares of GDP.

Other levels of government program spending

PTLA government program spending is expected to continue to decline from the peak of 27.3 per cent of GDP in 2009—when stimulus programs and benefits were highest during the recession—to 24.5 per cent at the end of the medium-term projection, as governments continue fiscal consolidation measures (PBO assumes the PTLA sector holds the level of discretionary spending constant over the medium term).[29] Following the fiscal consolidation period, spending is projected to expand at an average rate of growth of 3.9 per cent, reaching nearly 30 per cent of GDP by 2087

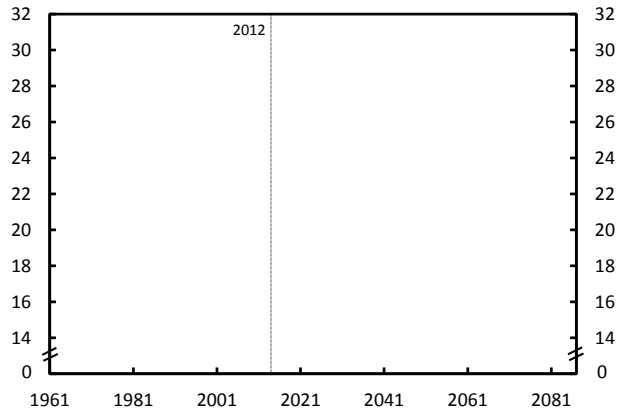
[29] PTLA program spending is on a gross basis and includes the acquisition of nonfinancial assets.

(Figure 5-2). This significant upward trend is driven by health spending.

Figure 5-2

Other levels of government program spending, 1961 to 2087

per cent of GDP



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.
Note: Revenues prior to 1981 are shown using historical CSNA97 shares of GDP.

PBO projects PTLA sector non-interest spending under separate classifications for health care, education, social benefits, and other spending.

Health care expenses

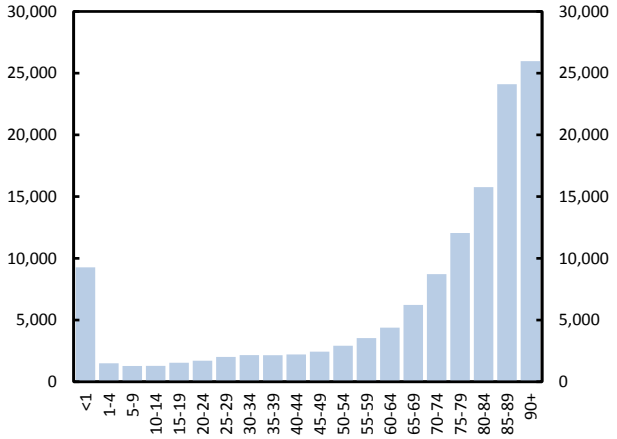
Canada's provincially administered health care includes the costs of hospitals and other health care facilities, services from physicians and other professionals, drug plans, public health administration, and other spending.[30]

PBO projects health spending by decomposing its growth into three components: (1) an index of spending by age, (2) income, and (3) an excess cost growth factor. The age index is projected by mapping per capita health spending by age group in 2010 onto the projected population for the next 75 years (Figure 5-3), income is projected as GDP, and the excess cost growth factor is the average cost growth in excess of the age index and GDP growth over the period 1976-2012.[31] The period is chosen to average out volatility in the excess cost growth estimates. PBO's estimate of excess cost growth in FSR 2013 averages 0.35 per cent, which is lower than the estimated enrichment factor in FSR 2012 of 0.42 per cent, due to data revisions and one additional year of historical data. PBO's assumed enrichment factor is a conservative assumption compared with the IMF assumption of 1 per cent in its Canada 2012 Article IV Consultation Report.[32]

Figure 5-3

Per capita health expenditure by age group, 2010

dollars



Source: Canadian Institute for Health Information.

As a result of the ageing of the population and excess cost growth, health spending as a share of GDP is projected to rise from 7.5 per cent in 2012 to 11.7 per cent in 2050 and 13.8 per cent in 2087 (Figure 5-4). From 2012 to 2050, health spending is projected to grow by an average of 4.9 per cent annually (of which the ageing factor contributes 0.8 percentage points, on average). After 2050, ageing pressure declines and spending growth slows to an average of 4.2 per cent annually (of which the ageing factor contributes 0.1 percentage points).[33] Beyond 2050 the increase in health

[30] For details on the categories of health spending, see Canadian Institute for Health Information (2012). *National Health Expenditure Trends, 1975 to 2012*. https://secure.cihi.ca/free_products/NHEXTrendsReport2012EN.pdf.

[31] CIHI historical data for health spending is available from 1975 to 2010. CIHI also provides forecasts for health spending for 2011 and 2012. See Annex D for more details on methodology.

[32] IMF (2013a). *Canada 2012 Article IV Consultation Report*. http://www.imf.org/external/pubs/ft/scr/2013/cr1340.pdf.

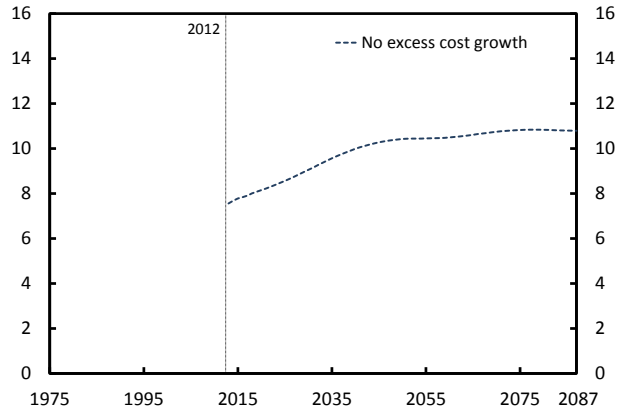
[33] It is sometimes argued that the rise in life expectancy reflects a better health status of the population (i.e., *compression of morbidity*)

spending as a share of GDP is primarily driven by excess cost growth (the projection of health spending with no excess cost growth is given in Figure 5-4 for comparison).

Figure 5-4

Health spending, 1975 to 2087

per cent of GDP



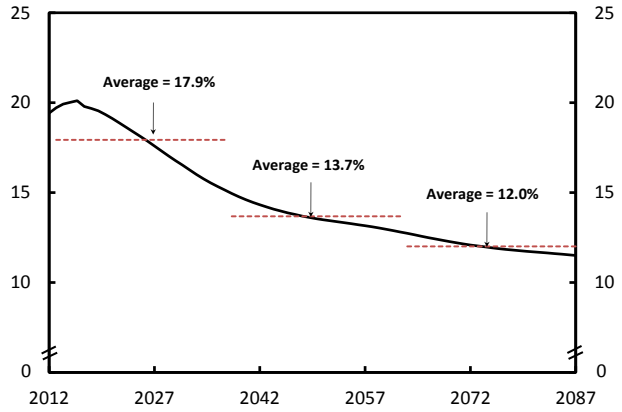
Sources: Office of the Parliamentary Budget Officer; Canadian Institute for Health Information; Statistics Canada.

The CHT as a share of other levels of government spending is projected to decline over the long term, averaging 17.9 per cent of other levels of government health spending over the first 25 years of the projection horizon, 13.7 per cent over the next 25 years, and 12.0 per cent over the remaining years (Figure 5-5).

Figure 5-5

Share of federal transfers in health spending, 2012 to 2087

per cent



Sources: Office of the Parliamentary Budget Officer, Canadian Institute for Health Information, Statistics Canada.

Education expenses

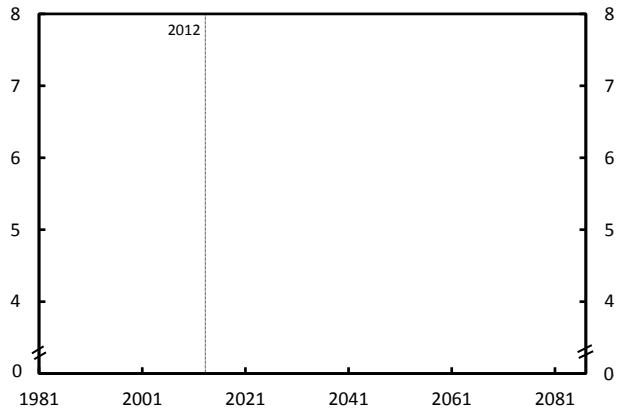
PBO grows education spending with nominal GDP and the 5 to 24 age group, and assumes there is no spending enrichment.

As growth in the population aged 5-24 falls relative to that of the overall population, growth in education spending falls below growth in output, and declines as a share of GDP from 5.8 per cent in 2012 to 5.2 per cent in 2087 (Figure 5-6). The long-term trend decline is interrupted twice by dampened demographic shocks from the children and grandchildren of the baby boom generation.

Figure 5-6

Education spending, 1981 to 2087

per cent of GDP



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

and should lead to lower growth in health spending as the impact of ageing on costs is delayed. PBO does not take into account this potential impact because estimation has a wide band of inherent uncertainty (wide confidence intervals). For a detailed discussion of the relationship between ageing and health status and its implications for health spending, see OECD (2006). *Projecting OECD Health and Long-Term Care Expenditures: What Are the Main Drivers?* OECD Economics Department Working Paper No. 477 and Hogan, S. and S. Hogan (2002). *How Will the Ageing of the Population Affect Health Care needs and Costs in the Foreseeable Future?* Commission on the Future of Health Care in Canada discussion paper No. 25.

Social benefits

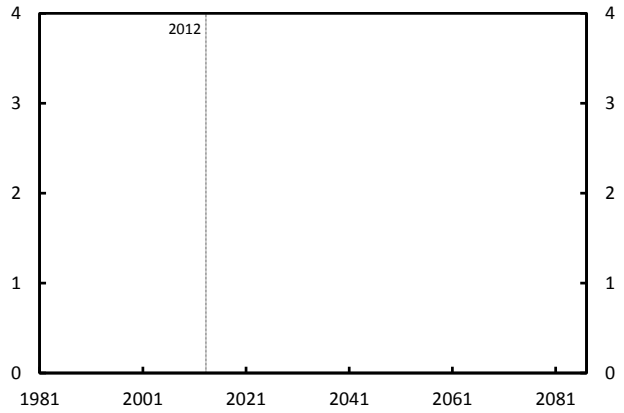
Social benefits include income replacement, disability support, and other social assistance programs. PBO projects social benefits along with the population aged 15 to 64 and the growth of nominal GDP.[34]

As the growth in the population aged 15 to 64 declines, average annual growth in social benefits (3.5 per cent) falls below average GDP growth (3.7 per cent). As a result, spending on social benefits declines from 1.6 per cent of GDP in 2012 to 1.3 per cent in 2087 (Figure 5-7).

Figure 5-7

Social benefits spending, 1981 to 2087

per cent of GDP



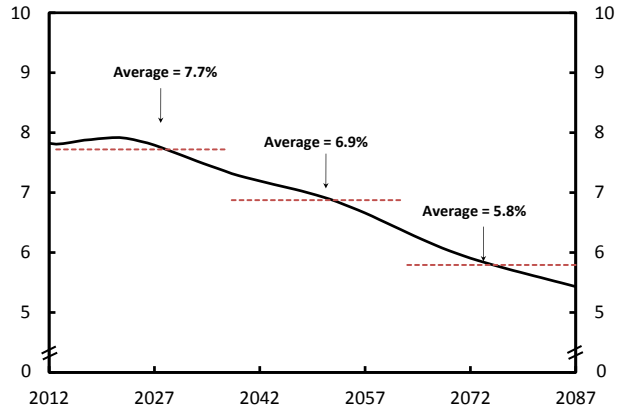
Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

The CST escalator of 3 per cent is assumed to continue, falling below the projected growth of PTLA spending on social benefits and education. Federal CST transfers as a share of social benefits and education spending is projected to average 7.7 per cent over the first 25 years of the projection, 6.9 per cent over the next 25 years, and 5.8 per cent over the remainder (Figure 5-8).

Figure 5-8

Share of federal transfers in PTLA social and education spending, 2012 to 2087

per cent



Sources: Office of the Parliamentary Budget Officer; Statistics Canada

Other non-interest spending

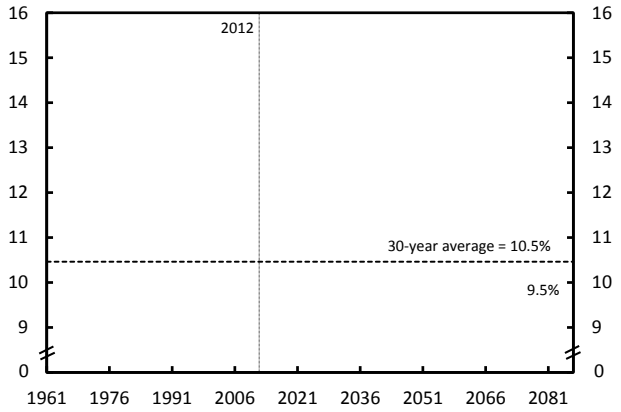
PBO assumes that other spending will remain frozen until the end of the medium term and decline as a share of the economy. This reflects commitments to restrain discretionary spending in provincial budgets. There has been some success in restraining other spending in the past three years, which has declined from its peak of 12.0 per cent of GDP in 2009 to 11.5 per cent in 2012. With this assumption, other spending will continue to fall as a share of the economy to 9.5 per cent in 2017—a level corresponding to the lows observed during the late 1990s and early 2000s (Figure 5-9). PBO assumes that the reduction in other program spending will be permanent and remain more than 1 percentage point of GDP below its historical average of 10.5 per cent.

[34] PBO assumes the population eligible for social benefits is unaffected by changes to the ages of eligibility for federal elderly benefits.

Figure 5-9

Other levels of government other program spending, 1961 to 2087

per cent of GDP



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.
Note: Revenues prior to 1981 are shown using historical CSNA97 shares of GDP.

6 Canada and Quebec Pension Plans

The CPP and QPP are part of the total government sector of the Canadian economy. Federal and provincial governments act as joint stewards of the CPP while the government of Quebec manages and administers the QPP.

The Offices of the Chief Actuary for the CPP and QPP provide regular reports (typically every three years) which assess the current and projected financial status of the plans. PBO's projection results are based on the latest reports—the 25th Actuarial Report of the Canada Pension Plan as at 31 December 2009[35] and the Actuarial Report of the Québec Pension Plan as at 31 December 2009.[36]

To ensure consistency with its estimates of federal and PTLA government sustainability, PBO produces its own projections for the CPP and QPP based on the FSR 2013 demographic and economic projections. Annex E provides additional detail on the projection methodology for the CPP and QPP.

The remainder of this section presents PBO's baseline projections for CPP and QPP contributions, expenditures, and rates of return from 2013 to 2087.

CPP and QPP contributions

Contributions are determined by the contribution rate and contributory earnings. For the CPP, the contribution rate is set at 9.9 per cent but the contribution rate for the QPP is set to increase from 10.05 per cent in 2012 (increasing by 0.15 percentage points a year) to 10.8 per cent in 2017. Over the projection period, PBO assumes that contributions for the CPP and QPP grow in line with projected employment, inflation, and labour productivity. Using the demographic and economic projections described in Section 2 and 3, PBO estimates that contributions for the CPP and QPP will remain roughly stable over the long term relative to GDP. CPP contributions are projected to grow slightly from 2.2 per cent of GDP in 2012 to 2.4 per cent of GDP in 2087. QPP contributions are projected to decline from 0.7 per cent of GDP in 2012 to 0.6 per cent of GDP in 2087. This difference largely reflects slower employment growth in Quebec compared with the rest of Canada.[37] The combined CPP and QPP contributions are projected to increase from 2.9 per cent of GDP in 2012 to 3.0 per cent in 2087 (Figure 6-1).

[35] Office of the Superintendent of Financial Institutions Canada (2010). *25th Actuarial Report on the Canada Pension Plan as at 31 December 2009*. http://www.osfi-bsif.gc.ca/app/DocRepository/1/eng/oca/reports/CPP/CPP25_e.pdf.

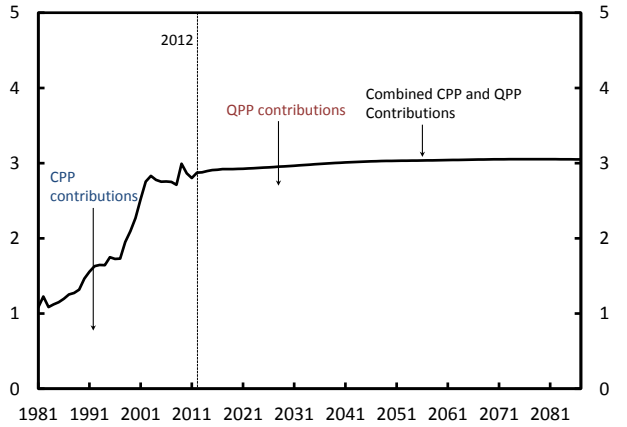
[36] Régie des rentes du Québec (2010). *Actuarial Report of the Québec Pension Plan as at 31 December 2009.* http://www.rrq.gouv.qc.ca/SiteCollectionDocuments/www.rrq.gouv.qc/Anglais/publications/regime_rentes/analyse_actuarielle_2009_en.pdf.

[37] PBO uses the distribution from the 25th Actuarial Report on the CPP to allocate PBO's national employment projections to Quebec and the rest of Canada. The average annual growth of employment in Quebec from 2013 to 2087 is 0.31 per cent, while the rest of Canada is 0.66 per cent over the same period.

Figure 6-1

CPP and QPP contributions, 1981 to 2087

per cent of GDP



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

CPP and QPP expenditures

Over the long term, the population aged 65 and older relative to the population aged 15 to 64 is projected to increase from 21.6 per cent in 2012 to 44.3 per cent in 2087. This places upward pressure on CPP and QPP expenditures, which are composed of retirement benefits and administrative expenses. PBO projects that CPP and QPP retirement benefits will rise from 1.9 per cent of GDP in 2012 to 2.8 per cent in 2047 as the baby-boomer generation transitions into retirement. Retirement benefits will continue to increase thereafter, reaching 3.1 per cent of GDP by the end of the projection horizon. The increase in retirement benefits is due to both population ageing and the enrichment of benefit payments. Retirement benefits are enriched because labour productivity growth will increase average contributory real earnings for future retirees.

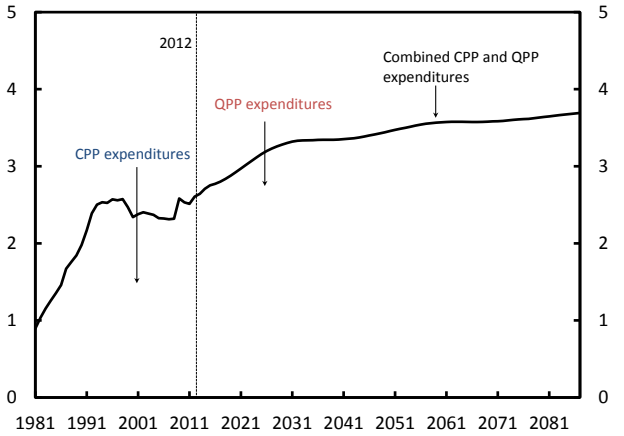
Other benefits paid by the CPP and QPP are projected to grow at approximately 0.6 per cent of GDP annually throughout the projection period, reflecting projected growth in the working age population, inflation, and labour productivity. Administrative expenses are projected to grow in line with contributory earnings, which average 0.05 per cent of GDP over the projection horizon.

Total expenditures of CPP and QPP are projected to increase from 2.6 per cent of GDP in 2012 to 3.7 per cent of GDP by 2087 (Figure 6-2).

Figure 6-2

CPP and QPP expenditures, 1981 to 2087

per cent of GDP



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

CPP and QPP rate of return

The rate of return for the CPP and QPP investment portfolios determines investment income for the plans. The rate of return is calculated based on PBO's projection of the 10-year Government of Canada bond rate, the portfolio shares, and risk premiums from the Actuarial Report on the CPP. PBO assumes that interest rates would return to their long-term levels after the medium term, and the 10-year Government of Canada bond rate is projected to remain stable at 5.3 per cent. Therefore, based on this assumed rate of return on the Government of Canada bond, the portfolio shares, and risk premiums from the Actuarial Report on the CPP, PBO projects the nominal rate of return on the CPP and QPP investment portfolios to reach 6.5 per cent by 2017 and stay constant thereafter.

7 Fiscal sustainability assessment

To assess long-term fiscal sustainability across the federal and combined PTLA governments, PBO begins with the stock of interest-bearing debt in 2012—the latest year for which historical data is available—and computes the annual flow of the primary balance using the projection of revenues and spending described above, along with interest payments on the public debt (calculated using the projection of the effective interest rate applied to the existing stock of interest-bearing debt—see Box 3). Adding the primary balance and interest charges in each year gives *net lending* if positive (i.e. government is contributing financial resources to other sectors of the economy) or *net borrowing* if negative (i.e. government is consuming financial resources from other sectors of the economy). For the baseline scenario this is projected over 75 years.[38]

Using the projected annual flow of net lending, PBO calculates a summary statistic of sustainability of the government fiscal position known as the fiscal gap, adapted from the methodology of Blanchard et al (1990) and Auerbach (1994). The fiscal gap is the immediate and permanent improvement to the primary balance required to achieve the same debt-to-GDP ratio at the end of the chosen time horizon as at the beginning of the projection (2087 and 2012, respectively). An improvement in the primary balance can be achieved by increasing revenues, decreasing non-interest spending, or a combination of the two. If left uncorrected, a positive fiscal gap would lead to government debt increasing exponentially as a share of the economy, eventually making government programs difficult to finance. A detailed definition and derivation of the fiscal gap is provided in Annex F.

Alternatively, if the fiscal gap is negative, there is fiscal room available to increase spending or decrease revenues while maintaining the current debt-to-GDP ratio at the end of the period. If no policy changes are implemented, the government would accumulate an escalating net asset position.

The fiscal gap is calculated as the fiscal response required in 2013, but action need not be taken immediately. Consolidation can be implemented gradually; however, greater adjustments will be required the longer they are delayed. PBO does not suggest a particular policy response.

Box 3: Projecting effective interest rates

Projecting the stock of government debt requires a projection of government interest rates. PBO calculates the effective rate on government debt as public debt charges divided by the stock of the previous year's interest-bearing debt. Interest-bearing debt includes both market debt (short-term and long-term bonds) and non-market debt (unfunded pension plan obligations and other accounts payable).

The interest rate on federal market debt is determined by an estimated equation weighting short-term and long-term debt. Over the long-term, non-market debt and its interest charges are phased out and the long-term interest rate approaches the long-term interest rate on market debt, which is assumed to be equal to 4.9 per cent. The long-term interest rate on market debt is a weighted average of the market interest rates on 3-month treasury bills (4.2 per cent) and 10-year government of Canada bonds (5.3 per cent) from the economic projection.

PBO assumes that the effective interest rate on market debt of the PTLA government sector settles at 50 basis points above the interest rate on the 10-year Government of Canada bond rate (5.3 per cent). This is based on the average market interest rate difference between long-term federal and provincial government debt over the period 1993 to 2007.[a] As a result, there is a 90-point difference between the interest rate of federal and other levels of government over the long term (i.e. 5.8 versus 4.9 per cent respectively) which is moderately smaller than the average differential of 110 basis points observed over the period 1992 to 2007.

[a]The long-term federal rate is the average yield on Government of Canada bonds with maturities over 10 years and the long-term provincial rate is Scotia Capital's average weighted yield on long-term provincial bonds.

[38] A 75-year horizon is far enough in the future to capture the demographics of the baby boom generation, their children, and their grandchildren, and for the old-age dependency ratio to stabilize. It is also the same period over which the Office of the Chief Actuary projects incomes, expenditures, and assets.

PBO calculates government debt and assets according to the definition of net financial worth under the GFS2001 statistical, economic, and accounting principles for fiscal analysis. Net financial worth is defined as financial assets less liabilities; however, for the analysis and presentation of results, PBO redefines net financial worth as *net debt*, equal to total liabilities less financial assets.

To assess the sustainability of CPP and QPP, PBO estimates the steady-state contribution rate, which is calculated as the constant contribution rate which would need to be implemented immediately to achieve a target of the plan's current asset-to-expenditure ratio in 75 years. Comparing the steady-state contribution rate to the legislated contribution rate will determine the sustainability of the plans under current policy.

In addition to the fiscal levers of the primary balance and contribution rates, the fiscal sustainability of the federal and PTLA governments and the pension plans depends critically on the difference between interest rates and nominal GDP growth (see Box 4).

The following section presents PBO's baseline sustainability assessment for the federal government, other levels of government, and the CPP/QPP funds.

Fiscal gap of the federal government

Figure 7-1 shows the federal primary balance, net lending, and debt dynamics resulting from PBO's baseline projection of federal government revenues and program spending combined with federal government debt service charges.

As the economy recovers over the medium term, federal revenues rebound from a cyclical low, while growth in overall program spending remains constrained. This results in a sharp improvement in the primary balance, reaching 1.9 per cent of GDP in 2017.

Box 4: Interest rates, growth rates, and sustainability

When the effective interest rate on debt (*i*) exceeds GDP growth (*g*) maintaining a stable debt-to-GDP ratio (*D/Y*) requires running primary balance (P*B*) surpluses. As a share of GDP, the size of the primary balance surplus necessary to maintain a stable debt-to-GDP ratio depends on the difference between the interest rate and the GDP growth rate as well as the current debt ratio.

$$\frac{PB}{Y} = (i - g) \cdot \frac{D}{Y}$$

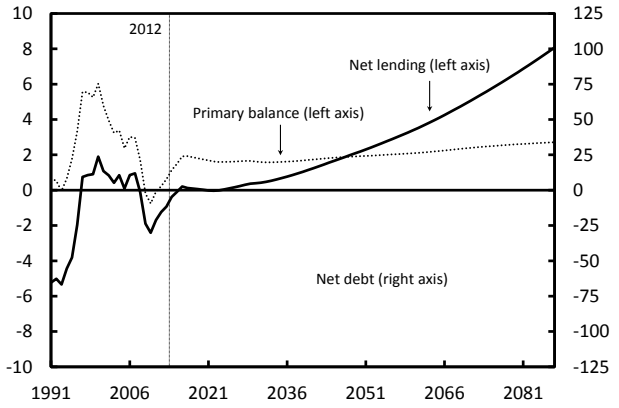
This relationship dictates that the debt-to-GDP ratio will increase if the primary balance as a share of GDP is smaller than the interest-growth rate differential multiplied by the current debt ratio.

For the CPP and QPP, when the rate of return (*r*) exceeds GDP growth (*g*), maintaining a stable asset-to-GDP ratio (*A/Y*) requires negative net cash flows (*NCF*) to offset investment income. As a share of GDP, the size of the net cash flow (contributions less expenditures) necessary to maintain a stable asset ratio depends on the difference between the rate of return and the GDP growth rate as well as the current asset ratio.

$$\frac{NCF}{Y} = -(r - g) \cdot \frac{A}{Y}$$

Figure 7-1

Federal government primary balance, net lending, and net debt, 1991 to 2087



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Once the economy has fully recovered and revenue grows in line with nominal GDP, increased spending on elderly benefits from an ageing population puts minor strain on the primary balance until 2032, with a brief recovery from 2023 to 2029 as the age of eligibility is increased. As the baby boom cohorts move past their life expectancy, the pressure on elderly benefits recedes (spending falls by 0.9 percentage points from its peak of 2.8 per cent of GDP in 2033 to 1.8 in 2087).

Over the same period, the CST escalator—which is limited to 3 per cent annually—remains below the projected average annual growth in nominal GDP (3.7 per cent). The combined effect of lower elderly benefits and transfers to other levels of government as a share of GDP results in a sustained increase in the primary balance after 2032, from 1.6 per cent of GDP to 2.7 per cent in 2087.

Although the primary balance surplus is projected to decline slightly over the period 2018 to 2032 and the interest rate on debt is projected to exceed GDP growth, the annual surpluses are larger than necessary to stabilize the debt-to-GDP ratio. Net debt falls as a share of GDP and is eliminated in 2044, after which the government begins to accumulate a net financial asset position.

Table 7-1 presents PBO's estimate of the baseline federal government fiscal gap calculated over 25-, 50-, and 75-year horizons. The current federal government net debt-to-GDP ratio is 37.4 per cent in 2012. The fiscal gap estimate is based on the assumption that fiscal actions required to stabilize the debt ratio would be implemented immediately (i.e., starting in 2013) and maintained indefinitely. For each projection horizon, implementing these fiscal actions would ensure that the ratio of federal net debt to GDP returns to its 2012 level at the end of each horizon.

Table 7-1

Fiscal gap estimate, federal government

per cent of GDP

	Projection horizon		
	25 years	50 years	75 years
Federal government	-0.9	-1.1	-1.3

Source: Office of the Parliamentary Budget Officer.
Note: The projection period starts in 2013. Calculations are based on the endpoint net debt-to-GDP ratio of 37.4 per cent.

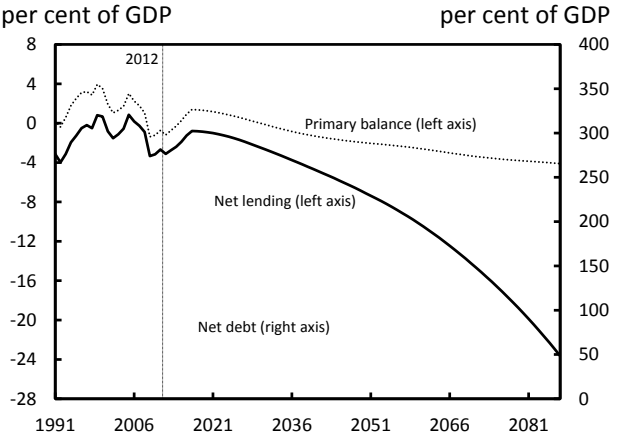
The baseline federal fiscal gap is estimated to be -1.3 per cent of GDP (i.e. fiscal room of 1.3 per cent) based on the 75-year horizon. This means that beginning in 2013 the federal primary balance could be reduced annually by 1.3 percentage points of GDP below the current policy level, by reducing revenue, increasing program spending, or some combination of both, while returning to the current net debt-to-GDP ratio of 37.4 per cent in 2087.

Fiscal gap of other levels of government

Figure 7-2 shows the primary balance, net lending, and debt dynamics of aggregate other levels of government resulting from PBO's baseline projection of PTLA government revenues and program spending, combined with the projected effective PTLA interest rate.

Figure 7-2

Other levels of government primary balance, net lending, and net debt, 1991 to 2087



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

As the economy recovers over the medium term, PBO assumes that own-source revenues of other levels of government will return to the long-term average share of GDP over 1982 to 2012 and that program spending will be restrained. As a result, PBO projects a substantial improvement in the primary balance from a deficit of 1.2 per cent of GDP in 2012 to a surplus of 1.4 per cent in 2017, although net lending remains negative (net borrowing). After 2017, population ageing and escalating health care costs result in a steadily deteriorating primary balance over the long term, reaching a deficit of 4.1 per cent of GDP in 2087. This decline also reflects a 0.2 percentage point decline in revenue relative to GDP from the CST, which grows at 3 per cent annually while the economy is projected to grow at an average 3.7 per cent annually over the projection horizon. Relative to GDP, the impacts of increased health spending and lower federal CST transfers are only marginally offset by lower spending on education and social assistance (0.5 percentage points of GDP combined).

With interest rates on PTLA government debt exceeding GDP growth, maintaining a stable debt-to-GDP ratio requires running primary surpluses. Increasing future primary deficits lead to escalating public debt charges, which combined result in rapidly escalating net lending and debt-to-GDP ratios.

The baseline fiscal gap for other levels of government is estimated at 1.9 per cent of GDP when calculated over a 75 year horizon. Beginning in 2013 the primary balance would need to increase by 1.9 percentage points of GDP annually above its projected baseline by increasing revenues, reducing program spending, or some combination of both, in order to return to a net debt-to-GDP ratio of 31.5 per cent after 75 years (Table 7-2).

Table 7-2

Fiscal gap estimate, other levels of government

per cent of GDP

	Projection horizon		
	25 years	50 years	75 years
Other levels of government	0.6	1.4	1.9

Source: Office of the Parliamentary Budget Officer.
Note: Projection period begins in 2013. Calculations are based on the endpoint net debt-to-GDP ratio of 31.5 per cent.

Alternative debt-to-GDP targets

Rather than returning to the current ratio of net debt-to-GDP in 2087, fiscal gaps may also be calculated for alternative long-term debt-to-GDP targets. Table 7-3 gives PBO's calculated fiscal gaps for alternative assumptions for federal and PTLA government net debt-to-GDP targets. The federal government could permanently increase spending or decrease revenues by 1.0 per cent of GDP and eliminate net debt by 2087. The PTLA government would need a sustained reduction in spending or increase in revenues of 2.1 per cent of GDP annually to do the same. Alternatively, if targeting a debt-to-GDP ratio of 100 per cent of GDP in 2087, the federal government has fiscal room of 1.8 per cent of GDP, while the PTLA government would still have to permanently reduce spending or increase revenues, although by a lesser amount equal to 1.5 per cent of GDP.

Table 7-3

Fiscal gap of federal and other levels of governments under alternative net debt-to-GDP targets

per cent of GDP

	Net debt-to-GDP endpoint in 2087					
	2012 ratio	0	25	50	75	100
Federal government	-1.3	-1.0	-1.2	-1.4	-1.6	-1.8
Other levels of government	1.9	2.1	2.0	1.8	1.7	1.5

Sources: Office of the Parliamentary Budget Officer.
Note: All gaps calculated over 75 years.

The CPP and QPP sector

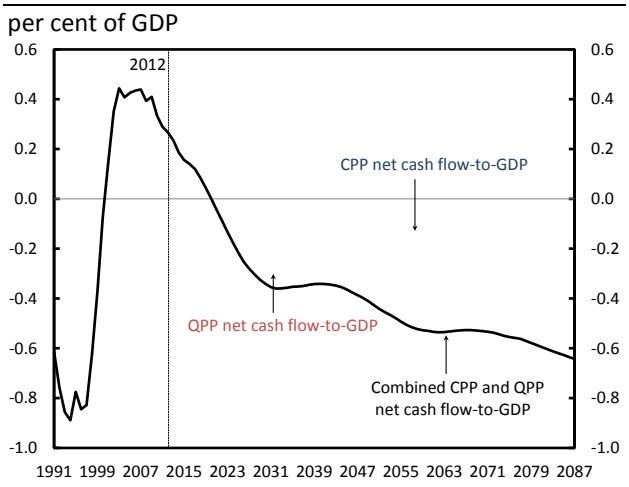
The projected net cash flows (i.e., contributions less expenditures) for the CPP and QPP relative to GDP are presented in Figure 7-3. As the baby-boomer generation transitions into retirement and

collects pension benefits, the net cash flow position of the CPP shifts from a surplus of 0.2 per cent of GDP in 2012 to a deficit of 0.3 per cent of GDP in 2047 (expenditures exceed contributions beginning 2021). Thereafter, CPP's net cash flow position continues to decrease (reaching -0.6 per cent of GDP by 2087) as the children and grandchildren of the baby boom generation move into retirement and reach their life expectancy.

For the QPP, the net cash flow is estimated to balance until 2023 as contributions are projected to move in line with expenditures. Thereafter, net cash flow declines slightly to -0.1 per cent of GDP throughout the rest of the projection horizon. This reflects the assumption that Quebec's demographic structure is projected to be slightly older compared to the rest of Canada, which increases projected benefit payments. The upward pressure on expenditures is partly offset by the legislated increase in the QPP contribution rate to 10.8 per cent in 2017.

Figure 7-3

CPP and QPP net cash flows relative to GDP, 1991 to 2087

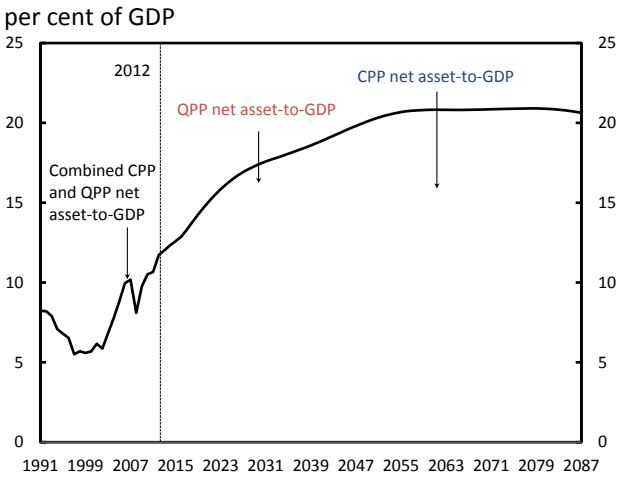


Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Figure 7-4 presents the net assets for the CPP and QPP relative to GDP based on projected net cash flows and rates of return on investments. PBO projects that the combined CPP and QPP net asset position relative to GDP will improve over the long term, rising from 11.7 per cent of GDP in 2012 to 20.6 per cent in 2087. This is an indication that the plans are in good financial health.

Figure 7-4

CPP and QPP net assets relative to GDP, 1991 to 2087

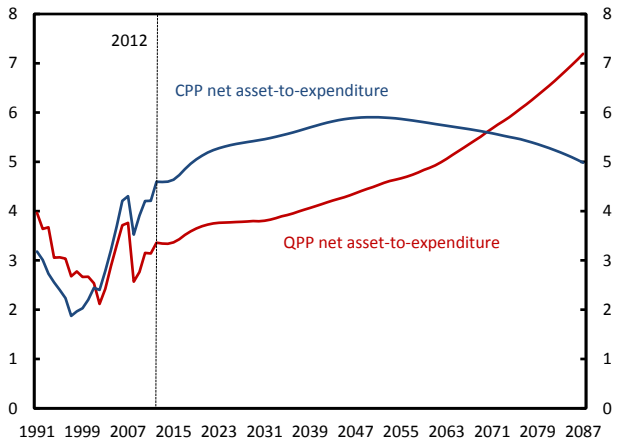


Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

From an actuarial and policy perspective, it is more useful to assess the asset-to-expenditure ratio of the plans as an indicator of fiscal sustainability. The asset-to-expenditure ratio is the primary indicator used in the actuarial reports of the CPP and QPP. Figure 7-5 presents the net asset-to-expenditure ratios of the CPP and QPP based on PBO projections.

Figure 7-5

CPP and QPP net assets relative to expenditures, 1991 to 2087



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

PBO projects that the CPP asset-to-expenditure ratio will rise steadily from 4.6 in 2012 to reach 5.9 in 2045, then gradually decline to 5.0 in 2087. The path of the asset-to-expenditure ratio is in line with the path of asset-to-expenditure ratio presented in the most recent Actuarial Report on the CPP.[39] PBO projects that the QPP asset-to-expenditure ratio will increase from 3.4 in 2012 to 7.1 in 2087. The projected increase in the QPP asset-to-expenditure ratio outpaces that of the CPP, reflecting the higher legislated contribution rate (10.8 versus 9.9 per cent, respectively).[40]

The fiscal gap estimates for the CPP and QPP are presented in Table 7-4, based on the same approach used to calculate the estimates for federal and PTLA governments. The fiscal gap for the CPP and QPP is the permanent change in the plans' revenues and/or expenditures which would need to be made immediately so that the net asset-to-GDP ratio is the same at the beginning and end of the projection. PBO estimates that both the CPP and QPP 75-year fiscal gaps are zero, which suggests that both plans are sustainable over the long term.

Table 7-4

Fiscal gap estimate, CPP and QPP

per cent of GDP

	Projection horizon		
	25 years	50 years	75 years
Combined CPP and QPP	-0.2	-0.1	0.0
Canada Pension Plan	-0.2	-0.1	0.0
Quebec Pension Plan	0.0	0.0	0.0

Source: Office of the Parliamentary Budget Officer.
Note: The projection period starts in 2013. For the CPP (QPP), calculations are based on the endpoint net asset-to-GDP ratio of 9.5 (2.2) per cent.

In order to bring the fiscal gap framework more in line with approaches used in the actuarial reports of the CPP and QPP, PBO estimates the steady-state (i.e., constant) contribution rate which ensures that the asset-to-expenditure ratio at the end of the projection horizon is equal to its 2012 level.[41]

PBO's estimates of the steady-state contribution rates are lower than the contribution rate for both the CPP and QPP (9.9 per cent and ultimately 10.8 per cent, respectively), which suggests that both plans are sustainable over the long term (Table 7-5). For the CPP, PBO estimates that the statutory contribution rate could be reduced to 9.88 per cent beginning in 2013 in order to stabilize the asset-to-expenditure ratio at its current level in 2087.[42] For the QPP, the (ultimate) statutory contribution rate of 10.8 per cent could be reduced to 10.57 per cent. The steady-state rate for the CPP increases as the projection horizon lengthens, indicating upward pressure on costs associated with population ageing. Estimates of the steady-state contribution rate for the QPP are relatively stable

[39] Based on the most recent Actuarial Report (25th) on the CPP, the asset-to-expenditure ratio is projected to increase to 5.0 in 2085. The projection may differ slightly from the PBO's due to different demographic and economic assumptions and data. As demonstrated in the Actuarial Report on the CPP (see Section VI), long-term projections of the asset-to-expenditure ratios are highly sensitive to demographic and economic assumptions.

[40] Based on the assumption that the QPP contribution rate remains at 9.9 per cent (the same as the CPP); the QPP asset-to-expenditure ratio would decrease from 3.4 in 2012 to -6.9 in 2087.

[41] In this report the steady-state contribution rate is applied to 2013 levels; however, in the CPP actuarial report, the steady-state rate is applied after the end of the review period (three years beyond the last historical data point) and is defined such that it achieves the asset-to-expenditure ratio being the same in the 10th and 60th year following the end of the review period. For the QPP, the timing of the application of the steady-state contribution rate is the same as the CPP actuarial report; however, the objective is to stabilize the asset-to-expenditure ratio between 2040 and 2060.

[42] Under the steady-state contribution rate projection for the CPP, the asset-to-expenditure ratio averages 5.4 over the period 2013 to 2087, reaching a high of 5.9 in 2045.

over each horizon reflecting steady and balanced net cash flow throughout the projection horizons.

Table 7-5

Steady-state contribution rate estimate, CPP and QPP

per cent

	Projection horizon		
	25 years	50 years	75 years
Canada Pension Plan	9.55	9.76	9.88
Quebec Pension Plan	10.51	10.56	10.57

Source: Office of the Parliamentary Budget Officer.
Note: The projection period starts in 2013. For the CPP (QPP), calculations are based on the endpoint net asset-to-expenditure ratio of 4.6 (3.4).

8 Sensitivity analysis

To assess the sensitivity of PBO's 75-year baseline fiscal gaps and steady-state contribution rates, PBO tests a number of alternative demographic, economic, and policy assumptions. This section discusses the impacts of the following scenarios:

a) Older (higher cost) and younger (lower cost) demographic projections
b) Alternative economic growth and interest rate projections
c) Alternative enrichment growth in elderly benefits
d) Alternative excess cost growth in health spending

a) Alternative demographic projections

PBO projects the fiscal gaps and steady-state contribution rates under two alternative demographic scenarios: (1) a higher cost older scenario with lower fertility, higher life expectancy and lower immigration rates, and (2) a lower cost younger scenario with higher fertility, lower life expectancy, and higher immigration rates. Table 8-1 summarizes the baseline and alternative assumptions.

Table 8-1

Alternative demographic projections

	Baseline	Older	Younger
Total fertility rate (births per woman)	1.7	1.5	1.9
Life expectancy at birth in 2062 (years)			
Males	87.4	88.8	85.8
Females	90.0	91.3	88.6
Immigration rate in 2062 (per 1,000 persons)	7.6	5.9	9.4

Source: Office of the Parliamentary Budget Officer.

With older demographics, age-related spending increases and output declines (lowering revenues, but also lowering program spending such as federal transfers that are escalated with GDP growth). The net effect of older demographics on the federal and PTLA primary balances and net debt paths is negative. Federal fiscal room declines to 0.9 per cent of GDP and the PTLA fiscal gap increases, requiring a permanent fiscal tightening of 2.2 per cent of GDP (Table 8-2).

With younger demographics, federal fiscal room increases to 1.7 per cent of GDP and the PTLA fiscal gap improves to 1.7 per cent of GDP.

Table 8-2

Fiscal gaps under alternative demographic scenarios

per cent of GDP

	Baseline	Older	Younger
Federal government	-1.3	-0.9	-1.7
Other levels of government	1.9	2.2	1.7

Source: Office of the Parliamentary Budget Officer.

With older demographics, the CPP steady-state contribution rate increases to 10.44 per cent (Table 8-3). This is due to the additional contributions required to finance higher spending on retirement benefits while achieving the same asset-to-expenditure ratio in 2087. For QPP, older demographics would increase the steady-state contribution rates to 11.18 per cent.

Younger demographics require a lower CPP steady-state contribution rate of 9.32 per cent and a lower QPP steady-state contribution rate of 9.96 per cent.

Table 8-3

Steady-state contribution rates under alternative demographic projections

per cent

	Baseline	Older	Younger
Canada Pension Plan	9.88	10.44	9.32
Quebec Pension Plan	10.57	11.18	9.96

Source: Office of the Parliamentary Budget Officer.

b) Alternative economic projections

PBO projects the change in the fiscal gap under alternative assumptions for two economic scenarios beyond the medium-term: (1) higher (lower) real GDP growth equal to plus (minus) 0.5 percentage points of baseline growth, and (2) higher (lower) interest rates equal to plus (minus) 50 basis points on effective interest rates on government debt and CPP and QPP rates of return.

Based on lower GDP growth, federal government fiscal room falls to 0.7 per cent of GDP and the PTLA government fiscal gap remains at 1.9 per cent of GDP (Table 8-4). With higher GDP growth, federal government fiscal room increases to 1.9 per cent of GDP and the PTLA fiscal gap increases slightly to 2.0 per cent of GDP. The response of the federal fiscal gap to GDP is driven by elderly benefits and the CST escalator, as revenue and most other expenses change in line with GDP growth either by legislation or assumption. The stability of the PTLA fiscal gap stems from the assumption that most PTLA revenues (with the exception of the CST) and PTLA spending change in line with GDP growth.

Table 8-4

Fiscal gaps under alternative real GDP growth projections

per cent of GDP

	Baseline	Lower GDP growth	Higher GDP growth
Federal government	-1.3	-0.7	-1.9
Other levels of government	1.9	1.9	2.0

Source: Office of the Parliamentary Budget Officer.

With lower GDP growth, the CPP steady-state contribution rate increases to 10.00 per cent and the QPP steady-state contribution rate increases to 10.78 per cent (Table 8-5). An increase in contribution rates is required because projected contributions grow with GDP, while expenses do not. With higher GDP growth, the CPP steady-state contribution rate declines to 9.72 per cent and the QPP steady-state contribution rate declines to 10.33 per cent.

Table 8-5

Steady-state contribution rates under alternative real GDP growth projections

per cent

	Baseline	Lower GDP growth	Higher GDP growth
Canada Pension Plan	9.88	10.00	9.72
Quebec Pension Plan	10.57	10.78	10.33

Source: Office of the Parliamentary Budget Officer.

A 50-basis point reduction in the effective interest rate increases federal fiscal room compared to the baseline estimate (Table 8-6). A smaller difference between the interest rate and the GDP growth rate requires smaller primary balances to achieve the same debt-to-GDP ratio in 2087. In contrast, a 50 basis point increase in the effective interest rate reduces federal fiscal room.

Table 8-6

Fiscal gaps under alternative effective interest rate assumptions

per cent of GDP

	Baseline	Lower interest rate	Higher interest rate
Federal government	-1.3	-1.5	-1.1
Other levels of government	1.9	1.9	1.9

Source: Office of the Parliamentary Budget Officer.

The PTLA government fiscal gap is essentially unchanged from its baseline under alternative assumptions about the effective interest rate on debt. For the PTLA sector the impact on the fiscal gap of a lower or higher difference between the interest rate and the GDP growth rate is offset by the impact of a lower or higher interest rate

assumption on the present value of projected primary balances relative to GDP.

Under the lower interest rate scenario, the CPP steady-state contribution rate increases to 10.14 per cent to offset the impact of slower growth in investment income (Table 8-7). The QPP steady-state contribution rate increases to 10.75 per cent. Under the scenario with a higher interest rate and higher growth in investment income, the CPP steady-state contribution rate declines to 9.63 per cent and the QPP steady-state contribution rate declines to 10.40 per cent.

Table 8-7

Steady-state contribution rates under alternative interest rate assumptions

per cent

	Baseline	Lower interest rate	Higher interest rate
Canada Pension Plan	9.88	10.14	9.63
Quebec Pension Plan	10.57	10.75	10.40

Source: Office of the Parliamentary Budget Officer.

c) Enriching elderly benefits

Baseline elderly benefits are projected according to current policy, which indexes payments to increases in the cost of living (CPI inflation) only. In the future, government may enrich elderly benefits to ensure growth in the purchasing power of payments does not fall far behind growth in the living standards of the population (measured here as real GDP per capita).

PBO considers two alternative enrichment scenarios: (1) benefits are enriched by half the growth of real GDP per capita, and (2) benefits are enriched fully with the growth of real GDP per capita. Alternative elderly benefits scenarios affect only the federal fiscal gap.

When enriched by half the growth of real GDP per capita, federal fiscal room falls from 1.3 per cent of GDP to 1.1 per cent (Table 8-8). When enriched by the full growth of real GDP per capita, fiscal room would be reduced further to 0.7 per cent of GDP. Federal debt is sustainable under both enrichment scenarios.

Table 8-8

Enrichment of elderly benefits, federal fiscal gap

per cent of GDP

	Baseline	Half real GDP per capita	Real GDP per capita
Federal government	-1.3	-1.1	-0.7

Source: Office of the Parliamentary Budget Officer.

d) Alternative health cost growth assumptions

PBO's baseline health projection assumes costs grow with aging, income (GDP growth), and an excess cost growth factor equal to the average cost growth in excess of the age index and GDP growth over the period 1976 to 2012. PBO considers two alternative health care excess cost growth assumptions: (1) zero annual growth above ageing and income, and (2) average annual growth in excess of ageing and income over recent history, 2003 to 2012 (0.8 per cent). Alternative health spending scenarios affect only the fiscal gap of PTLA levels of government.

Assuming zero excess cost growth, health spending grows only in line with population ageing and income growth, decreasing the fiscal gap of other levels of government to 1.0 per cent of GDP (Table 8-9). Assuming higher cost growth consistent with recent experience over the past decade increases the fiscal gap to 3.4 per cent of GDP.

Table 8-9

Cost growth of health spending, other levels of government fiscal gap

per cent of GDP

	Baseline	No excess cost growth	2003-2012 excess cost growth
Other levels of government	1.9	1.0	3.4

Source: Office of the Parliamentary Budget Officer.

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Annex A
Summary of FSR 2013 and FSR 2012 demographic and economic projections

Table A-1

per cent, unless otherwise indicated

		FSR 2013			FSR 2012		
		2035	**2060**	**2085**	**2035**	**2060**	**2085**
Demographic assumptions							
Fertility rate (births per woman)		1.7	1.7	1.7	1.7	1.7	1.7
Life expectancy	Males	83.8	87.3	87.4	83.8	87.3	87.4
(years at birth)	Females	87.1	89.9	90.0	87.1	89.9	90.0
Immigration rate (per 1,000)		7.6	7.8	6.6	7.6	7.8	6.6
Population growth		0.8	0.7	0.6	0.8	0.7	0.6
Ages 65+ population growth		1.5	1.0	0.8	1.5	1.0	0.8
Old age dependency ratio		38.8	43.3	44.0	38.9	43.2	44.1
Economic projections							
Nominal GDP growth		3.7	3.8	3.6	3.9	3.9	3.7
CPI and GDP inflation		2.0	2.0	2.0	2.0	2.0	2.0
Real GDP growth		1.7	1.8	1.6	1.9	1.9	1.7
Labour input growth		0.6	0.7	0.5	0.6	0.7	0.5
Labour productivity growth		1.1	1.1	1.1	1.2	1.2	1.2
Real GDP per capita growth		0.9	1.0	1.0	1.0	1.2	1.1
Unemployment rate		6.0	6.1	6.1	6.4	6.4	6.4
Employment rate		55.5	53.9	53.6	55.9	54.4	54.0
Participation rate		59.1	57.4	57.0	59.7	58.1	57.7
Average weekly hours worked (hours/week)		34.3	34.4	34.3	34.3	34.4	34.3
3-month treasury bill rate		4.2	4.2	4.2	4.2	4.2	4.2
10-year government bond rate		5.3	5.3	5.3	5.3	5.3	5.3

Source: Office of the Parliamentary Budget Officer.

Annex B
Labour input projection methodology

As discussed in Section 3, labour input (i.e., total hours worked) is determined by the size of the working age population (*LFPOP*), the aggregate employment rate (*LFER*) and the average weekly number of hours worked (*AHW*) by an employed individual in a given week:

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

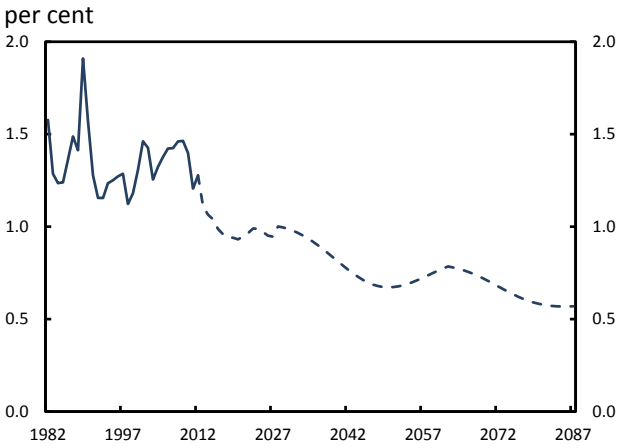
Each component is projected separately in PBO's projection in order to capture the different factors affecting their respective profiles. The demographic pressures noted above are projected to have important impacts on the working age population and the aggregate employment rate going forward.

i) Working age population

The working age population, defined as individuals 15 years of age and over, is taken from the Labour Force Survey.[43] Over the projection horizon it is extrapolated using the individual age and sex profiles from the demographic projections discussed earlier. Growth in the working age population has slowed steadily over the last 30 years, falling from roughly 1.6 per cent in 1982 to 1.3 per cent in 2012 (Figure B-1). Growth in the working age population is projected to continue to fall going forward, consistent with PBO's demographic projection.[44]

Figure B-1

Growth in the working age population, 1982 to 2087



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

ii) Aggregate employment rate

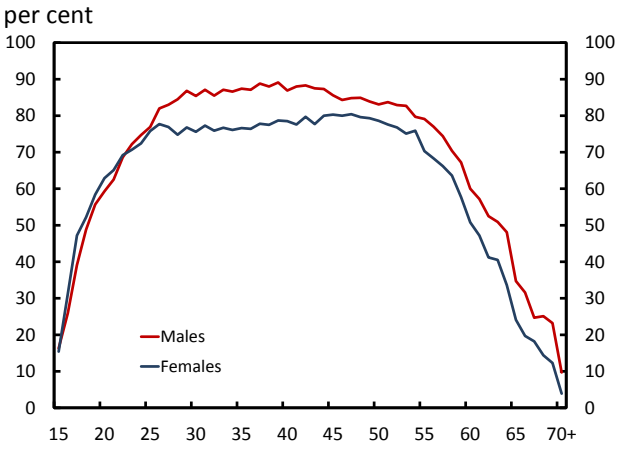
The aggregate employment rate, defined as total employment relative to the size of the working age population, is the second key determinant of the amount of labour input that will be influenced by the demographic transition. Age matters as employment rates follow an inverted-U shape, staying relatively low until the mid-20s when the majority of individuals transition from school into the labour force (Figure B-2). Participation in the labour market then rises and remains relatively stable throughout one's prime working years (25-54), before falling off after age 55 as individuals begin to transition into retirement and withdraw from the labour force.

[43] More specifically, Statistics Canada defines the (working age) population as those members of the civilian non-institutional population 15 years of age and over.

[44] The sample of labour market data in this report begins in 1981—the first year that National Accounts data is available.

Figure B-2

Employment rates by age, 2012

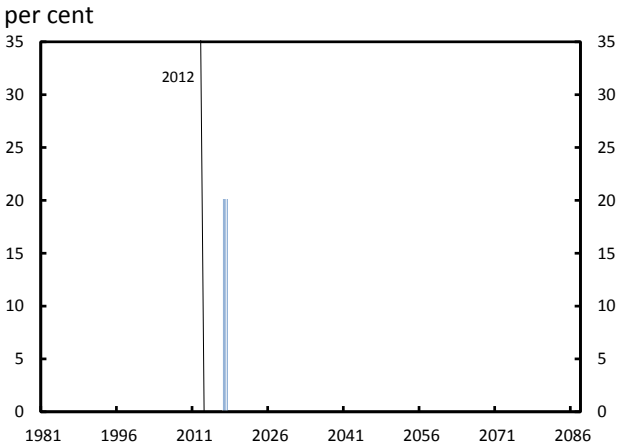


Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Therefore, the shift in the age composition of the Canadian population over the projection horizon towards older individuals will have important implications for the aggregate employment rate. Over the past 30 years, the share of the working age population 65 years of age and over has risen steadily from 12.3 per cent in 1981 to 17.8 per cent in 2012 – a 5.5-percentage point increase (Figure B-3). Based on PBO's projection this upward trend will accelerate rapidly in the next 20 years increasing 8.8 percentage points by 2029, as the large cohort of baby-boomers enter the 65 and over age group and live longer than earlier cohorts. The share of the working age population 65 and over is then projected to continue to rise, albeit at a slower pace, until around 2060, at which point the share stabilizes around 30 per cent.

Figure B-3

Population 65 years of age and over relative to the working age population, 1981 to 2087

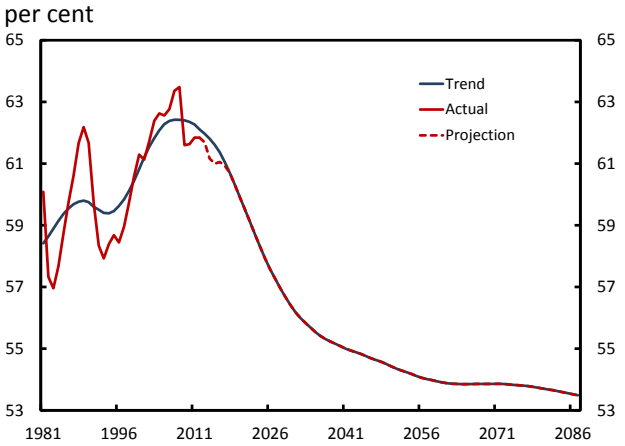


Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Over the medium term, the employment rate is projected to decline throughout the 2012 to 2017 period, as is the trend employment rate (Figure B-4). The employment rate is assumed to return to its trend level by 2018 and is projected to decline thereafter due to the shifting composition of the working age population. The projected decline in the employment rate is particularly steep in the earlier part of the projection, with the declines moderating somewhat beyond 2036.

Figure B-4

Aggregate employment rate, 1981 to 2087



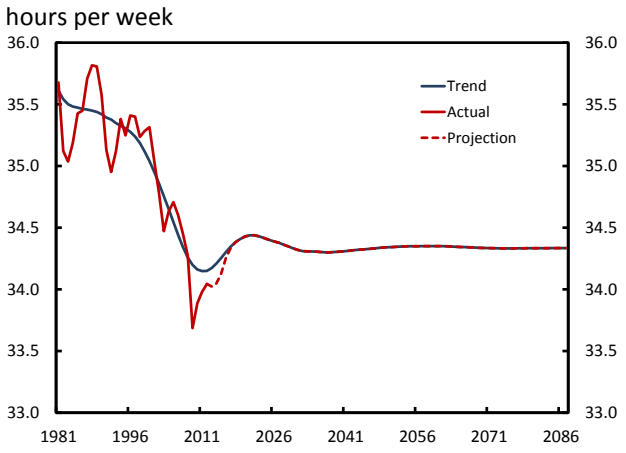
Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

iii) Average weekly hours worked

The final component of labour input, average weekly hours worked, is not projected to be significantly affected by the demographic transition. Average hours worked fell significantly in 2008 and 2009 as firms reduced production in the face of declining demand, but has subsequently rebounded toward its trend (Figure B-5). Over the 2013-2017 period, average hours worked are projected to increase strongly as the economy returns to trend. Average hours worked by employees are then assumed to return to trend by 2018 and are projected to remain relatively stable over the projection horizon.

Figure B-5

Average weekly hours worked, 1981 to 2087



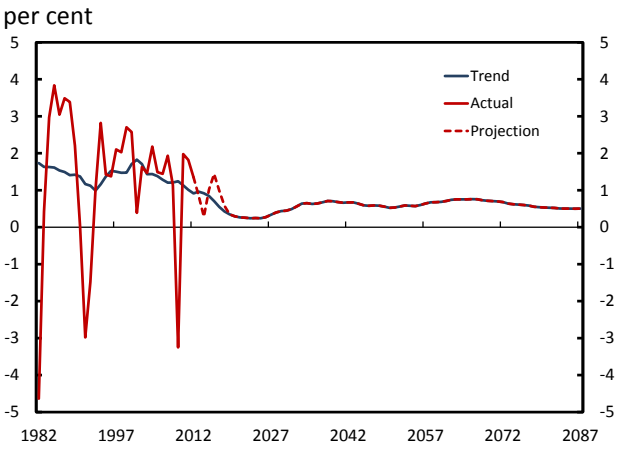
Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

iv) Labour input

The labour input projection is then constructed by combining the projections for the working age population, the aggregate employment rate and average weekly hours worked. In the near term, labour input growth is projected to remain volatile, being driven primarily by the economic cycle. However, beyond 2017 labour input growth is projected to decrease significantly due to the slowdown in the growth of the working age population and the projected decline in the aggregate employment rate (Figure B-6). Specifically, labour input growth is projected to fall from 1.3 per cent in 2012 to 0.3 per cent around 2022, but is then projected to average 0.6 per cent over the remainder of the projection horizon.

Figure B-6

Labour input growth, 1982 to 2087



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Annex C
Summary of FSR 2013 and FSR 2012 fiscal projections[1]

Table C-1

per cent of GDP

	FSR 2013			FSR 2012		
	2035	2060	2085	2035	2060	2085
Fiscal projections						
Federal government						
Revenue	14.5	14.5	14.5	15.0	15.0	15.0
Canada Health Transfer	1.6	1.6	1.6	1.6	1.6	1.6
Canada Social Transfer	0.5	0.4	0.4	0.5	0.4	0.3
Other transfers to governments	2.0	2.0	2.0	1.9	1.9	1.9
Elderly benefits[2]	2.7	2.4	1.8	2.9	2.8	2.4
Employment Insurance benefits	0.8	0.8	0.8	0.9	0.9	0.9
Children's benefits	0.6	0.6	0.6	0.7	0.7	0.6
Other program spending	4.6	4.6	4.6	4.7	4.7	4.7
Primary balance	1.6	2.1	2.7	1.8	2.0	2.4
Interest on the public debt	0.9	-1.3	-5.0	0.6	-1.8	-5.3
Net lending	0.7	3.4	7.7	1.2	3.8	7.8
Net debt	13.3	-31.6	-109.7	6.9	-41.7	-116.6
Other levels of government						
Own-source revenue	21.8	21.8	21.8	21.9	21.9	21.9
Health spending	10.2	12.2	13.7	10.5	12.7	14.5
Education spending	5.5	5.3	5.2	5.2	5.0	4.8
Social spending	1.4	1.3	1.3	1.3	1.3	1.3
Other program spending	9.5	9.5	9.5	9.7	9.7	9.7
Primary balance	-0.7	-2.6	-4.0	-0.7	-2.8	-4.6
Interest on the public debt	2.8	7.6	18.3	2.8	7.6	18.5
Net lending	-3.5	-10.1	-22.3	-3.5	-10.4	-23.1
Net debt	46.7	138.8	337.2	44.5	138.1	341.1
CPP/QPP						
Contributions	3.0	3.0	3.1	3.1	3.1	3.1
Expenditures	3.3	3.6	3.7	3.3	3.5	3.6
Net cash flow	-0.4	-0.5	-0.6	-0.3	-0.4	-0.5
Investment income	1.1	1.3	1.3	1.2	1.6	2.2
Net lending	0.8	0.8	0.7	0.9	1.2	1.7
Net assets	18.1	20.8	20.7	19.5	26.3	35.6

Source: Office of the Parliamentary Budget Officer.

Notes: [1]In addition to changes in the underlying economics and additional historical data, FSR 2012 was prepared according to the CSNA97 national accounting framework and FSR 2013 was prepared on a CSNA2012 basis. Consequently, they are are not directly comparable.

[2]In FSR 2012 the elderly benefits baseline included partial GDP per capita enrichment, while in FSR 2013 the baseline has no enrichment. Here, both projections have been presented with no enrichment.

Annex D
Government fiscal projection methodology

This annex describes PBO's long-term fiscal projection methodology for the federal and PTLA government sectors.

Government Finance Statistics (GFS) accounting framework

This report uses, on a calendar-year basis, Statistics Canada's preliminary GFS-based statistics (available from 1991 to 2012) and the underlying National Accounts statistics on which they are based (available from 1981 to 2012). These data ensure consistency across government sectors and can be used to put the PTLA on a consolidated basis.

Canada's System of National Accounts (CSNA2012), however, does not explicitly identify spending on health; rather it combines it with spending on social services to form a sub-sector in the provincial-territorial government sequence of accounts. PBO therefore uses data from the Canadian Institute for Health Information (CIHI) for government health spending. A residual spending category ensures that overall provincial-territorial spending matches the CSNA total.

Revenue projections

For long-term projections beyond 2017, PBO assumes that federal[45] and PTLA[46] own-source revenue will remain constant as a share of GDP (the broadest measure of the tax base) at 14.5 per cent and 21.8 per cent, respectively. This assumption implies certain government tax policies will adjust such that the tax burden on Canadians remains the same over the long-term projection horizon.[47] This approach is common to other independent fiscal institutions such as the Congressional Budget Office (CBO) in the United States and the Office for Budget Responsibility (OBR) in the United Kingdom.

Program spending projections

The general approach for projecting long-term federal and PTLA spending on programs decomposes growth in nominal spending on a given category (*EXP*) into its three key drivers: age composition (*AGE*), nominal income (*GDP*) and an enrichment factor (*X*).[48]

$$EXP_t = EXP_{t-1} \cdot \left(\frac{AGE_t}{AGE_{t-1}} \right) \cdot \left(\frac{GDP_t}{GDP_{t-1}} \right) \cdot (1 + X_t)$$

The age composition factor for each category attempts to capture the impact of changes in the population's age structure over time. Specifically, it is constructed as an index of the weighted (with weights ω_i) shares of age groups (Pop_i) in the population (Pop).

$$AGE_t = \sum_i \left[\omega_i \cdot \left(\frac{Pop_{i,t}}{Pop_t} \right) \right]$$

Individual spending programs are then projected according to shifts in their target demographics and particular legislation. Figure D-1 shows the population shares for the age groups affecting spending programs. While the under-18, 5-to-24, and 15-to-64 cohorts are gradually declining over the long term, the 65-and-over cohort is projected to increase significantly over the period, from 14.9 per cent of the population in 2012 to 26.0 per cent in 2087.

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[45] The medium-term projection of federal revenues is based on PBO's updated April 2013 EFO projections, revised to include the latest national accounts data and Fiscal Monitor results.

[46] The medium-term projection returns PTLA own-source revenue to its historical average share of the economy, from a cyclical low of 20.9 per cent of GDP in 2011 to 21.8 per cent in 2017. The average historical share was calculated over the period 1983 to 2012.

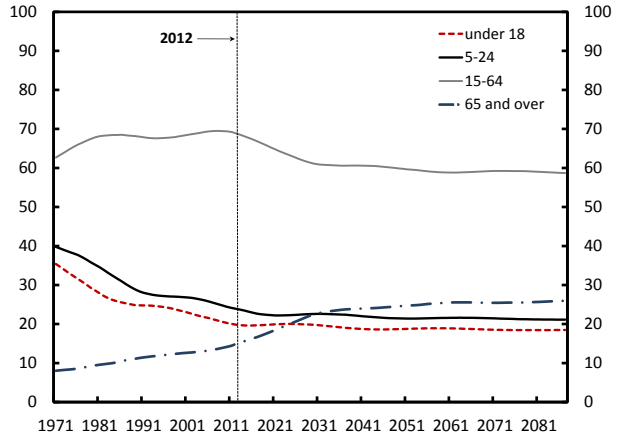
[47] Many of the largest revenue streams (e.g., taxes on goods and services and corporate income) have flat rate structures and would not need adjustment; however, future policy action must occur to maintain policies with progressive structures such as personal income tax.

[48] In some studies this factor is called *excess cost growth* or *residual cost growth*.

Figure D-1

Population shares for key age groups

per cent



Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

For categories in which benefits or spending are well targeted – for example federal spending on elderly benefits – the weights for age groups 65 and over are set equal to one and the weights for all other age groups are set equal to zero. In the case of PTLA government health spending, the weights are based on health expenditure data on a per capita age group basis produced by CIHI.

Consistent with FSR 2012, growth in the enrichment factor for health spending is set equal to its long-term historical average (1976 to 2012). For federal spending on elderly benefits, PBO has changed the enrichment assumption to more closely follow current policy, which indexes benefits only to CPI inflation. The long-term enrichment factor for EI is set such that the average benefit payment grows in line with nominal wages.

Alternative scenarios (including elderly benefits enrichment at half the growth of real GDP per capita—consistent with FSR 2012) are provided in Section 8.

For PTLA spending on education, social benefits and children's benefits, the enrichment factor is assumed to be zero over the long term.[49] This implies that relative to the size of the economy, spending on these categories will increase or decrease over the long term in line with changes in the age structure of the population. This means that spending targeted at relatively older (younger) age groups will increase (decrease) relative to GDP over the long term. Further, this assumption implies that inflation-adjusted spending per beneficiary is fully indexed to growth in real GDP per capita.

Consistent with FSR 2012, the remainder of program spending – excluding federal intergovernmental transfers – is assumed to grow in line with nominal GDP over the long term for both federal and PTLA government sectors.

Beyond 2024 – the next review date for the CHT and CST – PBO assumes that the CHT and CST will continue to increase annually at their escalators that will be in effect beginning in 2017 (i.e., average growth in nominal GDP and 3 per cent, respectively). Equalization and Territorial Formula Financing and other federal transfers, as well as transfers from provincial-territorial governments to the federal government, are assumed to grow in line with nominal GDP over the long term.

In this report, the stock of debt that is used to assess fiscal sustainability is based on the GFS concept of net financial worth, which is defined as financial assets less total liabilities. Rearranging these terms (i.e., total liabilities less financial assets) results in net debt which is typically the concept used to assess fiscal sustainability.

Debt accounting

Revenue and non-interest program spending form a government's primary balance.[50] The primary balance less interest payments is equivalent to net lending in the GFS framework and mirrors closely

[49] The medium-term outlook for spending on health, education and social benefits is constructed based on the long-term projection approach. However, in the case of health spending it is assumed that there is zero growth in enrichment (on average) over the period 2012 to 2016, reflecting a degree of spending restraint. Over the same period, growth in spending on education and social benefits is, on average, the same as projected using the long-term approach.

[50] Here PBO defines the primary balance as gross expenses (excluding consumption of fixed capital) plus the acquisition of nonfinancial capital.

the Public Accounts concept of the budgetary balance.

Federal and PTLA governments are assumed to finance any budgetary deficits (i.e., net borrowing from other sectors in the economy) by issuing interest-bearing debt. Similarly, any budgetary surpluses (i.e., net lending to other sectors in the economy) are used to pay down interest-bearing debt. In addition, it is assumed that there are no changes to the initial stock of financial assets and non-interest-bearing debt.

These assumptions result in the following evolution for a government's net debt:

$$Net\ Debt_t = Net\ Debt_{t-1} - Net\ Lending_t$$

To ensure a stable economic backdrop, and consistent with baseline projections in CBO (2012) and OBR (2013), PBO's long-term fiscal projections are constructed under the assumption that there is no feedback to the economy. However, rising debt ratios beyond the medium term could reduce GDP and/or put upward pressure on interest rates. Incorporating these effects would simply accelerate any projected increases in debt-to-GDP ratios.

Annex E
CPP and QPP projection methodology

This annex describes PBO's projection methodology for the Canada and Quebec Pension Plans.

The Office of the Chief Actuary and the Régie des rentes du Québec provide long-term projections of each plan's contributions, investment income and expenditures in their Actuarial Reports. The most recent report on the CPP is the 25th Actuarial Report on the Canada Pension Plan as at 31 December 2009. For the QPP, it is the 2nd Actuarial Update to the Actuarial Report of the Quebec Pension Plan as at 31 December 2009. Based on these reports, PBO has developed its own methodology to project CPP and QPP contributions, investment income and expenditures over a 75-year horizon using its own demographic and economic assumptions and projections.

CPP and QPP contributions

Growth in each plan's contributions (C_i) is composed of five factors: growth in the share of contributors in employment (*CRATIO*); growth in employment (*LFE*); CPI inflation; labour productivity growth (*gp*); and, a residual component. Series identified by the superscript *AR* are derived from the CPP and QPP Actuarial Reports.

This relationship can be expressed as:

$$C_{t,i} = C_{t-1,i} \cdot \frac{CRATIO^{AR}_{t,i}}{CRATIO^{AR}_{t-1,i}} \cdot \frac{LFE_{t,i}}{LFE_{t-1,i}} \cdot \frac{CPI_t}{CPI_{t-1}} \cdot (1+gp_t) \cdot (1+\varepsilon^{AR}_{t,i})$$

For the CPP, LFE refers to employment in Canada excluding Quebec and for the QPP it refers to employment in Quebec.[51] The residual growth component, ε^{AR}, is calculated as the difference between the growth in contributions from the actuarial reports and the growth rate produced from using the above growth decomposition and the projections for the other components from the actuarial reports. Over the projection horizon, the residual growth components for CPP and QPP contributions (derived from their actuarial reports) average zero.

$$(1+\varepsilon^{AR}_{t,i}) = \frac{C^{AR}_{t,i}}{C^{AR}_{t-1,i}} \cdot \left[\frac{CRATIO^{AR}_{t,i}}{CRATIO^{AR}_{t-1,i}} \cdot \frac{LFE^{AR}_{t,i}}{LFE^{AR}_{t-1,i}} \cdot \frac{CPI^{AR}_{t,i}}{CPI^{AR}_{t-1,i}} \cdot (1+gp^{AR}_{t,i}) \right]^{-1}$$

CPP and QPP expenditures

Expenditures for CPP and QPP are composed of benefits payments and administrative costs, with retirement benefits making up the largest share of total benefits. Similar to the approach used to project contributions, PBO uses a growth accounting framework to project CPP and QPP benefits.

Retirement benefits

Growth in retirement benefits for each plan (RB_i) consists of: growth in the share of beneficiaries in the population aged 65 and older (*BRATIO*); growth in population aged 65 and older (*POP65*); CPI inflation; labour productivity growth (*gp*); and, a residual growth component. In addition, growth in labour productivity is adjusted by a scaling factor (β) to reflect the fact that benefits of new entrants into the program are based on their history of contributory earnings (which will be rising through time in line with labour productivity growth) while benefits paid to existing plan members are indexed to inflation only.

$$RB_{t,i} = RB_{t-1,i} \cdot \frac{BRATIO^{AR}_{t,i}}{BRATIO^{AR}_{t-1,i}} \cdot \frac{POP65_{t,i}}{POP65_{t-1,i}} \cdot \frac{CPI_t}{CPI_{t-1}} \cdot (1+\beta_i \cdot gp_t) \cdot (1+\theta^{AR}_{t,i})$$

The residual growth component, θ^{AR}, is calculated as the difference between the growth in retirement benefits from the actuarial reports and the growth rate produced from using the above

[51] PBO's long-term demographic and economic projections are constructed at the national level. To allocate PBO's national population and employment projections to Canada excluding Quebec and to Quebec, PBO uses the distribution from the 25th Actuarial Report on the CPP.

growth decomposition and the projections for the other components from the actuarial reports.

$$\left(1+\theta_{t,i}^{AR}\right)=\frac{RB_{t,i}^{AR}}{RB_{t-1,i}^{AR}}\cdot\left[\frac{BRATIO_{t,i}^{AR}}{BRATIO_{t-1,i}^{AR}}\cdot\frac{POP65_{t,i}^{AR}}{POP65_{t-1,i}^{AR}}\cdot\frac{CPI_{t,i}^{AR}}{CPI_{t-1,i}^{AR}}\cdot\left(1+\beta_i\cdot gp_{t,1}^{AR}\right)\right]^{-1}$$

The scaling factor β is selected such that the residual growth component averages zero over the projection horizon. For the CPP (QPP), the scaling factor β is set at 0.75 (0.78).

Other benefits

Other benefits, which include disability benefits, death and survivor benefits, disabled contributor's child and orphan benefits, are projected using the same approach as for retirement benefits; however, the target population is expanded to ages 15 years and older. For the CPP (QPP), a scaling factor of 0.33 (0.07) is selected to ensure that the residual growth component is zero, on average, over the projection horizon based on the projected data and projected growth rates in the CPP and QPP Actuarial Reports.

Administrative costs

Administrative costs for each plan ($ADMIN_i$) are projected as a proportion of contributory earnings (*CEARN*) based on the projections of administrative costs relative to contributory earnings in the CPP and QPP Actuarial Reports, denoted by the superscript *AR*.

$$ADMIN_{t,i}=\frac{ADMIN_{t,i}^{AR}}{CEARN_{t,i}^{AR}}\cdot CEARN_{t,i}$$

Rate of return

Following the approach used in the actuarial reports, the 10-year Government of Canada bond rate serves as the benchmark rate of return for assets in the CPP and QPP investment portfolios. PBO assumes that the ultimate inflation-adjusted return on the 10-year Government of Canada bond rate is 3.3 per cent (5.3 per cent in nominal terms, assuming 2 per cent inflation). The inflation-adjusted rate of return on the investment portfolio is constructed by multiplying the share of each asset in the portfolio by its assumed rate of return. Thus for each type of asset, its assumed rate of return is comprised of the inflation-adjusted benchmark bond rate plus its long-run risk premium. Based on PBO's benchmark bond rate and the portfolio shares and risk premiums from the CPP Actuarial Report[52] the nominal return on the CPP and QPP investment portfolios is projected to ultimately reach 6.5 per cent, which is 20 basis points higher and 50 basis points lower, respectively, than assumed in the CPP and QPP[53] Actuarial Reports. This rate of return is then applied to each plan's assets in the previous period, which determines investment income for the current year.

[52] Asset shares of the CPP investment portfolio are taken from Table 63 in Office of the Superintendent of Financial Institutions Canada (2010).

[53] In the Actuarial Report of the Quebec Pension Plan as at 31 December 2009, after deducting management fees amounting to 25 basis points, the ultimate rate of return on QPP investments is 7.0 per cent.

Annex F
Fiscal gap definition

A government's budget balance *BB* is defined as $BB_t = PB_t - i_t \cdot D_{t-1}$, where *PB* is the primary balance (revenues minus program spending) and *i* is the effective rate on government debt *D*. Government debt accumulates according to $D_t = (1+i_t)\cdot D_{t-1} - PB_t$. Solving the debt accumulation equation forward and substituting yields:

$$D_t = \prod_{i=1}^{k}\left(\frac{1}{1+i_{t+i}}\right)\cdot D_{t+k} + \sum_{i=1}^{k}\prod_{j=1}^{i}\left(\frac{1}{1+i_{t+j}}\right)\cdot PB_{t+i}$$

Fiscal sustainability is conventionally defined as satisfying the condition that debt cannot ultimately grow faster than the interest rate. Denoting growth in debt as *x* and evaluating over the infinite horizon implies that if debt does not grow faster than the interest rate over the long term, then

$$\lim_{k\to\infty}\prod_{i=1}^{k}\left(\frac{1}{1+i_{t+i}}\right)\cdot D_{t+k} = \lim_{k\to\infty}\prod_{i=1}^{k}\left(\frac{1+x_{t+i}}{1+i_{t+i}}\right)\cdot D_t = 0;$$

and the relationship holds that the current debt level must equal the present value of future primary balances, which is the starting point for fiscal gap calculations.

$$D_t = \sum_{i=1}^{\infty}\prod_{j=1}^{i}\left(\frac{1}{1+i_{t+j}}\right)\cdot PB_{t+i}$$

Given projected primary balances $\overline{PB}$, the current level of debt is unlikely to equal the present value of primary balances; thus the fiscal gap is the difference between the current debt level and the present value of projected primary balances. The fiscal gap Δ is usually expressed as the immediate and permanent change to the projected primary balance, calculated as a constant proportion of projected GDP ($\overline{Y}$).

$$D_t = \sum_{i=1}^{\infty}\prod_{j=1}^{i}\left(\frac{1}{1+i_{t+j}}\right)\cdot\left(\overline{PB}_{t+i} + \Delta\cdot\overline{Y}_{t+i}\right)$$

$$\Delta = \frac{D_t - \sum_{i=1}^{\infty}\prod_{j=1}^{i}\left(\frac{1}{1+i_{t+j}}\right)\cdot\overline{PB}_{t+i}}{\sum_{i=1}^{\infty}\prod_{j=1}^{i}\left(\frac{1}{1+i_{t+j}}\right)\cdot\overline{Y}_{t+i}}$$

The fiscal gap can also be computed over finite horizons under alternative assumptions about the endpoint debt-to-GDP ratio d^* at some point *k* periods in the future. Typically the current debt-to-GDP ratio is used as the endpoint.

$$D_t = \prod_{i=1}^{k}\left(\frac{1}{1+i_{t+i}}\right)\cdot d^*\cdot\overline{Y}_{t+k} + \sum_{i=1}^{k}\prod_{j=1}^{i}\left(\frac{1}{1+i_{t+j}}\right)\cdot\left(\overline{PB}_{t+i} + \Delta\cdot\overline{Y}_{t+i}\right)$$

$$\Delta = \frac{D_t - \prod_{i=1}^{k}\left(\frac{1}{1+i_{t+i}}\right)\cdot d^*\cdot\overline{Y}_{t+k} - \sum_{i=1}^{k}\prod_{j=1}^{i}\left(\frac{1}{1+i_{t+j}}\right)\cdot PB_{t+i}}{\sum_{i=1}^{k}\prod_{j=1}^{i}\left(\frac{1}{1+i_{t+j}}\right)\cdot\overline{Y}_{t+i}}$$

The fiscal gap can also be expressed relative to GDP, where *g* represents growth in nominal GDP.

$$\Delta = \frac{\frac{D_t}{Y_t} - \prod_{i=1}^{k}\left(\frac{1+g_{t+i}}{1+i_{t+i}}\right)\cdot d^* - \sum_{i=1}^{k}\prod_{j=1}^{i}\left(\frac{1+g_{t+i}}{1+i_{t+j}}\right)\cdot\frac{\overline{PB}_{t+i}}{\overline{Y}_{t+i}}}{\sum_{i=1}^{k}\prod_{j=1}^{i}\left(\frac{1+g_{t+i}}{1+i_{t+j}}\right)}$$

Over the long-term projection horizon, PBO's assumed level of the effective interest rate on government debt exceeds its projected growth in nominal GDP.

In the case where interest rates and GDP growth rates are constant, the fiscal gap reduces to the following:

$$\Delta = \left(\frac{i-g}{1+g}\right)\cdot\left[\frac{D_t}{Y_t} - \left(\frac{1+g}{1+i}\right)^k\cdot d^* - \sum_{i=1}^{k}\left(\frac{1+g}{1+i}\right)^i\cdot\frac{\overline{PB}_{t+i}}{\overline{Y}_{t+i}}\right]$$