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BUREAU DU DIRECTEUR PARLEMENTAIRE DU BUDGET

Fiscal Sustainability Report 2012

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The mandate of the Parliamentary Budget Officer (PBO) is to provide independent analysis to Parliament on the state of the nation's finances, the government's estimates 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 sustainability of government finances by sector (i.e., federal and provincial-territorial-local governments as well as the Canada and Quebec Pension Plans) over the long term. PBO will be providing an update of the federal government's medium-term fiscal outlook later this fall.

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Contents

Summary	1
1 Fiscal Sustainability Reporting	6
2 Demographic Projection	7
3 Long-Term Economic Projection	9
4 Federal Government Revenue and Spending Projection	15
5 Provincial-Territorial-Local Government Revenue and Spending Projection	20
6 CPP and QPP Contribution and Expenditure Projection	23
7 Fiscal Sustainability Assessment	25
8 Sensitivity Analysis	36
References	44
Annex A – Summary of FSR 2012 and FSR 2011 Demographic and Economic Projections	46
Annex B – Summary of FSR 2012 and FSR 2011 Fiscal Projections	47
Annex C – Government Fiscal Projection Methodology	48
Annex D – CPP and QPP Projection Methodology	51
Annex E – Fiscal Gap Definition	53

Summary

This report provides PBO's assessment of the long-term sustainability of the federal and (consolidated) provincial-territorial-local governments' fiscal structures, as well as the Canada and Quebec Pension Plans (CPP and QPP). PBO's assessment of fiscal sustainability involves projecting government debt and, in the case of the CPP and QPP, pension plan assets over the long term based on assumptions about current program commitments and tax "burdens" given projected demographic and economic trends. Fiscal sustainability requires that government debt cannot ultimately grow faster than the economy. For the CPP and QPP, fiscal sustainability requires that their assets cannot ultimately grow slower than their expenditures.

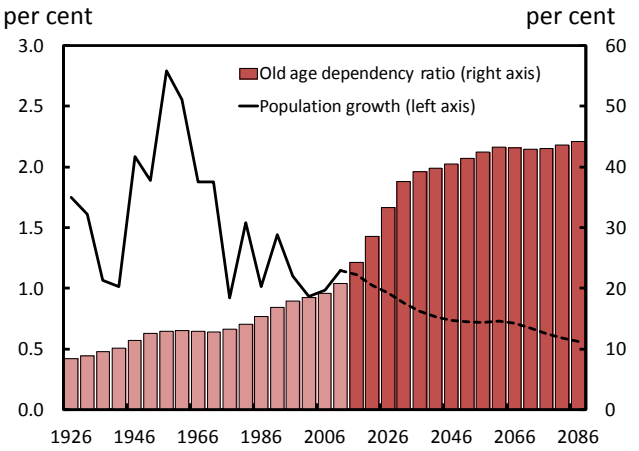
Following the Congressional Budget Office (CBO) in the United States and the Office for Budget Responsibility (OBR) in the United Kingdom, PBO also estimates the degree to which a government's fiscal structure is not sustainable using the fiscal gap, which is the amount of action required to achieve fiscal sustainability. Following the CPP and QPP Actuarial Reports, PBO also estimates the "steady-state" contribution rates to quantify the extent to which these plans are fiscally sustainable.

Long-term economic and fiscal projections provide an essential perspective for analyzing – consistent with the PBO's mandate – trends in the national economy and the state of the nation's finances. While long-term projections can be produced for various horizons, PBO uses a 75-year time horizon in order to fully capture the demographic transition in Canada. Moreover, it is the same time horizon over which the Office of the Chief Actuary projects incomes, expenditures and assets in the Actuarial Reports on the Canada Pension Plan. That said, given the large and inevitable uncertainty associated with such long-term projections this report includes a sensitivity analysis that considers different fiscal policy assumptions as well as alternative demographic and economic projections.

Although it is important to acknowledge that many elements of a long-term fiscal projection are uncertain, the ageing of Canada's population is not. The demographic transition – already underway – is expected to intensify over the long term, with population growth declining steadily and the ratio of individuals 65 years of age and over to the population 15 to 64 years of age (often referred to as the old age dependency ratio) rising sharply in the coming decades (Summary Figure 1).

Summary Figure 1

The Demographic Transition

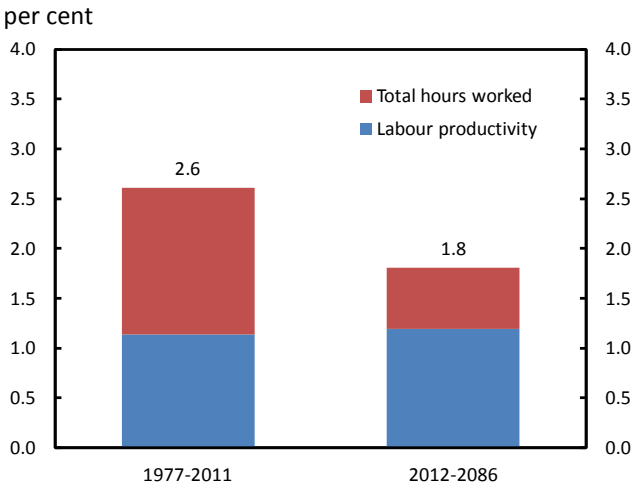


Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

The ageing of the population will move an increasing share of Canadians out of their prime working-age years and into their retirement years, resulting in slower growth in the labour force. Assuming that the pace of labour productivity growth over the last 35 years continues over the long term, PBO projects that slower labour force growth will reduce average annual real gross domestic product (GDP) growth from 2.6 per cent observed over 1977-2011 to 1.8 per cent over 2012-2086 (Summary Figure 2).

Summary Figure 2

Average Annual Real GDP Growth

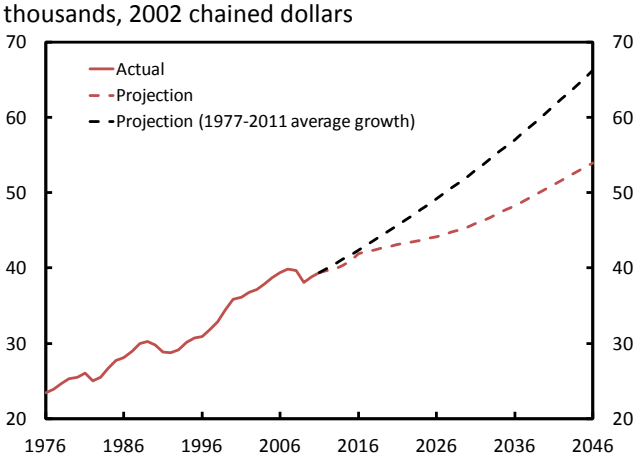


Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Based on PBO's long-term economic projection, growth in real GDP per capita – one of the most widely used indicators of living standards – will fall significantly over the next 35 years: from 1.5 per cent, on average, since 1977 to 0.9 per cent over the period 2012 to 2046, reflecting a slowdown in the growth of labour input relative to the population. As a result, real GDP per capita is projected to be $12,300 (18.5 per cent) lower than if its growth continued at the same rate it did over the last 35 years (Summary Figure 3).

Summary Figure 3

Real GDP Per Capita, 1976 to 2046



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

Fiscal Sustainability Assessment

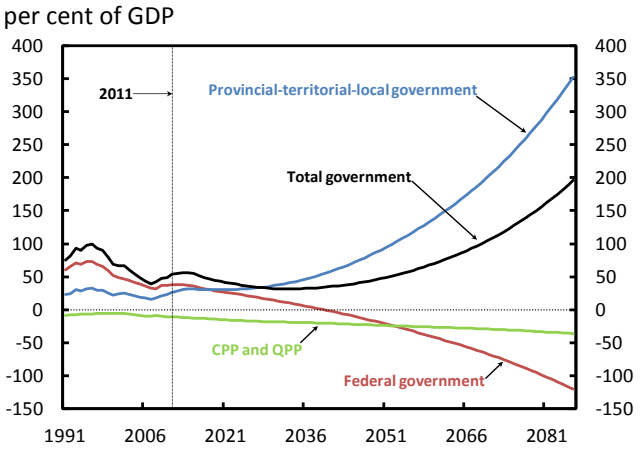
Population ageing will put downward pressure on revenues, as growth in economic activity, and therefore the tax base, slows. At the same time, ageing will put upward pressure on programs whose benefits are mostly realized by Canadians in older age groups, such as health care, elderly benefits and public pension benefits. The upward pressure on the costs of these programs will only be partially offset by reduced spending on programs with benefits largely focused on younger age groups, such as education, social and children's benefits. Assessing the sustainability of a government's or pension plan's fiscal structure involves projecting its financial position over the long term, taking into account the pressures from population ageing and other factors.

PBO's analysis suggests that the fiscal structures of the federal government, the CPP and QPP are sustainable over the long term; however, the fiscal structure of the provincial-territorial-local government sector is not. The analysis in this report assumes that recently announced reductions in government spending will be permanent, resulting in historically low levels of direct program spending relative to the size of the economy.

Summary Figure 4 presents PBO's projections of the net debt positions for the federal, provincial-territorial-local and CPP/QPP sectors, as well as the total government sector, relative to GDP. PBO projects the net debt of the total government sector to decline from 53.5 per cent of GDP in 2011 to 31.9 per cent in 2032. Thereafter, however, total government net debt climbs steadily, reaching just over 195 per cent of GDP by 2086.

Summary Figure 4

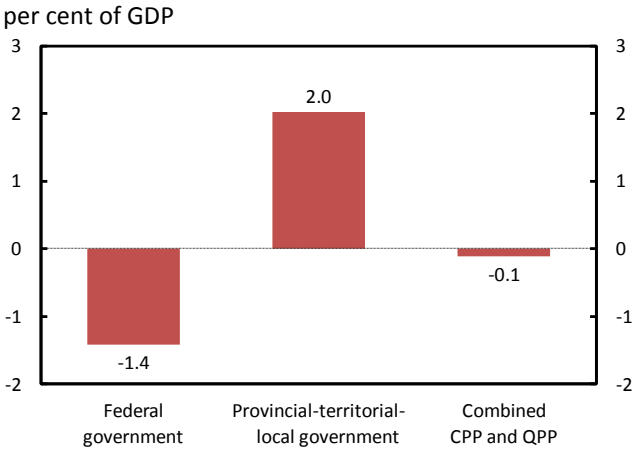
Government Sector Net Debt-to-GDP, 1991 to 2086



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

Summary Figure 5

Fiscal Gap Estimates



Source: Office of the Parliamentary Budget Officer.

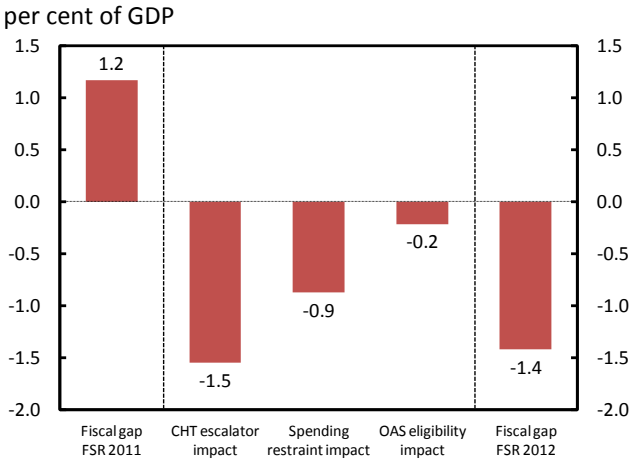
This rise in debt accumulation, however, reflects an acceleration in provincial-territorial-local government sector indebtedness that more than offsets the debt reduction, or asset accumulation, in the federal government and CPP/QPP sectors. Based on the projection of total government net debt relative to GDP, this would indicate that the government sector – as a whole – is not fiscally sustainable over the long term given that total government debt ultimately grows faster than the economy. However, it is important to note that this result stems from an unsustainable fiscal structure at the provincial-territorial-local government sector only – the fiscal structures of the federal government and CPP/QPP sectors are sustainable over the long term.

PBO estimates the federal fiscal gap to be -1.4 per cent of GDP, indicating that – relative to PBO's projection – the federal government could reduce revenue, increase program spending or some combination of both while maintaining fiscal sustainability (Summary Figure 5). To put PBO's estimate of the federal fiscal gap in context, it represents $25 billion of fiscal room in 2012 and the amount of this room, in dollar terms, would increase over time in line with GDP.

The change in PBO's assessment of federal fiscal sustainability from the September 2011 Fiscal Sustainability Report (FSR) reflects key policy changes over the course of the year: the reduction in growth in the Canada Health Transfer beyond 2016-17; reductions in direct program expenses; and, the increase in the age of eligibility for the Old Age Security (OAS) program (Summary Figure 6). In the absence of these policy changes, PBO estimates that the federal fiscal structure would not be sustainable and the federal fiscal gap would be 1.2 per cent of GDP.

Summary Figure 6

Impacts of Key Policy Changes on the Federal Fiscal Gap since the 2011 FSR



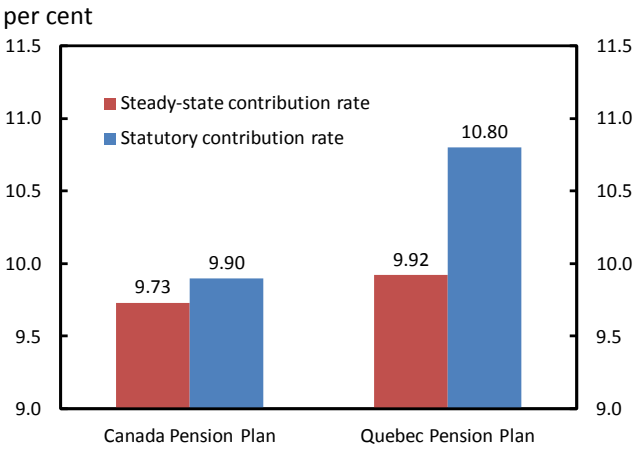
Source: Office of the Parliamentary Budget Officer.

In contrast, PBO estimates that addressing the provincial-territorial-local fiscal gap would require permanent policy actions of 2.0 per cent of GDP, either to raise taxes, reduce overall program spending, or some combination of both (Summary Figure 5). To put PBO's estimate of the provincial-territorial-local government fiscal gap in context, it represents $36 billion of fiscal actions in 2012 and the amount of these actions, in dollar terms, would increase over time in line with GDP.

PBO's fiscal gap estimates indicate that both the CPP and QPP are sustainable over the long term (Summary Figure 5). However, from an actuarial and policy perspective, estimating the fiscal gap of the CPP and/or QPP relative to the size of the Canadian economy may not be the most relevant indicator of fiscal sustainability for these plans. Therefore, to estimate the degree to which the CPP and QPP are fiscally sustainable PBO has adjusted its fiscal gap framework, bringing it more into line with approaches used in actuarial reports. Specifically, for each plan, given PBO's projection of contributory earnings, expenditures and rates of return, 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 current level. Comparing the statutory contribution rate to the steady-state rate also provides an indication of the "gap" between the current structure and a sustainable structure. PBO's estimates of the CPP and QPP steady-state contribution rates indicate that the plans' current structures are fiscally sustainable over the long term (Summary Figure 7).

Summary Figure 7

Steady-State Contribution Rate Estimates



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

Analogous to the fiscal gap, these estimates indicate that based on PBO's projections and endpoint assumptions, the contribution rate for the CPP could be reduced to 9.73 per cent beginning in 2012 while ultimately stabilizing the asset-to-expenditure ratio at its current level. Over the same horizon, the statutory contribution rate for the QPP could be set at 9.92 per cent beginning in 2012 while stabilizing the asset-to-expenditure ratio at its current level. It should be noted, however, that PBO is not recommending that contribution rates for the CPP and QPP be lowered from their legislated levels – PBO is only providing indicators of the plans' fiscal sustainability and quantifying the degree to which the CPP and QPP are sustainable based on concepts and measures used by the Chief Actuaries of the CPP and QPP. Specific policy recommendations are beyond the mandate of the PBO.

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 that:

- For the provincial-territorial-local government sector, implementing the required fiscal actions may be delayed until the economy has fully recovered without unduly increasing the size of the fiscal gap. However, significant delays in implementing the required actions substantially increase the amount of corrective measures.
    - Delaying fiscal actions by 5 years increases the fiscal gap from 2.0 to 2.3 per cent of GDP.
    - Delaying fiscal actions by 10, 20 and 30 years increase the fiscal gap to 2.6, 3.4 and 4.7 per cent of GDP, respectively.
- With a "younger" population over the long term, reflecting higher fertility and increased immigration levels, the fiscal gaps would be reduced from -1.4 to -1.8 per cent of GDP for the federal government, and from 2.0 to 1.8 per cent of GDP for the provincial-territorial-local government sector. Steady-state contribution rates would be reduced for the CPP from 9.73 to 9.18 per cent and for the QPP from 9.92 to 9.35 per cent.
- With higher real GDP growth (+0.5 percentage points) due to faster productivity growth the federal fiscal gap improves to -2.0 per cent of GDP; however, the provincial-territorial-local government fiscal gap is not significantly affected. Under this assumption, steady-state contribution rates for the CPP and QPP would be reduced to 9.55 and 9.68 per cent, respectively.
- Under the assumption of lower inflation-adjusted interest rates (-50 basis points), the federal fiscal gap improves to -1.7 per cent of GDP while the provincial-territorial-local fiscal gap is unaffected. Under the assumption of lower inflation-adjusted rates of return, the CPP steady-state contribution rate increases to 9.97 per cent, indicating that it is not fiscally sustainable. The QPP steady-state rate increases to 10.08 per cent but remains below its statutory rate, indicating that it is fiscally sustainable.

Caveats

PBO's long-term projections are best viewed as illustrative "what if" scenarios that attempt to 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. Furthermore, several important issues are beyond the scope of this report and have not been explicitly incorporated in this analysis. For instance, this report does not: consider the outlooks for individual provinces or territories; identify which fiscal actions should be taken or what a government's long-term debt-to-GDP objective should be; capture any interaction between government debt levels and economic activity; or, assess the implications for intergenerational equity.

1 Fiscal Sustainability Reporting

On their own, medium-term fiscal projections provide a useful but incomplete description of the challenges policymakers face. The main limitation of analysis based on medium-term projections is that, given the major demographic transition underway in Canada and many other countries, they cannot be used to determine whether a government's fiscal structure is *sustainable* over the long term.[1] A sustainable fiscal structure is one that does not lead to a government's debt growing faster than the economy over the long term.

Over the coming decades, population ageing will move an increasing share of the population out of their prime working-age years and into their retirement years. With an older population, spending pressures in areas such as health care, elderly benefits and public pensions are projected to increase. At the same time, slower labour force growth is projected to restrain growth in the economy, which will slow the growth of the general tax base from which government collects its revenue.

PBO believes that long-term economic and fiscal projections provide an essential perspective for analysing – consistent with its mandate – trends in the national economy and the state of the nation's finances.

In February 2010, PBO released its first Fiscal Sustainability Report[2] (FSR), which committed PBO to preparing long-term economic and fiscal projections and to providing a FSR on a regular basis. PBO's FSR 2011[3] expanded the analytical scope to include, on a consolidated basis, the provincial and territorial governments. In the 2011 Article IV Report for Canada[4], International Monetary Fund (IMF) staff welcomed these reports and acknowledged that they are an "important first step forward" in terms of providing regular and comprehensive fiscal sustainability reporting. PBO subsequently used its FSR 2011 framework to assess the impact of policy changes by the Government of Canada on fiscal sustainability, specifically changes to the Canadian Health Transfer and Old Age Security (OAS) program.[5] PBO's FSR 2012 expands the analytical scope further to include, on a consolidated basis, the provincial, territorial, and, now, local governments, as well as the Canada Pension Plan (CPP) and Quebec Pension Plan (QPP).

Prior to the publication of FSR 2010, long-term fiscal projections for Canada were last published in Department of Finance Canada staff working papers.[6] However, since these papers were published about a decade ago there have been significant economic and fiscal changes. While these research papers did not represent the official views of the Government of Canada, Budget 2007 committed to "publish a comprehensive fiscal sustainability and intergenerational report with the 2007 *Economic and Fiscal Update*". This report would "provide a broad analysis of current and future demographic changes and the implication of these changes for Canada's long-run economic and fiscal outlook". The Government's report is yet to be published. PBO believes that the Government could improve fiscal transparency by fulfilling its Budget 2007 commitment to publish a fiscal sustainability and intergenerational report.

In contrast, governments in several Organisation for Economic Co-operation and Development (OECD) countries have assessed fiscal sustainability by routinely preparing long-term economic and fiscal projections. According to the OECD[7] such reports "offer invaluable signposts to help current governments to respond to known fiscal pressures

[1] OECD (2009) suggests that, in addition to demographic change, fiscal pressures and risks stemming from global climate change and contingent government liabilities (e.g., guarantees on government loans and uncertain public-private relationships) could also be incorporated into long-term fiscal projections.
[2] http://www.pbo-dpb.gc.ca/files/files/Publications/FSR_2010.pdf.
[3] http://www.pbo-dpb.gc.ca/files/files/Publications/FSR_2011.pdf.
[4] http://www.imf.org/external/pubs/ft/scr/2011/cr11364.pdf.
[5] http://pbo-dpb.gc.ca/files/files/Publications/Renewing_CHT.pdf and http://pbo-dpb.gc.ca/files/files/Publications/Sustainability_OAS.pdf.
[6] See King, P. and H. Jackson (2000), Jackson, H. and C. Matier (2003), and Kennedy, S. and C. Matier (2003).
[7] "The Benefits of Long-term Fiscal Projections." OECD Policy Brief. Available at: http://www.oecd.org/dataoecd/40/26/43836144.pdf.

and risks in a gradual manner, earlier rather than later, and help future governments avoid being forced to adopt sudden policy changes". Examples of countries that have undertaken long-term fiscal projections include the United States, United Kingdom, Australia, New Zealand, and the European Commission.

In preparing its long-term fiscal analysis, PBO bases its analysis, in part, on the recommendations outlined by the OECD and others.[8] These include:

- Fiscal projections should be prepared on an annual basis;
- Fiscal projections should incorporate comparisons with past government assessments;
- Fiscal projections should include sensitivity analysis (or "alternative scenarios") for changes in demographic, macro- and microeconomic, and other assumptions;
- Fiscal projections should clearly present changes in the methodology, key assumptions, and data sources; and,
- Fiscal projections should be used to illustrate the fiscal consequences of past reforms or general policy options.

Long-term fiscal projections, however, should not be regarded as forecasts or predictions of the most likely economic and fiscal outcomes rather they should be viewed as "what-if" scenarios. Indeed, an unsustainable fiscal structure could result in an explosive increase in a government's debt-to-GDP ratio over the long term. Such a scenario would not likely be realized as responses by the government, households, firms and financial markets would bring about changes to this structure. Nonetheless, long-term debt-to-GDP projections serve as a useful signal and a gauge of fiscal sustainability although it is important to recognize that they are – as is the case with all long-term projections – subject to considerable uncertainty.

Further, the size of the fiscal action needed to achieve fiscal sustainability – the "fiscal gap" – can be estimated using the underlying projections of revenue and spending and given assumptions about long-term debt-to-GDP levels. Estimates of the fiscal gap, however, cannot be used to determine which actions should be taken to achieve fiscal sustainability over the long term or what a government's debt-to-GDP ratio should be in the long term.

2 Demographic Projection

Canada, like most industrialized countries, is undergoing a demographic transition that will have profound impacts on the Canadian 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.[9] Specifically, PBO's demographic projection is driven by three key assumptions regarding the total fertility rate, life expectancy at birth and the immigration rate.

[8] Anderson, B. and J. Sheppard (2009).

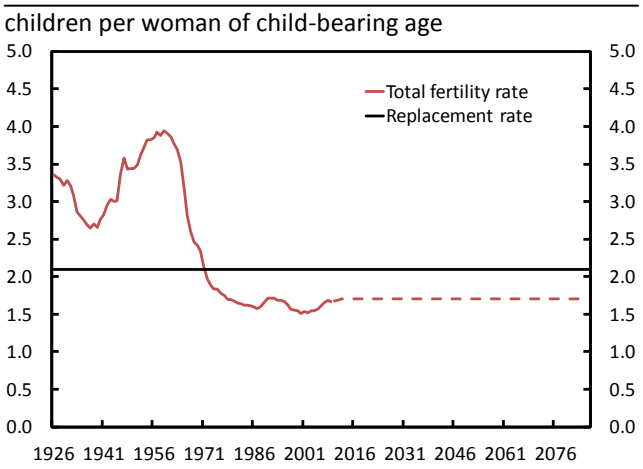
[9] This approach is the same as that used in FSR 2011, but updated to include Statistics Canada's current population estimates for 2011. Beyond 2011, single year age and sex groups are extrapolated using Statistics Canada (2010) imputed growth rates. Annex A provides a summary of the demographic projections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

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 towards the end of the period known as the "baby boom" and has declined significantly since then; remaining well below the replacement rate of 2.1 children per woman since the 1970s (Figure 2-1). Over the projection horizon, PBO has assumed that the fertility rate will remain at 1.7 children per woman of child bearing age, which is consistent with Statistics Canada (2010) medium scenario and in line with the most recent data for 2009 of 1.67 children per woman of child bearing age.

Figure 2-1

Total Fertility Rate, 1926 to 2086



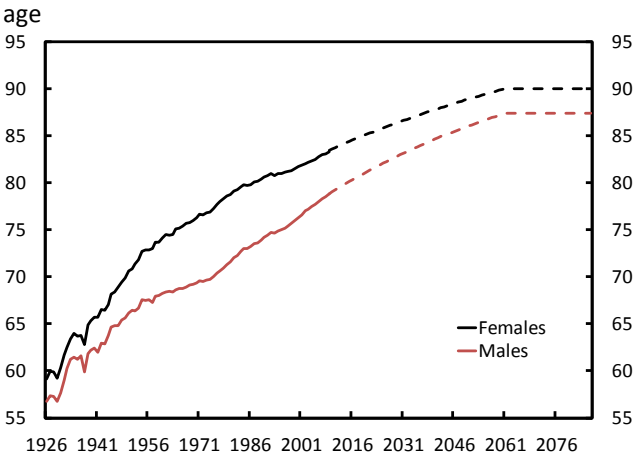
Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Life Expectancy at Birth

Life expectancy at birth has 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, on average, have always had higher life expectancies at birth relative to their male counterparts, although the gap between the two sexes has varied substantially over time. For example, a woman born in 1926 could, at that time, be expected to live approximately 2.3 years longer than a man born in the same year. However, 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 7.3 years had opened up 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 over this period, narrowing the gap between female and male life expectancies to 4.5 years.

Figure 2-2

Life Expectancy at Birth, 1926 to 2086



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

Going forward, PBO has chosen to use assumptions consistent with Statistics Canada (2010) medium scenario with life expectancies at birth projected to continue to improve, for both males and females, until 2061 at which point PBO has assumed that they will remain stable until 2086. Specifically, life expectancy at birth for males and females is projected to improve to 87.4 years and 90.0 years respectively.

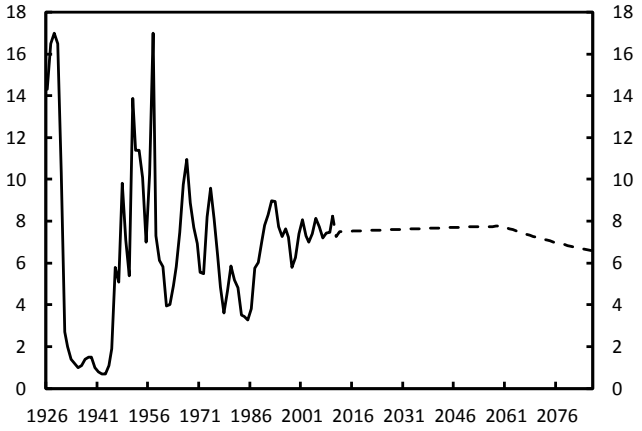
Immigration Rate

The third assumption affecting PBO's population projection is the rate of immigration to Canada. The immigration rate has fluctuated significantly since 1926 reflecting the different immigration policies that existed at given points in time (Figure 2-3). Since the mid-1990s immigration rates have been fairly stable averaging approximately 7.3 immigrants per 1,000 persons in the population. Going forward, PBO has assumed

that the immigration rate will average 7.6 per 1,000 persons from 2011 to 2061 at which point the level of immigration is assumed to remain constant, implying a falling immigration rate beyond 2061.

Figure 2-3

Immigration Rate, 1926 to 2086



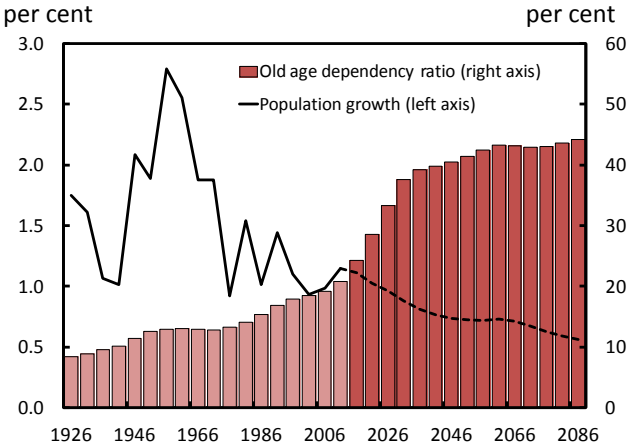
Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

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 ratio of individuals 65 years of age and over divided by the population between 15 to 64 years of age (often referred to as the old age dependency ratio), is projected to increase significantly in the coming decades. This ratio is projected to increase by 7.8 percentage points from 20.8 per cent in 2011 to 28.6 per cent by 2021, which is only slightly less than the total increase observed over the last four decades. Moreover, the pace of increase is expected to gain momentum, pushing the dependency ratio to 37.5 per cent by 2031. The pace is then projected to slow after 2031 but the ratio continues to rise, reaching 43.3 per cent by 2061 and 44.2 per cent by 2086. Said differently, in 1971 there were approximately 7.8 persons between the ages of 15 to 64 for every individual 65 years of age and over, the traditional retirement age group. By 2011 the ratio had fallen to 4.8 and is projected to continue falling, reaching 3.5 and 2.7 by 2021 and 2031 respectively before stabilizing at around 2.3 after 2060.

Figure 2-4

Population Growth and the Old Age Dependency Ratio, 1926 to 2086



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

3 Long-Term Economic Projection

The second component of PBO's fiscal projection is its economic outlook. Over the 2012 to 2016 period the economic projection is taken from PBO's April 2012 Economic and Fiscal Outlook (EFO), updated for newly released economic data. Beyond 2016, the economic projection is based on PBO's current estimate of potential GDP growth[10] and long-term assumptions for: Consumer Price Index (CPI) inflation, GDP inflation, 3-month treasury bill rate, and the 10-year Government of Canada bond rate. Annex A provides a summary of the long-term economic projections in the 2012 and 2011 FSRs.

[10] Since its April 2012 EFO, PBO has updated its estimate of potential GDP to reflect 2011 productivity and labour force data.

PBO's April 2012 EFO provides a natural starting point for the long-term projection since, based on the April 2012 EFO, the output gap (i.e., the level of real GDP relative to potential GDP) is essentially closed by 2016 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 2016 is based on its estimate of potential GDP growth.[11] 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 (*LFPOP*), the aggregate employment rate (*LFER*) and the average weekly number of hours worked (*AHW*) by an employed individual in a given week:

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

[11] See PBO (2010a) for additional detail on the methodology and assumptions used to construct estimates of potential GDP.

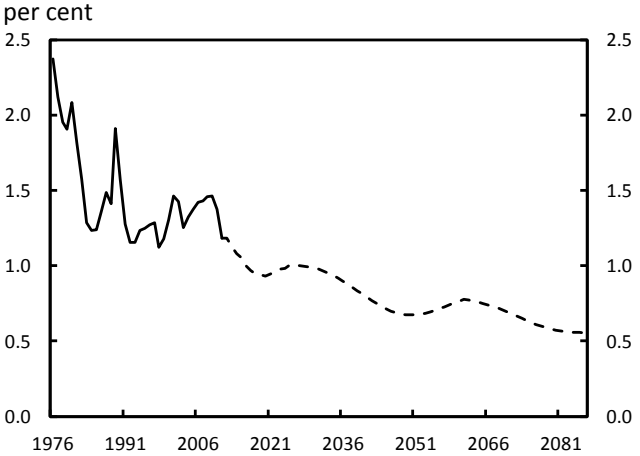
Each component is projected separately in PBO's projection in order to capture the different factors affecting their respective profiles. The demographic pressures noted above are projected to have important impacts on the working age population and the aggregate employment rate going forward.

i) Working Age Population

The working age population, defined as individuals 15 years of age and over, is taken from the Labour Force Survey.[12] 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 by nearly half in the last 35 years, falling from roughly 2.1 per cent in 1977 to 1.2 per cent in 2011 (Figure 3-1). Growth in the working age population is projected to continue to fall going forward, consistent with PBO's demographic projection.[13]

Figure 3-1

Growth in the Working Age Population, 1976 to 2086



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

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

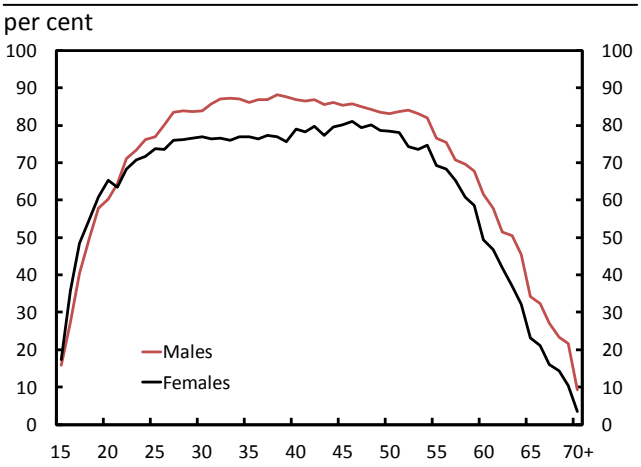
[13] The sample of labour market data in this report begins in 1976 – the first year that Labour Force Survey data is available.

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 3-2). 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.

Figure 3-2

Employment Rates by Age, 2011

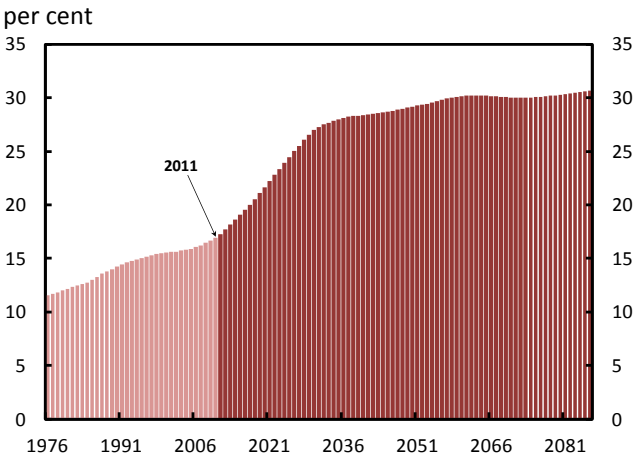


Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

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 35 years, the share of the working age population 65 years of age and over has risen steadily from 11.6 per cent in 1976 to 17.2 per cent in 2011 – a 5.6-percentage point increase (Figure 3-3). Based on PBO's projection this upward trend will accelerate rapidly in the next 20 years increasing 9.4 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 3-3

Population 65 years of Age and Over Relative to the Working Age Population, 1976 to 2086

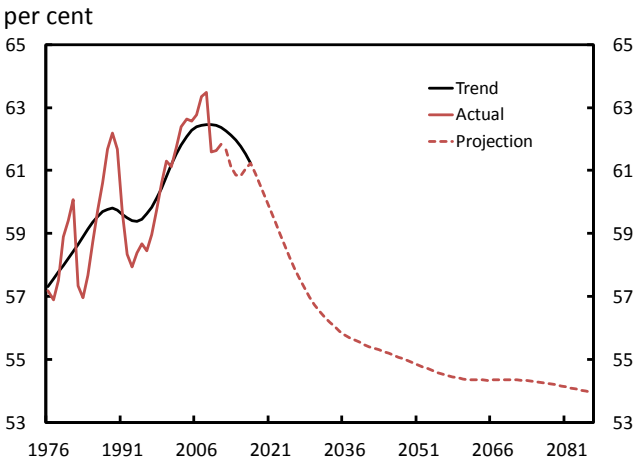


Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Over the medium term, the employment rate is projected to decline throughout the 2012 to 2016 period, as is the trend employment rate (Figure 3-4). The employment rate is assumed to return to its trend level by 2017 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 3-4

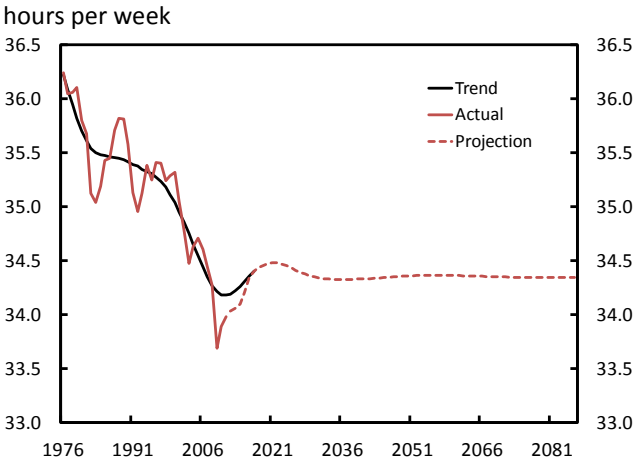
Aggregate Employment Rate, 1976 to 2086



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

Figure 3-5

Average Weekly Hours Worked, 1976 to 2086



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

iii) Average Weekly Hours Worked

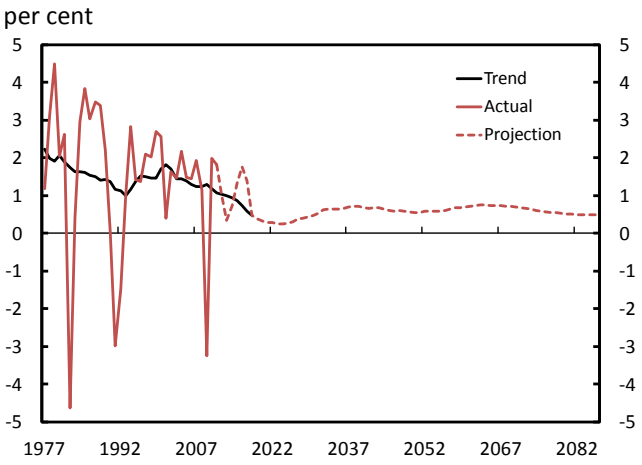
The final component of labour input, average weekly hours worked, is not projected to be significantly affected by the demographic transition. Average hours worked fell significantly in 2008 and 2009 as firms reduced production in the face of declining demand, but has subsequently rebounded toward its trend (Figure 3-5). Over the 2012-2016 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 2017 and are projected to remain relatively stable over the projection horizon.

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 2016 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 3-6). Specifically, labour input growth is projected to fall from 1.8 per cent in 2011 to 0.3 per cent around 2021, but is then projected to average 0.6 per cent over the remainder of the projection horizon.

Figure 3-6

Labour Input Growth, 1977 to 2086



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 35 years, averaging 1.2 per cent since 1977. 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.

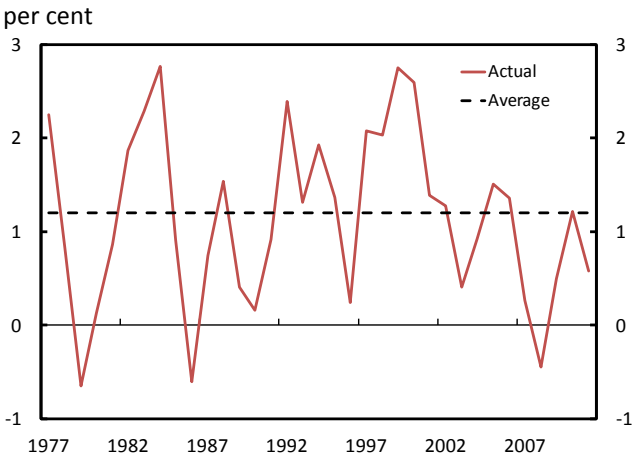
Beyond 2016, PBO has assumed that labour productivity growth will return to 1.2 per cent, the average rate observed since 1977 (Figure 3-7). PBO believes that this is a reasonable assumption given Canada's recent productivity performance. Although some research suggests that labour productivity growth 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 thus suggesting that population ageing will put downward pressure on productivity.[14] After reviewing research on population ageing and productivity, Beach (2008) notes:

> What, then, is the empirical evidence on the effect of population aging on productivity and, hence, on living standards? Again, unfortunately, there is no real consensus of empirical estimates, evidence from past experience may not be valid in the future, and evidence from some countries may not be appropriate for other countries because of institutional differences or differences in social norms.

Consistent with FSR 2010 and FSR 2011, by assuming labour productivity growth returns to its long-term historical average, PBO has taken a neutral assumption with respect to the impact of population ageing on labour productivity growth.

Figure 3-7

Labour Productivity Growth, 1977 to 2011



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

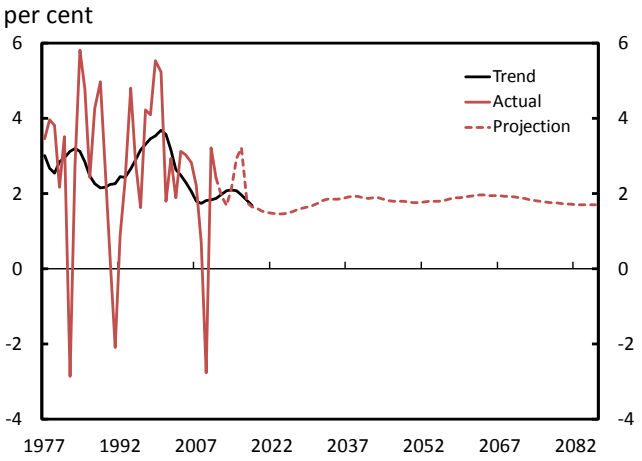
[14] For a review of the research on the effects of ageing on labour productivity see Beach, C.M, "Canada's Aging Workforce: Participation, Productivity, and Living Standards" Proceedings of a conference held by the Bank of Canada, November 2008. http://www.bankofcanada.ca/wp-content/uploads/2010/09/beach.pdf.

Real GDP Growth

While expected to grow faster than potential GDP through 2016, as the output gap closes, real GDP is projected to grow at the same rate as potential GDP over the long term (Figure 3-8). Real GDP growth is projected to decline over the projection horizon in line with the decline in labour input growth. More precisely, real GDP growth is projected to fall from 2.6 per cent growth, on average, over the last 20 years to average growth of only 1.8 per cent over the next two decades.

Figure 3-8

Real GDP Growth, 1977 to 2086



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

Real GDP per Capita

As one of the most commonly used measures of increases in living standards, growth in real GDP per capita is often used as a benchmark to "enrich" program entitlements in preparing long-term fiscal projections. 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).

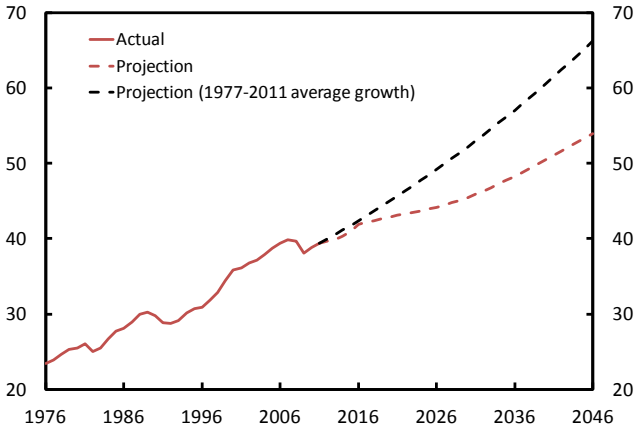
Over the last 35 years, growth in real GDP per capita has exceeded growth in labour productivity. This has occurred because labour input growth exceeded growth in the total population thus contributing positively to the growth in real GDP per capita. This stronger labour input growth relative to total 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 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 35 years. Real GDP per capita grew by 1.5 per cent annually, on average, since 1977, but is projected to average growth of only 0.9 per cent (annually) from 2012 to 2046. 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 2046 is projected to be nearly 18.5 per cent ($12,300) less than if real GDP per capita were to grow at the same rate it did over the last 35 years (Figure 3-9).

Figure 3-9

Real GDP per Capita, 1976 to 2046

thousands, chained 2002 dollars



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

Other Assumptions

Over the long term, PBO makes assumptions for the following variables: CPI inflation, GDP inflation, 3-month treasury bill rate, and the 10-year government benchmark bond rate. CPI and GDP inflation are assumed 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 rates of return of 2.2 and 3.3 per cent respectively, which is equal to the average ex post real rates of return observed over the 1993 to 2007 period.[15]

4 Federal Government Revenue and Spending Projection

The major demographic transition that is underway in Canada will strain governments' finances over the next several decades. During this time, population ageing will move an increasing share of the population out of their prime working-age years and into their retirement years. This will put downward pressure on revenues, as growth in economic activity, and therefore the tax base, slows. At the same time, ageing will put upward pressure on programs whose benefits are entirely or disproportionately realized by Canadians in older age groups, such as elderly benefits, health care and public pension benefits. The upward pressure on the costs of these programs will only be partially offset by reduced spending (as a share of GDP) on programs with benefits largely focused on younger age groups, such as education, social services and children's benefits.

This section presents the baseline revenue and program spending projections for the federal government, which build on the medium-term fiscal outlook presented in the April 2012 EFO. Sections 5 and 6 present the baseline fiscal projections for the provincial-territorial-local government and CPP/QPP sectors, respectively. Annex B provides a summary of key federal fiscal projections in the 2012 and 2011 FSRs. Annex C provides additional detail on the projection methodology for the federal government sector.

Federal Government Revenue

Federal revenues consist of taxes on income and excise goods as well as EI premiums and to a lesser extent investments and sales of goods and services. Federal revenues are projected to rebound from a low of 14.0 per cent in 2011 to 15.0 per cent of GDP in 2016 as the economy recovers over the medium term (Figure 4-1).[16] Over the long term, revenues are assumed to remain at 15.0 per cent of GDP, which is lower than the long-term historical average of 16.5 per cent, reflecting PBO's assumption that tax reductions implemented to date will endure.

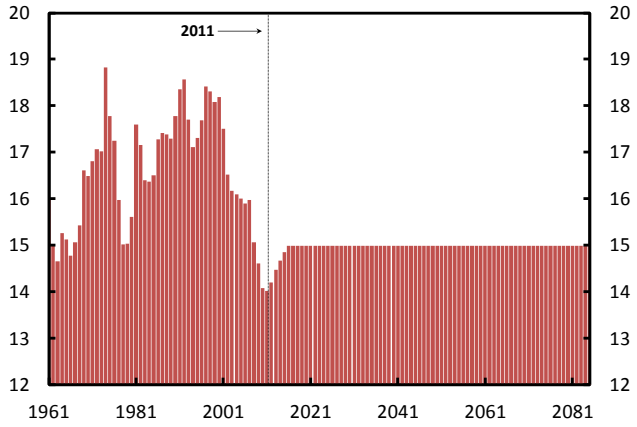
[15] This period was chosen to reflect the current monetary policy regime, but also to abstract from the recent financial crisis.

[16] The medium-term rebound reflects the economy returning to its potential GDP, as well as increases in EI premium rates and measures to close tax loopholes and phase out tax preferences.

Figure 4-1

Federal Government Revenue, 1961 to 2086

per cent of GDP



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

Further, the constant tax "burden" assumption implicitly assumes that future policy action will be taken to adjust tax rates so that rising incomes do not increase the tax burden on Canadians (e.g., by being pushed into higher brackets of the progressive personal income (PIT) tax system).[17]

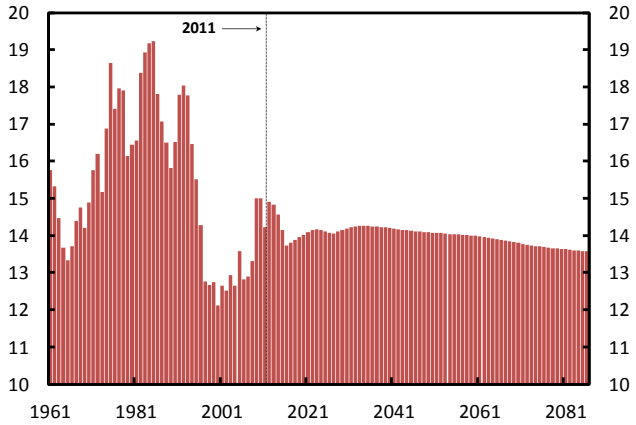
Federal Government Program Spending

The federal government's program spending consists of major transfers to persons and other levels of government, as well as direct program expenses. PBO projects program spending to settle at roughly 14 per cent of GDP over the long term after varying as high as 14.9 per cent and as low as 13.6 per cent over the medium term (Figure 4-2). There is a small trend decrease in the outer years of the projection as demographic pressures decline. PBO projects federal program spending to reach 13.6 per cent of GDP by the end of the projection horizon, which is almost 2 percentage points lower than its long-term historical average (15.4 per cent of GDP). Projections of individual program categories follow below.

Figure 4-2

Federal Government Program Spending, 1961 to 2086

per cent of GDP



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

Elderly Benefits

PBO's projection of elderly benefits (OAS, GIS, and the Allowance) grows in line with the number of recipients (i.e., the eligible population) and the average benefit payment, which is assumed to increase with the Consumer Price Index and an enrichment factor. In its 2012 budget, the federal government changed the age of eligibility for the elderly benefits program (see Box 4-1). PBO has subsequently updated the recipient population in the projection to reflect the new schedule of eligibility.

[17] Future PIT revenues may also be boosted somewhat due to the withdrawal of Registered Retirement Savings Plan and Registered Retirement Plan assets by retiring individuals that is likely to occur over the projection period due to the ageing of the population. Studies by the OECD (2004) e.g., see Antolin, P. et al., "Long-Term Budgetary Implications of Tax-Favoured Retirement Savings Plans" and the Department of Finance (2003), "Long-Run projections of the Tax Expenditure on Retirement Savings" in Tax Expenditure and Evaluations 2003, however, indicate that this effect will likely be small. Further, this effect may be tempered by the increasing use and expansion of Tax-Free Savings Accounts (TFSAs), which earn tax-free investment income.

Box 4-1: Budget 2012 Changes to Federal Elderly Benefits

The 2012 federal budget announced an increase in the age of eligibility for OAS/GIS from 65 to 67 over the period 2023-2029. This was accompanied by a similar increase for the Allowance and the Allowance for the Survivor programs from ages 60-64 to 62-66.

Those born in the years 1958-1962 will be subject to a phase-in schedule by month of birth – beginning with potential recipients born in April 1958 – which gradually delays eligibility in bi-monthly increments over four years.

Additionally, a voluntary deferral scheme was implemented with the incentive that OAS benefits will be increased by 0.6 per cent per month of deferral (up to a maximum increase of 36 per cent over a maximum deferral period of 5 years). The potential impact of this change, however, has not been incorporated into PBO's projection of elderly benefits.

The 11th Actuarial Report (http://www.osfi-bsif.gc.ca/app/DocRepository/1/eng/reports/oca/OAS11_e.pdf) provides estimates of the Budget 2012 changes to the OAS program.

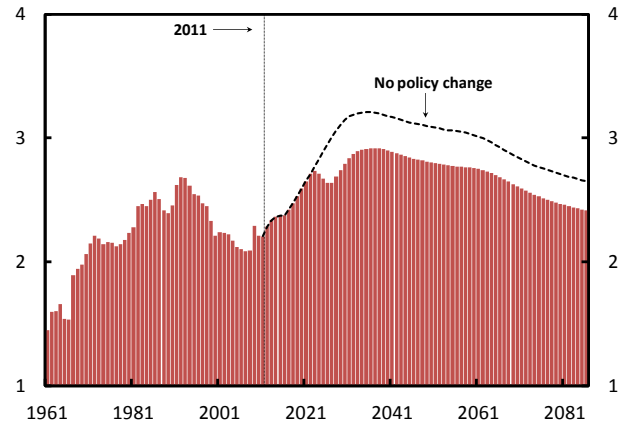
The changes to the age of eligibility for the elderly benefits program will begin to be felt in 2023 when growth in the eligible population stalls as the new ages of eligibility are implemented. For example, a potential recipient born in February 1960 would have entered the pool of beneficiaries upon turning 65 in February 2025. Instead, the recipient will have his or her eligibility delayed one year to February 2026.[18]

The increase in the age of eligibility for elderly benefits lowers projected spending – which would have reached a peak of 3.2 per cent of GDP in 2036 under the previous eligibility rules, but now reaches a peak of 2.9 per cent (Figure 4-3). From its peak, benefit payments are expected to remain at around 2.8 per cent of GDP for the following two decades before gradually declining to 2.4 per cent toward the end of the projection horizon (0.2 percentage points of GDP lower than would be the case without the Budget 2012 policy changes). Relative to GDP, spending on elderly benefits falls because growth of the population 67 and over declines and because benefit enrichment lags real GDP per capita growth (Box 4-2).

Figure 4-3

Elderly Benefits, 1961 to 2086

per cent of GDP



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

Box 4-2: Enriching Elderly Benefit Payments

PBO assumes elderly benefit payments will grow above and beyond the statutory indexation to CPI inflation by including an enrichment factor equal to half of projected real GDP per capita growth.

This assumption acknowledges the likelihood that OAS, GIS and Allowance benefits will be adjusted so that recipients will be compensated not only to maintain the purchasing power of the program, but also so that they may benefit, in part, from the increasing real incomes and living standards experienced by the rest of the population as real economic output increases.

[18] Those born two years prior and two years following 1960 will have shorter and longer benefit delays, respectively.

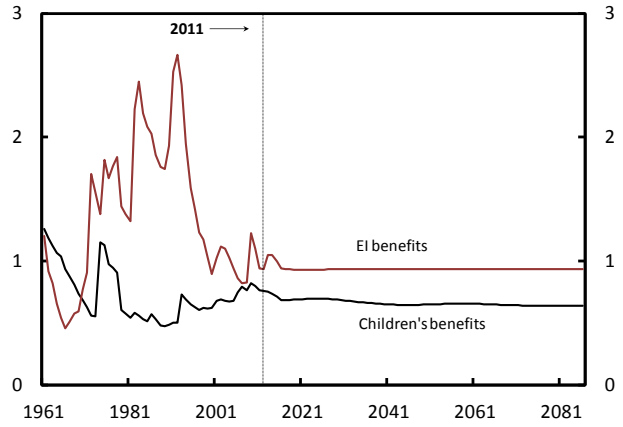
Employment Insurance and Children's Benefits

Employment Insurance (EI) benefits are projected such that, over the long term, the EI benefit payment grows in line with the average wage and the number of beneficiaries, which is assumed to grow with the labour force.[19] This results in total spending on EI benefits remaining stable at just under 1 per cent of GDP over the long term (Figure 4-4).

Figure 4-4

Employment Insurance and Children's Benefits, 1961 to 2086

per cent of GDP



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

Children's benefits include the Canada Child Tax Benefit (CCTB) and Universal Child Care Benefits (UCCB). PBO's long-term projection assumes that spending on children's benefits grows with nominal GDP per capita and the share of the population under 18 years of age. As the share of the under 18 population declines over the projection horizon, spending on children's benefits declines marginally from 0.8 per cent of GDP in 2011 to 0.6 per cent by the end of the projection horizon (Figure 4-4).

Transfers to Other Levels of Government

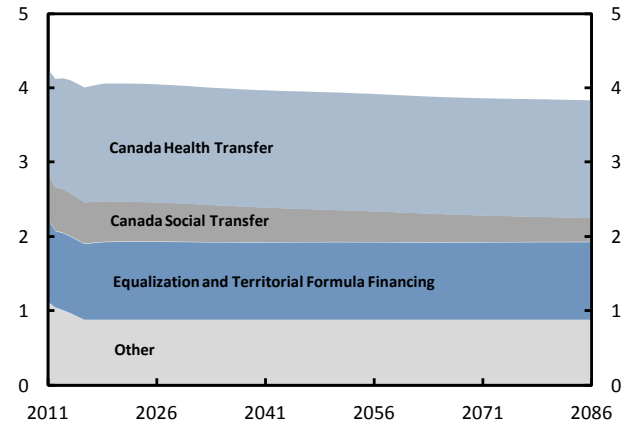
PBO's long-term projection for the Canada Health Transfer (CHT) and Canada Social Transfer (CST) incorporates the federal government's December 19, 2011 announcement to limit the growth in the CHT to growth in nominal GDP beyond 2016 and to maintain growth in the CST at 3 per cent annually.

As a consequence, PBO's long-term projection for the CHT is significantly lower relative to the 2011 FSR (which was released prior to the federal announcement). In the 2011 FSR, annual growth in the CHT beyond 2016-17 was assumed to continue at its current rate of 6 per cent. Based on the new escalator, CHT spending is projected to remain stable over the long-term at its 2016 value of 1.6 per cent of GDP (Figure 4-5).

Figure 4-5

Federal Transfers to Other Levels of Government, 2011 to 2086

per cent of GDP



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

The Canada Social Transfer (CST) is projected to decrease from 0.6 per cent of GDP in 2011 to 0.3 per cent in 2086, reflecting slower growth relative to GDP, which is projected to average 3.8 per cent over the long term. Beyond 2016, Equalization, Territorial Formula Financing and other transfers are assumed to grow in line with GDP.

PBO's assumption that the escalators for federal CHT and CST are maintained beyond the 2024 review date has significant implications with respect to the magnitude of these transfers

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

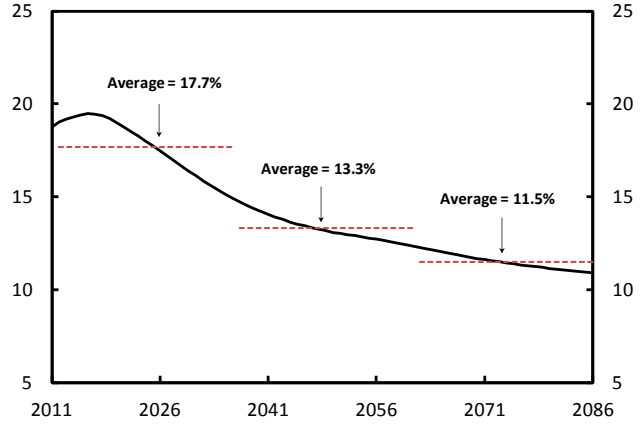
relative to projected provincial-territorial-local spending on health, education and social benefits. The shares of both federal CHT and CST in provincial-territorial-local government spending in these areas (discussed in Section 5) are projected to decline over the long term.

Federal CHT is projected to average 17.7 per cent of provincial-territorial-local government health spending over the first 25 years of the projection horizon, then 13.3 per cent over the next 25 years and 11.5 per cent over the remainder (Figure 4-6).

Figure 4-6

Federal CHT Relative to Provincial-Territorial-Local Government Health Spending, 2011 to 2086

per cent of GDP



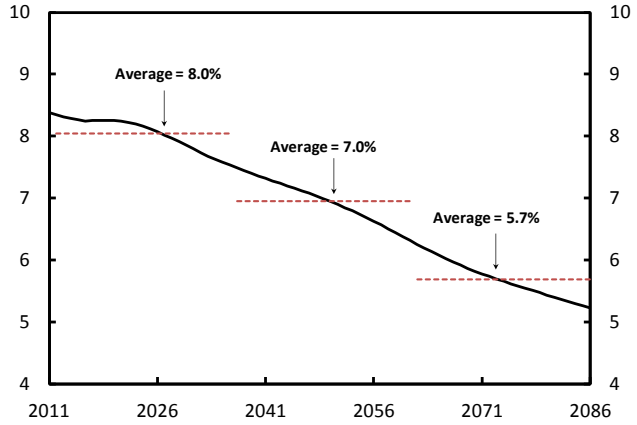
Source: Office of the Parliamentary Budget Officer; Canadian Institute for Health Information.

Federal CST is projected to average 8.0 per cent of provincial-territorial-local government spending on education and social assistance over the first 25 years of the projection horizon, followed by 7.0 per cent over the next 25 years and finally 5.7 per cent over the remainder (Figure 4-7).

Figure 4-7

Federal CST Relative to Provincial-Territorial-Local Spending on Education and Social Assistance, 2011 to 2086

per cent of GDP



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

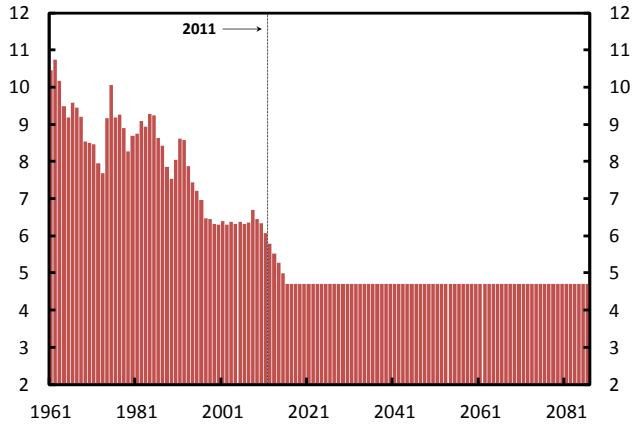
Other Program Spending

Over the medium term, PBO projects other program spending to fall from 6.1 per cent of GDP in 2011 to 4.7 per cent in 2016. This is a result of the federal government's planned restraint and reductions in operating expenses. Over the long term, PBO assumes other program spending grows in line with nominal GDP and therefore will remain at 4.7 per cent of GDP, which is well below levels observed over the last 50 years (Figure 4-8).

Figure 4-8

Other Program Spending, 1961 to 2086

per cent of GDP



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

Effective Interest Rate on Federal Government Debt

PBO calculates the effective rate on government debt as the interest on public debt divided by the previous year's interest-bearing debt. PBO projects the federal effective interest rate to rise over the medium term from 3.7 per cent in 2011 to 4.4 in 2016, and ultimately stabilize at 4.9 per cent over the longer term, reflecting changes in the composition of federal market and non-market debt. The ultimate federal effective rate is assumed to be equal to 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).

5 Provincial-Territorial-Local Government Revenue and Spending Projection

In FSR 2012 the local government sector is consolidated with provincial-territorial governments to form the provincial-territorial-local government sector.[20] As a result, many of the projections of this sector are not comparable to the provincial-territorial government projections presented in the 2011 FSR. Annex B provides a summary of the key provincial-territorial-local fiscal projections and Annex C provides additional detail on the projection methodology for the provincial-territorial-local government sector.

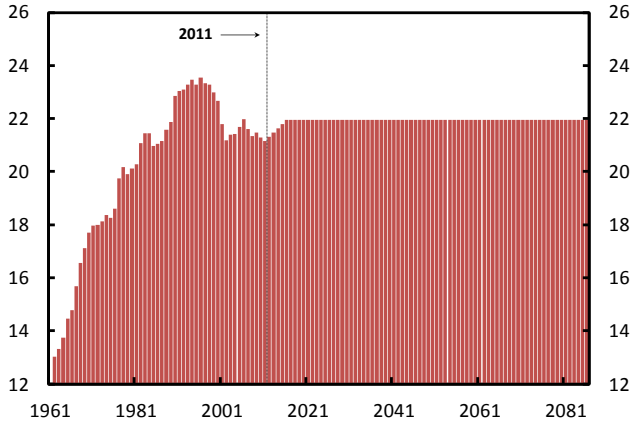
Provincial-Territorial-Local Government Own-Source Revenue

Provincial-territorial-local government own-source revenue (i.e., revenue excluding federal transfers) is projected under the assumption that, over the long term, the tax "burden" will remain constant. Own-source revenue is expected to recover in the medium term from a low of 21.2 per cent of GDP in 2011 to reach 21.9 per cent in 2016, where it is held constant for the remainder of the projection horizon (Figure 5-1). This ratio corresponds to the average observed over the period 1980 to 2011 (i.e., following the tax-point transfers related to Established Programs Financing in the late 1970s).

Figure 5-1

Provincial-Territorial-Local Government Own-Source Revenue, 1961 to 2086

per cent of GDP



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

Provincial-Territorial-Local Government Program Spending

PBO projects provincial-territorial-local government program spending to increase over the long term from a low of 24.4 per cent of GDP in 2016 to 30.4 per cent at the end of the long term horizon (Figure 5-2). The trend increase is driven

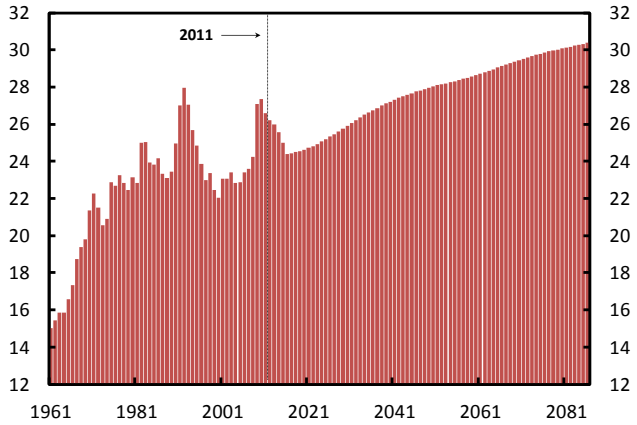
[20] Consolidation involves eliminating all the transfers between sectors as well as inter-sectoral holdings of government assets and liabilities.

by health spending, which increases dramatically as a share of the economy. Health and other program categories are discussed further below.

Figure 5-2

Provincial-Territorial-Local Government Program Spending, 1961 to 2086

per cent of GDP



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

Health Spending

Health spending comprises provincial-territorial-local government expenditure on: hospitals and other institutions; physicians and other professionals; drugs; capital; public health; administrations; and, other spending.[21]

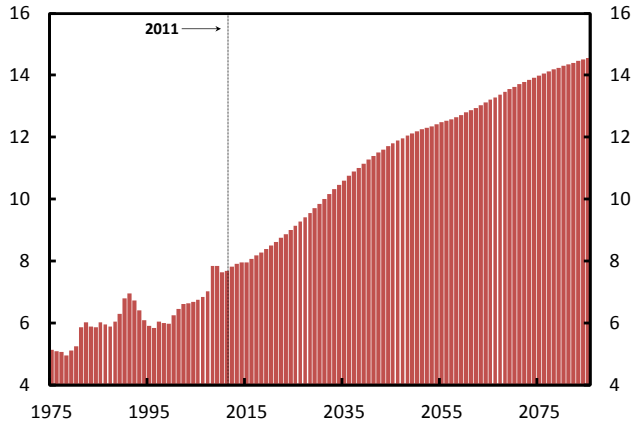
PBO projects health spending using the age structure of the population, income and an enrichment factor. PBO has assumed annual enrichment growth of 0.4 per cent, which is based on the average growth over the period 1976 to 2011. The long sample period is chosen to average out the effects of episodes of high and low enrichment growth.

As a result of population ageing and given the assumed enrichment growth, provincial-territorial-local government health spending as a share of GDP is projected to rise from 7.6 per cent in 2011 to 12.1 per cent of GDP in 2050 and 14.6 per cent in 2086 (Figure 5-3). The (annual) contribution to growth in provincial-territorial-local health spending from population ageing is projected to rise gradually, peaking in 2032 at 1.1 percentage points from 0.9 percentage points in 2011.[22] Over the same period, PBO's projection of provincial-territorial-local government health spending results in average annual growth of 5.1 per cent. From its peak in 2032, the ageing factor is projected to decline to zero by the end of the projection horizon.

Figure 5-3

Health Spending, 1975 to 2086

per cent of GDP



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

Education Spending

Spending on education by provincial-territorial-local governments comprises: provincial-territorial current and capital expenditure (excluding capital consumption allowances and interest payments) made by the education subsector; and, spending by schools in the local government sector. PBO assumes that education spending enrichment is

[21] See Canadian Institute for Health Information (2011) for a description of these categories.

[22] It is sometimes argued that the rise of life expectancy reflects a better health status of the population (i.e., *compression of morbidity)* and thus should lead to lower growth in health spending as the impact of ageing on health spending is delayed. Due to the difficulty of estimating this impact, PBO does not take it into account in its projection of health spending. See OECD (2006) and Hogan and Hogan (2002) for a detailed discussion of the relationship between ageing and health status and its implication for health spending.

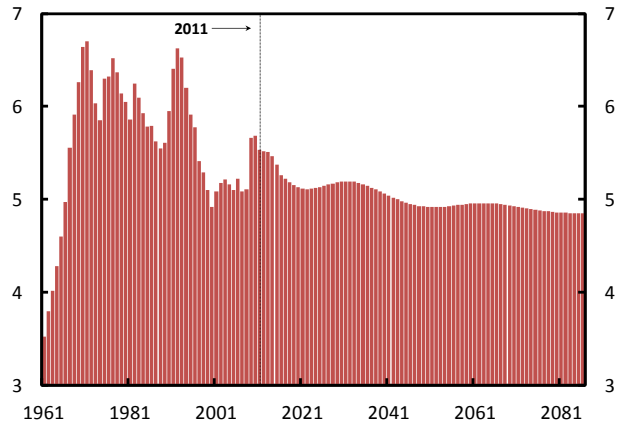
zero and therefore spending grows with nominal GDP and the 5 to 24 age group.

As growth in the population aged 5-24 falls relative to that of the overall population, growth in education spending remains below growth in the economy (Figure 5-4). There are however periods during which the population aged 5-24 grows faster than the overall population, reflecting the impact of the children and grandchildren of the baby boom generation having children of their own. Over the long term, provincial-territorial-local government education spending as a share of GDP is projected to trend down gradually from 5.5 per cent of GDP in 2011 to 4.8 per cent of GDP by the end of the projection horizon.

Figure 5-4

Education Spending, 1961 to 2086

per cent of GDP



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

Social Benefits

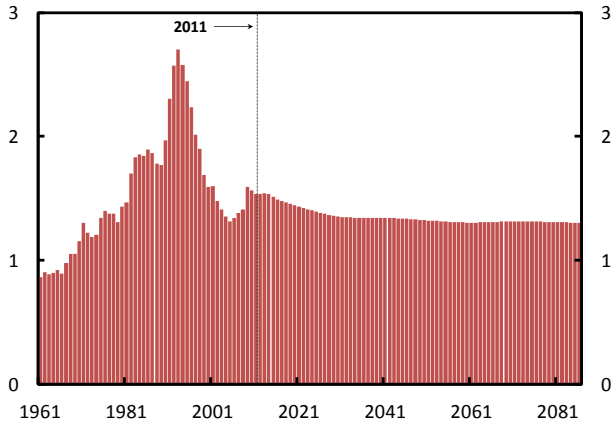
Social benefits include social assistance, social insurance, workers' compensation, and transfers to non-profit organizations. PBO assumes that the spending enrichment on social benefits is zero and therefore spending grows simply with nominal GDP and the 15 to 64 age group.

As the demographic transition progresses, growth in the prime working-age population (defined as 15 to 64 years of age) remains below that of the overall population, keeping growth in spending on social benefits below growth in the economy. As the baby-boom generation expires, the population age structure begins to stabilize and spending on social benefits settles at 1.3 per cent of GDP, slightly lower than the initial level of 1.5 per cent of GDP observed in 2011 (Figure 5-5).

Figure 5-5

Social Benefits, 1961 to 2086

per cent of GDP



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

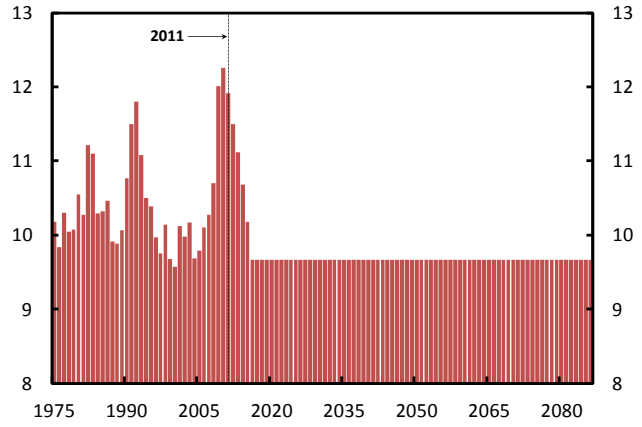
Other Program Spending

Over the medium term, PBO projects other provincial-territorial-local program spending to fall from 11.9 per cent of GDP in 2011 to 9.7 per cent in 2016 – a level corresponding to the lows observed during the late 1990s and early 2000s (Figure 5-6). This decline stems from PBO's assumption that spending in this category will remain frozen at 2011 levels for five years, reflecting fiscal restraint in this sector. PBO assumes that the reduction in other program spending, relative to GDP, will be permanent and remain more than 1 percentage point of GDP below its historical (1975-2011) average.

Figure 5-6

Other Program Spending, 1975 to 2086

per cent of GDP



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

Effective Interest Rate on Provincial-Territorial-Local Government Debt

Following the approach taken in the 2011 FSR, PBO assumes that the provincial-territorial-local effective rate settles at 50 basis points above the interest rate on the 10-year Government of Canada bond rate (5.3 per cent). This 50-basis point differential is based on the average market interest rate differential between long-term federal and provincial government debt over the period 1993 to 2007.[23] As a result, there is a 90-basis point differential between provincial-territorial-local and federal effective interest rates 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.

6 CPP and QPP Contribution and Expenditure Projection

The Canada Pension Plan (CPP) and Quebec Pension Plan (QPP) are distinct sectors within the total government sector of the Canadian economy. Federal and (all) provincial governments act as joint stewards of the CPP while the Government of Quebec manages and administers the QPP exclusively. 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 is incorporating the CPP and QPP into its framework to complete the government sector and its analysis of the state of the nation's finances. From a macroeconomic perspective, it is the financial position of the total government sector that affects economy-wide savings, investment and production. Further, assessments and international comparisons of the public sector's financial health typically focus on the balance sheet of the total government sector.

The Offices of the Chief Actuary for the CPP and QPP produce long-term projections of their plans. However, to ensure consistency with its federal and provincial-territorial-local government sectors, PBO is producing its own projections for the CPP and QPP projections based on its own demographic and economic projections using a relatively simple methodology that attempts to control for key demographic and economic differences.

The remainder of this section presents PBO's baseline projections for CPP and QPP contributions, expenditures and rates of return from 2012 to 2086. Annex D provides additional detail on the projection methodology for the CPP and QPP.

CPP and QPP Contributions

The demographic transition that is currently underway will also add financial strain to Canada's two public pension plans. As an increasing proportion of the working-age population transitions into their retirement years, this will put downward pressure on growth in contributions to the pension plans and, at the same time, upward pressure on the plans' expenditures through increased retirement benefit payments.

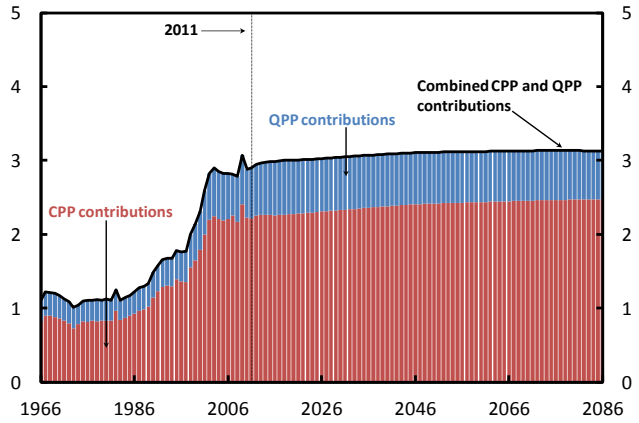
[23] The long-term federal rate is the average yield on Government of Canada bonds with maturities over 10 years and the long-term provincial rate is Scotia Capital's average weighted yield on long-term provincials.

Contributions to the CPP and QPP are determined by the contribution rate and contributory earnings. The contribution rate for CPP is set at 9.9 per cent of contributory earnings. For the QPP, however, the contribution rate is set to increase from 9.9 per cent in 2011 (increasing by 0.15 percentage points a year) to 10.8 per cent in 2017.[24] Beyond 2017, contributions for the CPP and QPP will therefore increase in line with total contributory earnings, which PBO assumes to grow in line with projected employment, inflation and labour productivity. Based on the demographic and economic assumptions and projections described in Sections 2 and 3, PBO projects that relative to GDP, CPP and QPP contributions, combined, will remain relatively stable over the long term, increasing only slightly from 2.9 per cent of GDP in 2011 to 3.0 per cent in 2017 once the ultimate QPP contribution rate is attained. Thereafter, combined contributions are essentially unchanged, averaging 3.1 per cent of GDP (Figure 6-1). Relative to GDP, CPP contributions are projected to rise by 0.2 percentage points from 2017 to 2086 while QPP contributions are projected to decline by 0.1 percentage points. This difference reflects faster projected employment growth in Canada excluding Quebec.

Figure 6-1

CPP and QPP Contributions, 1966 to 2086

per cent of GDP



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

CPP and QPP Expenditures

CPP and QPP expenditures are composed of benefit payments and administrative costs, with retirement benefits making up more than three-fourths of total expenditures.[25] Over the long term, the population aged 65 and older relative to the population aged 15 to 64 is projected to increase from 21 per cent in 2011 to 44 per cent by the end of the projection horizon. PBO projects that, combined, retirement benefits paid out by the CPP and QPP will rise from 1.9 per cent of GDP in 2011 to 2.8 per cent of GDP in 2046 as the baby-boom generation completes its transition through retirement. Retirement benefits are projected to continue rising thereafter, reaching 3.1 per cent of GDP by the end of the projection horizon as the children and grandchildren of baby-boomers transition through their retirement years. The rise in future retirement benefits is due to the impact of both population ageing and the "enrichment" of benefit payments. Adjusted for inflation, labour productivity growth will increase average contributory earnings for future retirees. Therefore, on average, future retirees will receive higher inflation-adjusted benefits payment because of increased contributory earnings.

[24] In its 2011-12 budget, the Government of Quebec announced several adjustments to the QPP, including a gradual increase in the contribution rate from 9.9 per cent to 10.8 per cent over a period of six years.

[25] Other benefits include disability benefits, death and survivor benefits, disabled contributors' child and orphan benefits.

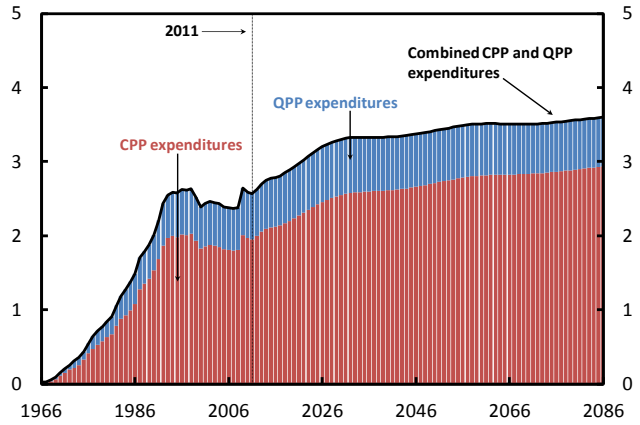
Other benefits paid out by the CPP and QPP are projected to remain relatively stable over the projection horizon at approximately 0.5 per cent of GDP, reflecting assumed increases in line with the growth in the working age population, inflation and productivity gains. Administrative expenses are projected to grow in line with contributory earnings and average 0.05 per cent of GDP over the projection horizon.

Combining retirement benefits, other benefits and administrative expenses of the CPP and QPP produces total expenditures, which are projected to increase from 2.6 per cent of GDP in 2011 to 3.6 per cent of GDP by the end of the projection horizon (Figure 6-2).

Figure 6-2

CPP and QPP Expenditures, 1966 to 2086

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 is based on PBO's assumed 10-year Government of Canada bond rate and the portfolio shares and risk premia from the Actuarial Report on the CPP. As the economy recovers over the medium term and interest rates return to their long-term levels, PBO assumes that the long-term Government of Canada bond rate remains at 5.3 per cent. Based on this interest rate and the portfolio shares and risk premia from the CPP Actuarial Report, PBO projects the return on the CPP and QPP investment portfolios to ultimately reach 6.5 per cent.[26]

7 Fiscal Sustainability Assessment

PBO's assessment of whether a government's fiscal structure is sustainable involves projecting its debt-to-GDP ratio over the long term based on assumptions about current program commitments and tax "burden" given projected demographic and economic trends. Fiscal sustainability requires that government debt cannot ultimately grow faster than the economy.

In the case of the CPP and QPP, however, these plans do not issue debt that is traded in financial markets. Rather, these plans hold and acquire financial assets to generate investment income which, combined with contributions to the plans, is used to fund benefit payments and administrative expenses. Assessing the fiscal sustainability of the CPP and QPP in this case therefore involves projecting their asset positions over the long term based on their current benefit structures and legislated contribution rates, given assumptions about future rates of return and given projected demographic and economic trends.

However, from an actuarial and policy perspective, assessing the CPP or QPP on an individual basis in terms of their assets relative to the size of the Canadian economy may not provide the most relevant indication of their fiscal sustainability. Therefore the sustainability of the CPP and QPP is assessed in terms of its asset-to-expenditure ratio, which is the primary indicator used in the Actuarial Reports of the CPP and QPP. Based on this approach, fiscal sustainability requires that each

[26] In the 25th Actuarial Report on the Canada Pension Plan (as at 31 December 2009), the ultimate rate of return on CPP investments is 6.3 per cent; the ultimate inflation-adjusted rate on the long-term Government of Canada bond rate is assumed to be 2.8 per cent, resulting in a nominal bond rate of 5.1 per cent, which is 20 basis points lower than PBO's assumption. In the Actuarial Report of the Quebec Pension Plan as at 31 December 2009, the ultimate rate of return on QPP investments is 7.0 per cent (after deducting management fees amounting to 25 basis points), which is 50 basis points higher than PBO's assumption.

plan's expenditures cannot ultimately grow faster than its assets.

The degree to which the fiscal structures of the government sector are not sustainable can be estimated by the "fiscal gap" – the difference between the current fiscal structure and a structure that is sustainable over the long term.[27] The fiscal gap conveys – in a single number – the magnitude of the fiscal action necessary to avoid unsustainable increases in a government's debt-to-GDP ratio. It helps to shift the focus beyond assessing the budget balance or the debt-to-GDP ratio in a given year by explicitly taking into account future revenue and spending pressures. It can be calculated under a variety of assumptions and over different time horizons. However, the fiscal gap cannot determine which actions should be taken to achieve fiscal sustainability over the long term or what a government's debt-to-GDP ratio should be in the long term. Such issues are beyond the scope of this report and need to be addressed in a richer framework that captures the costs and benefits of taxes, government spending and debt.

As in previous reports, the fiscal gap is calculated as the immediate and permanent change in a government's operating balance (i.e., revenue less program spending) relative to GDP that is required to achieve the level of the current debt-to-GDP ratio over the long term. The change in the operating balance can be achieved by adjusting revenue, program spending or some combination of both, from their projected paths over the long term.

Although fiscal gap estimates can be calculated for the CPP and QPP, a more relevant estimate for these plans is the steady-state contribution rate, which is calculated as the (constant) contribution rate implemented immediately that achieves the level of the plan's current asset-to-expenditure ratio over the long term. Thus, for the CPP and QPP the difference between the steady-state contribution rate and the legislated contribution rate can also be regarded as a fiscal gap.

The following presents PBO's baseline projection of federal and provincial-territorial-local government operating balances and debt-to-GDP ratios over the long term and their estimated fiscal gaps based on the assumptions that this current fiscal structure, including the system of intergovernmental transfers, is maintained. For the CPP and QPP, their baseline net cash flow, asset-to-GDP and asset-to-expenditure ratios are presented along with their estimated fiscal gaps and steady-state contribution rates.

To ensure a stable economic backdrop, and consistent with baseline projections in CBO (2012) and OBR (2012), PBO's long-term baseline fiscal projections are constructed under the assumption that there is no feedback to the economy from debt-to-GDP accumulation. However, rising debt ratios beyond the medium term could reduce GDP and or put upward pressure on interest rates (Box 7-1). Incorporating these effects would simply accelerate any projected increases in debt-to-GDP ratios.

[27] The fiscal gap methodology was developed in Blanchard et al. (1990) and Auerbach (1994). The fiscal gap measure is used by organizations such as the CBO, OBR, OECD and IMF, to quantify governments' long-term fiscal imbalances. Annex E provides the detailed definition.

Box 7-1: Impacts of Government Debt-to-GDP Accumulation

Permanent increases in government debt relative to the size of the economy can impact the economy through various channels (e.g., see Macklem, Rose and Tetlow (1994)). First, a permanent increase in the debt ratio can lead to reduced domestic savings if private saving does not increase sufficiently to offset the decrease in public saving (i.e., the increased budget deficits). Reduced domestic savings results in lower private investment and ultimately lower GDP and or increased borrowing from abroad, leading to increased foreign indebtedness. The increase in foreign indebtedness would ultimately have to be financed by higher trade surpluses and reduced domestic consumption. Second, a permanent increase in the debt-to-GDP ratio requires that a government run a larger operating surplus, financed through increases in tax rates and/or reductions in program spending, resulting in lower consumption, investment and GDP as households and firms respond to the required fiscal measures. Lastly, an increase in government debt relative to GDP to high levels could increase the uncertainty about future fiscal actions, resulting in an increase in the interest rate risk premium on government debt.

CBO (2012) and OBR (2012) also note that higher government debt levels can restrict the ability of policymakers to respond to unanticipated economic and financial developments. Further, debt-to-GDP accumulation can have important implications for intergenerational equity (e.g., see Statistics Canada's 1998 volume, *Government Finances and Generational Equity*).

Long-term Debt-to-GDP and Asset-to-GDP Projections

Revenue and program spending form a government's operating balance.[28] The operating balance less interest payments is equivalent to net lending in the Government Financial Statistics (GFS) framework and mirrors the Public Accounts concept of the budgetary balance. Federal and provincial-territorial-local governments are assumed to finance any budgetary deficits (i.e., net borrowing from other sectors in the economy) by issuing interest-bearing debt.[29] 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. For the CPP and QPP, net lending is equal to the net cash flow (contributions less expenditures) plus investment income. The CPP and QPP are assumed to finance asset purchases from their surpluses (i.e., net lending to other sectors in the economy).

In this report, the stock of debt and assets that is used to assess fiscal sustainability is based on the GFS concept of net financial worth, which is defined as financial assets less liabilities. Rearranging these terms (i.e., liabilities less financial assets) results in "net debt" which is typically the concept used to assess a government's fiscal sustainability. In the case of the CPP and QPP, the stock is a "net asset" (i.e., financial assets less liabilities).[30]

Arithmetically, a government's debt-to-GDP ratio will increase if its debt grows faster than GDP. It is informative, however, to distinguish the key drivers underlying government debt-to-GDP accumulation: 1) the operating balance (i.e., revenue less program spending) relative to GDP; and, 2) the differential between the interest rate on debt and nominal GDP growth (see Box 7-2).

In the case of the CPP and QPP, their asset-to-GDP ratio will decrease if their assets grow slower than GDP. Similarly, the key drivers underlying the evolution of their asset ratio are net cash flows relative to GDP and the differential between the

[28] In the GFS framework, the definition of the operating balance includes interest payments. To mirror the Public Accounts definition, the operating balance in this report is re-defined as revenue less program spending, which excludes (gross) interest payments but includes the GFS category of acquisition of non-financial assets (i.e., government capital formation).

[29] Interest-bearing debt in this report is defined as the sum of the GFS liabilities consisting of securities, loans and technical reserves.

[30] According to Statistics Canada's GFS estimates, combined CPP and QPP net assets amounted to $189.1 billion in 2011: $194.9 billion in financial assets less $5.8 billion in liabilities (securities other than shares and other accounts payable).

rate of return on their assets and nominal GDP growth.

Box 7-2: Debt and Asset-to-GDP Dynamics

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

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

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

In contrast, in the case of 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*) as investment income is used to cover this shortfall. 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.

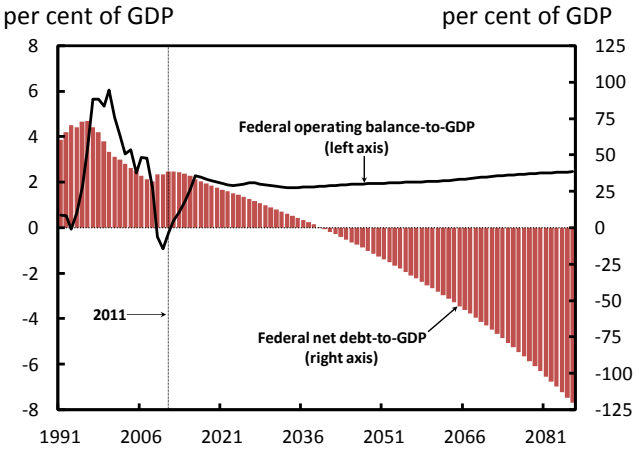
$$\frac{NCF}{Y} = -(r - g) \cdot \frac{A}{Y}$$

Federal Government Sector

Figure 7-1 shows the federal operating balance and debt dynamics resulting from PBO's baseline projection of federal government revenue and program spending combined with the projected effective interest rate on federal government debt.

Figure 7-1

Federal Government Operating Balance and Net Debt, 1991 to 2086



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

As the economy recovers over the medium term, federal revenue rebounds from its cyclical low while growth in overall program spending remains constrained. This results in a sharp improvement in the operating balance relative to GDP, reaching 2.3 per cent in 2016. Once the economy has fully recovered and revenue grows in line with nominal GDP, population ageing along with assumed growth in spending – adjusted for inflation and ageing – on elderly benefits reduces the federal operating surplus by 0.5 percentage points of GDP by 2034. However, as the baby-boom cohorts expire, the upward pressure on spending on elderly benefits recedes. Relative to the size of the economy, spending on elderly benefits then falls by 0.5 percentage points of GDP by the end of the projection horizon. The federal operating surplus improves by an additional 0.2 percentage points over the same period as the growth in CST is limited to 3 per cent annually, which is slower than growth in nominal GDP (3.8 per cent on average).

Despite the projected deterioration in the federal operating balance over the period 2016 to 2034 and an effective interest rate on debt that exceeds GDP growth, the federal net debt-to-GDP ratio is projected to decline sharply, turning into a net asset position in 2040. Although maintaining a stable debt-to-GDP ratio requires running

operating surpluses, the projected surpluses are larger than necessary to stabilize the debt ratio. As a result, these operating surpluses drive increases in budgetary surpluses (i.e., revenue less program spending and public debt charges) which begin to reduce debt levels, which in turn lead to lower public debt charges that, combined with relatively large and persistent operating surpluses, cause further increases in budgetary surpluses and declines in the federal debt-to-GDP ratio. After federal government debt is eliminated by 2041, the ever-increasing budgetary surpluses lead to a net *asset* position of 120.0 per cent of GDP by the end of the projection horizon.

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 38.4 per cent in 2011. 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 2012) and maintained indefinitely. For each projection horizon (i.e., 25, 50 and 75 years), implementing these fiscal actions would ensure that the federal net debt-to-GDP ratio returns to its 2011 level at the end of each horizon.

Although fiscal gap estimates are calculated and presented for 25-, 50- and 75-year projection horizons – following CBO (2012)[31] – PBO believes that given the lengthy time horizon over which the demographic transition is occurring, it is more appropriate to focus on the 75-year fiscal gap.[32] Further, while the 75-year projection horizon does cover a long period of time, it is the same time horizon over which the Chief Actuary projects incomes, expenditures and assets in the Actuarial Reports of the Canada Pension Plan.[33] As well, the Office for Budget Responsibility notes that in the case of the fiscal gap, the longer the projection horizon, the closer the fiscal gap is to the more "theoretically rigorous" infinite horizon fiscal gap.

Table 7-1

Fiscal Gap Estimate – Federal Government

per cent of GDP

	Projection horizon		
	25 years	50 years	75 years
Federal government	-1.2	-1.3	-1.4

Source: Office of the Parliamentary Budget Officer.
Note: The projection period starts in 2012. Calculations are based on the endpoint net debt-to-GDP ratio of 38.4 per cent.

The baseline federal fiscal gap is estimated at -1.4 per cent of GDP based on the 75-year horizon. This means that beginning in 2012 the federal operating balance could be reduced by 1.4 percentage points of GDP annually below its baseline level, by reducing revenue, increasing program spending or some combination of both, to achieve a net debt-to-GDP ratio of 38.4 per cent after 75 years.

In contrast, the baseline federal fiscal gap was estimated at 1.2 per cent of GDP in the 2011 FSR, indicating that the federal fiscal structure, which existed at that time, was not sustainable over the long term. The change in PBO's assessment of federal fiscal sustainability from the September 2011 FSR reflects key policy changes over the course of the year. First, on December 19, 2011 the Government of Canada announced that: the CHT would continue to grow at 6 per cent annually until 2016-17; starting in 2017-18 the CHT would then grow in line with a 3-year moving average of nominal GDP growth. In January 2012, PBO updated its fiscal gap estimates to reflect this change since the 2011 FSR had assumed that growth in the CHT would be maintained at 6 per

[31] OBR (2012) calculates its fiscal gap estimates based on a 50-year projection horizon.

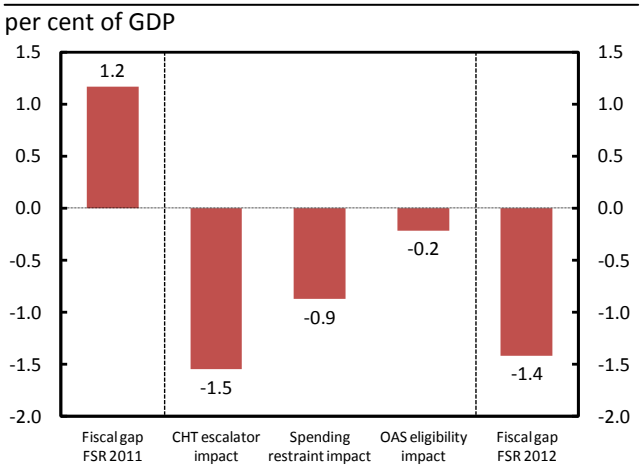
[32] For example, beyond the 25-year horizon, the old age dependency ratio is projected to increase by 5.0 percentage points from 39.2 per cent to 44.2 per cent over the remaining 50 years. Therefore additional measures could still be required to achieve fiscal sustainability over the subsequent horizon, notwithstanding the fact that the projected levels of revenue and program spending over the very long term are discounted heavily in the fiscal gap calculation.

[33] For example, see http://www.osfi-bsif.gc.ca/app/DocRepository/1/eng/oca/reports/CPP/CPP25_e.pdf.

cent annually over the long term.[34] Second, Budget 2012 introduced significant reductions to the Government's direct program expenses in addition to the freeze to operating expenses (initially announced in Budget 2010). The medium-term outlook for direct program expenses in FSR 2011 did not include this spending reduction and restraint. Third, Budget 2012 announced increases to the age of eligibility for the OAS program.[35] Figure 7-2 presents PBO estimates of the impact of these policy changes on the federal fiscal gap along with the current baseline estimate of the federal fiscal gap.

Figure 7-2

Impacts of Key Policy Changes on the Federal Fiscal Gap since the 2011 FSR



Source: Office of the Parliamentary Budget Officer.

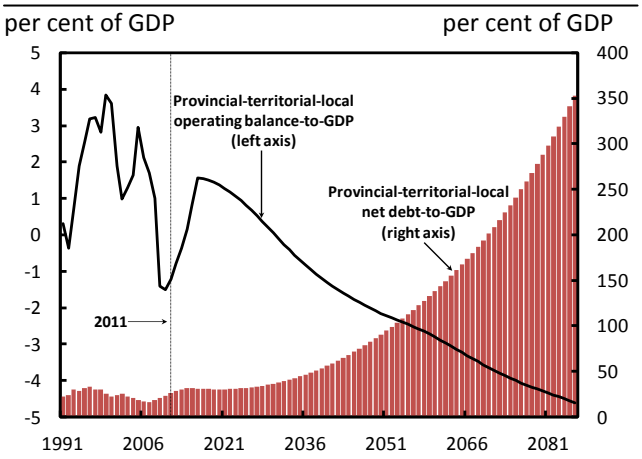
Figure 7-2 shows that the largest contribution to the change in the federal fiscal gap is the impact of reducing the CHT escalator from 6 per cent to 3.8 per cent annually on average (i.e., average growth in nominal GDP) beyond 2016. PBO estimates that this policy change has reduced the federal fiscal gap by 1.5 percentage points of GDP. The policy measures to reduce/restrain the Government's direct program expenses and to increase the age of OAS eligibility have reduced the federal fiscal gap by 0.9 and 0.2 percentage points of GDP, respectively. Combined, these three policy actions amount to a 2.6-percentage point of GDP reduction in the federal fiscal gap.

Provincial-Territorial-Local Government Sector

Figure 7-3 shows the provincial-territorial-local government operating balance and debt dynamics resulting from PBO's baseline projection of this sector's revenue and program spending combined with the projected effective interest rate on provincial-territorial-local government debt.

Figure 7-3

Provincial-Territorial-Local Government Operating Balance and Net Debt, 1991 to 2086



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

As the economy recovers over the medium term, PBO assumes that provincial-territorial-local own-source revenue, relative to the size of the economy, will return to its long-term (1980-2011) average and that these governments will also restrain their program spending. As a result, PBO projects a substantial improvement in the operating balance-to-GDP ratio from a deficit of 1.2 per cent in 2011 to a surplus of 1.6 per cent in 2016 although the budgetary balance remains in deficit over this period. However, once the economy has fully recovered and own-source revenue grows in line with nominal GDP,

[34] Available at: http://pbo-dpb.gc.ca/files/files/Publications/Renewing_CHT.pdf.

[35] In its April 2012 EFO, PBO estimated that the increase in the age of eligibility for elderly benefits would reduce spending on elderly benefits by approximately 12 per cent ($12 billion) in 2029-30. Available at: http://pbo-dpb.gc.ca/files/files/Publications/EFO_April_2012.pdf.

population ageing along with assumed growth in enrichment in health spending results in a steady deterioration in the provincial-territorial-local operating balance over the long term, resulting in an operating deficit of 4.6 per cent of GDP by the end of the projection horizon. This deterioration 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 3.8 per cent annually, on average, over the projection horizon. Relative to GDP, the impacts of increased government health spending and lower CST revenues are only marginally dampened by lower spending on education and social assistance (0.6 percentage points of GDP combined).

With interest rates on provincial-territorial-local government debt exceeding GDP growth, maintaining a stable debt-to-GDP ratio requires running operating surpluses. Thus the projected deterioration in this sector's operating balance begins to feed deficit and debt levels, which lead to higher public debt charges that, combined with larger and persistent operating deficits, causes further increases in budgetary deficits and debt levels etc., resulting in ever-increasing budgetary deficit and debt-to-GDP ratios.

The baseline provincial-territorial-local government fiscal gap is estimated at 2.0 per cent of GDP when calculated over a 75-year horizon. This means that beginning in 2012 this sector's operating balance (relative to GDP) would need to increase by 2.0 percentage points of GDP annually above its baseline level, by increasing revenue, reducing program spending or some combination of both from their projected baseline, to achieve a net debt-to-GDP ratio of 26.0 per cent after 75 years (Table 7-2).[36]

Table 7-2

Fiscal Gap Estimate – Provincial-Territorial-Local Government

per cent of GDP

	Projection horizon		
	25 years	50 years	75 years
Provincial-territorial-local government	0.6	1.4	2.0

Source: Office of the Parliamentary Budget Officer.
Note: The projection period starts in 2012. Calculations are based on the endpoint consolidated net debt-to-GDP ratio of 26.0 per cent.

In the 2011 FSR, PBO estimated the provincial-territorial government fiscal gap (the local sector was not included) to be 1.5 per cent of GDP. Following the federal government's change to the CHT escalator, PBO revised its provincial-territorial fiscal gap estimate to 2.9 per cent of GDP. PBO's current estimate of the provincial-territorial-local government fiscal gap at 2.0 per cent incorporates the new CHT escalator as well as assumed program spending reductions over the medium term. However, with the consolidation of the local sector into the provincial-territorial sector it is not possible to precisely quantify all the contributions of the various factors (e.g., policy changes and sectoral definitions) underlying this revision. That said, it is possible to estimate the impact of the change to the CHT escalator on the provincial-territorial-local fiscal gap. PBO estimates that this change has increased the provincial-territorial-local fiscal gap by 1.3 percentage points of GDP (i.e., the fiscal gap for this sector would be 0.7 per cent of GDP assuming annual CHT growth of 6 per cent beyond 2016).

To put the amount of fiscal action required to achieve fiscal sustainability at the provincial-territorial-local level into context, it is helpful to compare the estimate of the fiscal gap to historical movements in the provincial-territorial-local structural operating balance. The structural balance is considered to control for fluctuations arising from economic cycles. Figure 7-4 shows that this sector's structural operating balance, as a

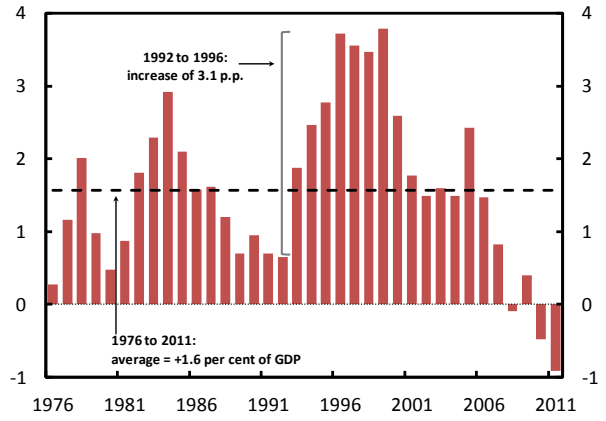
[36] Implementing these fiscal actions would result in budgetary surpluses to 2062, averaging 1.3 per cent of GDP (peaking at 2.1 per cent in 2025) followed by deficits thereafter, averaging 1.8 per cent of GDP.

share of potential nominal income, increased by 3.1 percentage points from 1992 to 1996. This amount of fiscal action exceeds the estimated fiscal gap under the baseline projection (2.0 per cent of GDP); however, these actions were not permanent and were subsequently reversed over the decade that followed. That said, the required 2-percentage point improvement in the provincial-territorial-local operating balance under the baseline projection would result in a projected operating *surplus* averaging 0.2 per cent of GDP over the long term, which is well below the historical average of 1.6 per cent.[37]

Figure 7-4

Structural Provincial-Territorial-Local Operating Balance, 1976 to 2011

per cent of potential nominal income



Source: Office of the Parliamentary Budget Officer.

The fiscal gap estimate of 2.0 per cent of GDP for the provincial-territorial-local sector is based on the assumption that fiscal measures required to achieve sustainability would be implemented immediately; however, the estimate can also be calculated under alternative assumptions about the speed at which the required measures are implemented. Table 7-3 presents the fiscal gap estimate for the provincial-territorial-local government under alternative assumptions about the implementation date while maintaining the endpoint debt-to-GDP ratio of 26.0 per cent in 2086. The benchmark fiscal gap estimate where measures are implemented immediately (i.e., in 2012) is shaded.

Table 7-3

Provincial-Territorial-Local Government Fiscal Gap Estimate under Alternative Implementation Dates

per cent of GDP

	Implementation date				
	2012	2017	2022	2032	2042
Provincial-territorial-local					
2086 endpoint	2.0	2.3	2.6	3.4	4.7

Source: Office of the Parliamentary Budget Officer.

Delaying implementing the measures required to achieve fiscal sustainability by five years (i.e., in 2017 when the economy, based on PBO's estimate, has reached its potential GDP), raises the fiscal gap moderately under the baseline projection to 2.3 per cent of GDP. However, delays of 10, 20 and 30 years (corresponding to implementation dates of 2022, 2032 and 2042 respectively) demonstrate that the amount of fiscal action required to return the provincial-territorial-local debt-to-GDP ratio back to its 2011 level increases disproportionately as the implementation horizon extends over decades.

The CPP and QPP Sector

Figure 7-5 presents the projected net cash flows (i.e., contributions less expenditures) for the CPP and QPP relative to GDP. Based on PBO's projection, the first year that CPP expenditures will exceed contributions is 2022. As the baby-boom generation retires and collects CPP benefits, the net cash flow position of the CPP decreases from a surplus of 0.3 per cent of GDP in 2011 to a deficit of 0.3 per cent of GDP in 2046, based on the contribution rate of 9.9 per cent (of contributory earnings). Over the longer term, the net cash flow position of the CPP continues to decline, albeit modestly, to -0.5 per cent of GDP by the end of the projection horizon, reflecting the transition of the

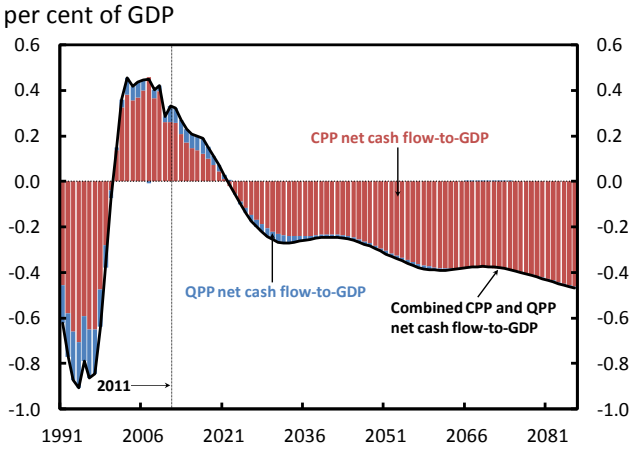
[37] On a consolidated basis, achieving a balanced budget over the medium term by either permanently increasing own-source revenue or reducing program spending relative to the size of the economy would reduce – but not eliminate – the provincial-territorial-local fiscal gap (from 2.0 to 1.2 per cent of GDP).

children and grandchildren of the baby boom generation into and out of retirement.

Based on PBO's projection, the first year that QPP expenditures will exceed contributions is 2023. However, over the longer-term horizon the net cash flow is projected to be essentially balanced as contributions move in line with expenditures. Although the demographic structure in Quebec is projected to be somewhat older compared to the rest of Canada[38] the recent legislated increase in the QPP contribution rate to 10.8 per cent in 2017 (90 basis points higher than the CPP) significantly improves the QPP's projected cash flow over the long term.[39]

Figure 7-5

CPP and QPP Net Cash Flows Relative to GDP, 1991 to 2086

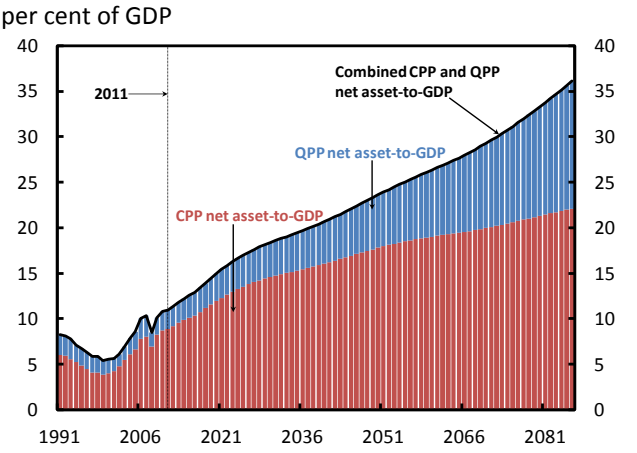


Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

Figure 7-6 presents the net assets for the CPP and QPP relative to GDP resulting from their projected net cash flows and rates of return. PBO projects that the combined CPP and QPP net asset position relative to the size of the economy will more than triple over the long term, rising from 11.0 per cent of GDP in 2011 to 36.1 per cent by the end of the projection horizon.

Figure 7-6

CPP and QPP Net Assets Relative to GDP, 1991 to 2086



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

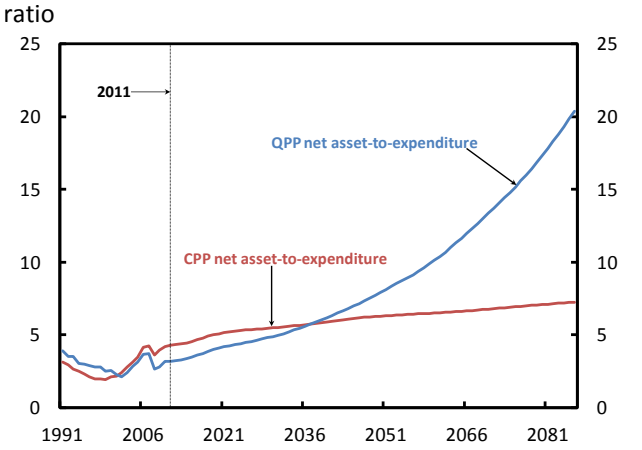
Although the projected net asset position of the CPP and QPP (relative to GDP) provides an indication of the financial sustainability of these plans, the actuarial reports of the CPP and QPP focus on the asset position relative to expenditures in assessing the sustainability of their respective plans. Figure 7-7 therefore presents the net asset-to-expenditure ratios of the CPP and QPP based on PBO projections.

[38] 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. Based on PBO's national demographic projection and the allocation from the CPP Actuarial Report, Quebec's old age dependency ratio is projected to be 3.2 percentage points higher, on average, compared to Canada excluding Quebec.

[39] Based on a contribution rate of 9.9 per cent – maintained indefinitely – the QPP net cash flow would decline from a surplus of 0.1 per cent of GDP to a deficit position, averaging 0.1 per cent of GDP over the entire projection horizon.

Figure 7-7

CPP and QPP Net Assets Relative to Expenditures, 1991 to 2086



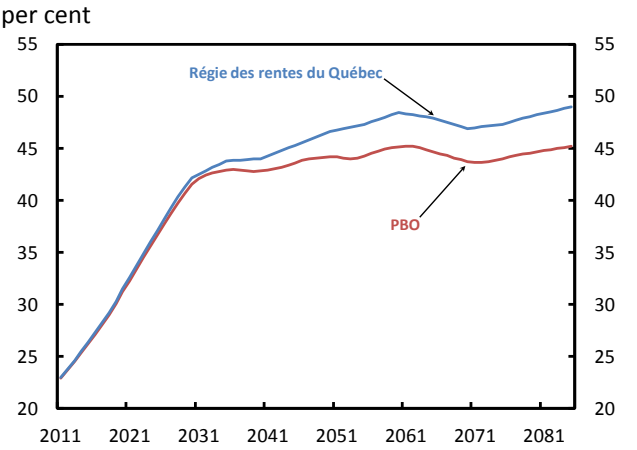
Sources: Office of the Parliamentary Budget Officer; Statistics Canada.

PBO projects that both the CPP and QPP asset-to-expenditure ratios will rise steadily from their currents levels over the next 75 years.[40] 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).[41]

Compared to the most recent Actuarial Report on the QPP, PBO projects the QPP asset-to-expenditure ratio to rise substantially over the longer term (i.e., beyond 2031). While PBO has not quantified the contributions of all the differences in assumptions, this likely reflects the impact of the "younger" demographic projection on which PBO's results are based. Figure 7-8 compares projections of Quebec's old age dependency ratio from the 2nd Actuarial Update on the QPP Actuarial Report and PBO. Over the longer term, PBO is projecting a younger age structure for Quebec compared to the Régie des rentes du Québec. By the end of the projection horizon, PBO's projected old age dependency ratio for Quebec is almost 4 percentage points (8 per cent) lower than the Régie des rentes du Québec. Relative to the QPP Actuarial Report, all else equal, PBO's younger demographic structure generates higher contributions and lower retirement benefit payments, which combine to improve the overall net cash flow of the QPP and asset position.

Figure 7-8

Projections of Quebec's Old Age Dependency Ratio, 2011 to 2085



Sources: Office of the Parliamentary Budget Officer; Régie des rentes du Québec.

Table 7-4 presents the fiscal gap estimates for the CPP and QPP based on the same approach used to calculate the estimates for federal and provincial-territorial-local governments. PBO's fiscal gap estimates indicate that both the CPP and QPP are sustainable over the long term. The size of the fiscal gap estimates reflect, in part, the relatively small size of the CPP and QPP programs compared to the overall economy (GDP).[42]

[40] 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 while, based on the most recent report (2nd Actuarial Update) on the QPP, the QPP asset-to-expenditure ratio is projected to decline to 2.7 in 2060. These projections differ 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 ratio are highly sensitive to demographic and economic assumptions.

[41] 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 decline from 3.2 in 2011 to 2.8 in 2086, falling below its current level of 3.2 in 2041.

[42] As shown in Section 6, CPP contributions (expenditures) amounted to 2.2 (2.0) per cent of national GDP in 2011 while QPP contributions (expenditures) amounted to 0.7 (0.6) per cent of national GDP. To gain a better perspective of the size of the CPP and QPP fiscal gap estimates it is helpful to compare the fiscal gaps to each plan's contributions or expenditures, expressed relative to GDP.

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	-0.2	-0.1
Canada Pension Plan	-0.2	-0.1	-0.1
Quebec Pension Plan	-0.1	-0.1	-0.1

Source: Office of the Parliamentary Budget Officer.
Note: The projection period starts in 2012. For the CPP (QPP), calculations are based on the endpoint net asset-to-GDP ratio of 8.9 (2.1) per cent.

However, from an actuarial and policy perspective, estimating the fiscal gap of either the CPP or QPP on an individual basis relative to the size of the Canadian economy may not be the most relevant indicator of fiscal sustainability for these plans. Therefore, to estimate the degree to which the CPP and QPP are fiscally sustainable PBO has adjusted its fiscal gap framework, bringing it more into line with approaches used in the CPP and QPP Actuarial Reports. More specifically, for each plan, given PBO's projection of contributory earnings, expenditures and rates of returns, PBO estimates the "steady-state" (i.e., constant) contribution rate which ensures that the asset-to-expenditure ratio at the end of each projection horizon is equal to its current (2011) level.[43]

PBO estimates that the steady-state contribution rate is lower than the statutory contribution rate for both the CPP and QPP (9.9 per cent and ultimately 10.8 per cent, respectively), which also indicates that the plans are sustainable over the long term (Table 7-5). In the case of the 75-year horizon, and analogous to the fiscal gap, these estimates indicate that based on PBO's projections and endpoint assumptions, the 9.90 per cent statutory contribution rate for the CPP could be reduced to 9.73 per cent beginning in 2012 while ultimately stabilizing the asset-to-expenditure ratio at 4.3 (2011 level) in 2086.[44] Over the same horizon, the (ultimate) 10.80 per cent statutory contribution rate for the QPP could be reduced to 9.92 beginning in 2012 while stabilizing the asset-to-expenditure ratio at 3.2 (2011 level) in 2086.[45]

It should be noted, however, that PBO is not recommending that contribution rates for the CPP and QPP be lowered from their legislated levels – PBO is only providing indicators of the plans' fiscal sustainability and quantifying the degree to which the CPP and QPP are sustainable based on concepts and measures used by the Chief Actuaries of the CPP and QPP. Specific policy recommendations to adjust contribution rates or benefits are beyond the mandate of the PBO.

Table 7-5

Steady-State Contribution Rate Estimate – CPP and QPP

per cent

	Projection horizon		
	25 years	50 years	75 years
Canada Pension Plan	9.43	9.62	9.73
Quebec Pension Plan	9.90	9.94	9.92

Source: Office of the Parliamentary Budget Officer.
Note: The projection period starts in 2012. For the CPP (QPP), calculations are based on the endpoint net asset-to-expenditure ratio of 4.3 (3.2).

[43] In this report the steady-state contribution rate is applied in 2012. However, in the Actuarial Report on the CPP, 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.

[44] Under the steady-state contribution rate projection for the CPP, the asset-to-expenditure ratio averages 5.0 over the period 2012 to 2086, reaching a high of 5.4 in 2048.

[45] Under the steady-state contribution rate projection for the QPP, the asset-to-expenditure ratio averages 3.2 over the period 2012 to 2086, reaching a high of 3.5 in 2021.

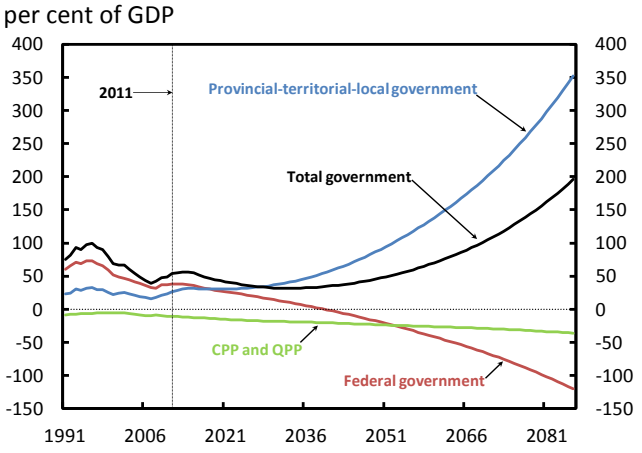
Estimates of the steady-state contribution rate for the CPP increase as the projection horizon lengthens, reflecting the inclusion of increased cost pressures stemming from population ageing. Estimates of the steady-state contribution rate for the QPP are essentially unchanged over the different horizons, reflecting the relatively stable and balanced net cash flow.

Total Government Sector Net Debt

From a macroeconomic perspective, it is the accumulation of net debt of the total government sector that affects economy-wide savings, investment and production. Further, assessments and international comparisons of the public sector's balance sheet typically focus on the total government sector's net debt relative to GDP. Figure 7-9 presents PBO's projections of the net debt positions for the federal, provincial-territorial-local and CPP/QPP sectors, as well as the total government sector, relative to GDP.

Figure 7-9

Government Sector Net Debt-to-GDP, 1991 to 2086



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

For the total government sector, PBO projects the net debt-to-GDP ratio to decline from 53.5 per cent of GDP in 2011 to 31.9 per cent in 2032. Thereafter, however, the total government debt-to-GDP ratio climbs steadily, reaching just over 195 per cent of GDP by 2086. This rise in debt accumulation reflects the acceleration in provincial-territorial-local government sector indebtedness that more than offsets the debt reduction, or asset accumulation, in the federal government and CPP/QPP sectors. Based on the projected path of total government debt-to-GDP, this would indicate that the government sector – as a whole – is not fiscally sustainable over the long term given that total government debt ultimately grows faster than the economy. However, it is important to note that this result stems from an unsustainable fiscal structure at the provincial-territorial-local government sector only – the fiscal structure of the federal government and CPP/QPP sectors are sustainable over the long term.

8 Sensitivity Analysis

To assess the sensitivity of PBO's baseline fiscal gap and steady-state contribution rate estimates, alternative fiscal, demographic and economic assumptions and projections are considered.[46] This section presents sensitivity results for the following scenarios:

a) alternative debt-to-GDP and asset-to-expenditure endpoints;
b) alternative enrichment growth in elderly benefits and health spending;
c) alternative demographic projections; and,
d) alternative economic projections.

While this section focuses on the fiscal gap and steady-state contribution rate results based on the 75-year horizon, results based on the 25- and 50-year horizons for each alternative scenario are produced and are available upon request. In the alternative scenarios, all remaining projections are maintained at their baseline levels.

[46] The CPP and QPP Actuarial Reports provide analysis of the sensitivity of their results to alternative demographic and economic assumptions and projections. See Section VI in the 25th Actuarial Report on the CPP and Appendix V in the December 2010 Actuarial Report on the QPP.

a) Alternative Debt-to-GDP Endpoints

Although the fiscal gap is typically calculated using the current debt-to-GDP ratio as the endpoint over the long term, it can also be calculated for any given debt-to-GDP value. Table 8-1 presents the fiscal gap calculations under the baseline projection for federal and provincial-territorial-local government net debt-to-GDP ratios, increasing in 25-percentage point increments from 0 to 100 per cent of GDP. The baseline estimates (shaded) are calculated using the current 2011 net debt-to-GDP ratios of 38.4 and 26.0 per cent, respectively, as the endpoint values.

Table 8-1

Fiscal Gap Estimates under Alternative Debt-to-GDP Endpoint Values

per cent of GDP

		Net debt-to-GDP endpoint in 2086				
	Baseline	0	25	50	75	100
Federal government	-1.4	-1.1	-1.3	-1.5	-1.7	-2.0
Provincial-territorial-local government	2.0	2.2	2.0	1.9	1.7	1.6

Source: Office of the Parliamentary Budget Officer.

Table 8-1 shows that all else equal, an increase in the debt-to-GDP endpoint reduces the fiscal gap as a smaller operating balance is required to achieve a higher debt ratio endpoint. For the federal government (provincial-territorial-local government), the fiscal gap ranges from -2.0 to -1.1 (1.6 to 2.2) per cent of GDP as the endpoint net debt-to-GDP ratio is reduced from 100 to 0 per cent. The 0.9-percentage point range of the federal fiscal gap estimate is moderately wider than the provincial-territorial-local fiscal gap range (0.6 percentage points). This reflects the higher effective interest rate at the provincial-territorial-local level which discounts the endpoint debt ratio to a greater extent.[47]

[47] Annex E shows that the fiscal gap indicator is essentially a present-value calculation of the difference between a government's current debt and future operating balances relative to GDP. Finite horizon estimates, however, require assumptions for the debt-to-GDP ratio at the end of the projection horizon. Similar to future operating balances, the debt-to-GDP endpoint is discounted by the effective interest rate on government debt and nominal GDP growth.

Alternative Asset-to-Expenditure Endpoints

Table 8-2 presents estimates of the CPP and QPP steady-state contribution rates based on alternative asset-to-expenditure endpoint ratios of 0, 10 and 20. The baseline estimates (shaded) are calculated using the current 2011 asset-to-expenditure ratios of 4.3 and 3.2, respectively, as the endpoint values.

Table 8-2

Steady-State Contribution Rate Estimates under Alternative Asset-to-Expenditure Endpoint Values

per cent

		Asset-to-expenditure ratio in 2086		
	Baseline	0	10	20
Canada Pension Plan	9.73	9.48	10.06	10.64
Quebec Pension Plan	9.92	9.77	10.24	10.71

Source: Office of the Parliamentary Budget Officer.

Under the assumption that CPP and QPP assets are depleted by 2086 (i.e., an asset-to-expenditure ratio of 0), the steady-state contribution rates decrease to 9.48 and 9.77 respectively. As the endpoint asset-to-expenditure ratio is increased above the baseline values (of 4.3 and 3.2 for the CPP and QPP respectively) to 10 and 20, the steady-state rates rise above their baseline estimates as higher contribution rates are required to attain a higher asset-to-expenditure endpoint value.

b) Alternative Enrichment of Federal Elderly Benefits

In the case of federal elderly benefits, the baseline assumption is that these benefits are partially indexed (at 50 per cent) to real GDP per capita growth. Alternative scenarios based on zero indexation and "full" (i.e., 100 per cent) indexation to real per capita GDP growth are considered.[48] The assumption of zero indexation to real GDP per

[48] The alternative indexation factors are implemented beginning in 2017.

capita growth is equivalent to assuming that benefit payments, in dollar terms, increase over time in line with inflation only, which is how the program is currently structured.

Under the zero (full) indexation assumption, federal elderly benefits are projected to fall (rise) to 1.7 (3.4) per cent of GDP by the end of the projection horizon, compared to 2.4 per cent of GDP in the baseline. In the alternative scenario with zero (full) indexation of elderly benefits to real GDP per capita growth, the federal fiscal gap decreases (increases) to -1.7 (-1.0) per cent (Table 8-3).

Table 8-3

Federal Fiscal Gap Estimates under Alternative Indexation Assumptions for Elderly Benefits

per cent of GDP

	Zero indexation	Full indexation	*Baseline*
Federal government	-1.7	-1.0	*-1.4*

Source: Office of the Parliamentary Budget Officer.
Note: Indexation (0 and 100 per cent) to growth in real GDP per capita.

Alternative Enrichment of Provincial-Territorial-Local Government Health Spending

For provincial-territorial-local government health spending the baseline enrichment assumption is based on the 1976-2011 historical average of 0.4 per cent. Alternative assumptions of zero and 1.1 per cent (the average over the last 10 years, 2002-2011) health spending enrichment are considered. To help put the health enrichment scenarios in context Table 8-4 presents a growth decomposition of provincial-territorial-local government health spending for the period 1976 to 2011 based on data from CIHI.

Table 8-4

Components of Provincial-Territorial-Local Government Health Expenditures, 1976-2011

per cent, average annual growth

	Total	Age	Income (GDP)	Enrichment
1976-2011	7.8	0.7	6.6	0.4
1981-1990	10.3	0.7	8.0	1.4
1991-2000	4.1	0.6	4.7	-1.1
2001-2010	7.1	0.9	4.2	1.9
2002-2011	6.6	0.9	4.5	1.1

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

The assumption of zero health enrichment helps to isolate the contribution from population ageing. With zero enrichment, provincial-territorial-local health spending is projected to increase from 7.6 per cent of GDP in 2011 to 10.5 per cent of GDP in 2050 (1.6 percentage points lower than the baseline) and 10.9 per cent in 2086 (3.7 percentage points lower than the baseline). Under the scenario assuming enrichment growth of 1.1 per cent – the average over the past 10 years – provincial-territorial-local health spending is projected to increase to 15.3 per cent of GDP in 2050 (3.2 percentage points higher than the baseline) and 23.6 per cent in 2086 (9.0 percentage points higher than the baseline). In the alternative scenario with zero enrichment to health spending the provincial-territorial-local fiscal gap falls to 0.8 per cent of GDP (Table 8-5). In the scenario where health spending is enriched at the 2002-2011 average of 1.1 per cent annually, the provincial-territorial-local fiscal gap estimate rises to 4.5 per cent of GDP.

Table 8-5

Provincial-Territorial-Local Fiscal Gap Estimates under Alternative Enrichments to Health Spending

per cent of GDP

	Zero enrichment	2002-2011 enrichment	*Baseline*
Provincial-territorial-local government	0.8	4.5	*2.0*

Source: Office of the Parliamentary Budget Officer.

c) Alternative Demographic Projections

In order to gauge the sensitivity of the baseline fiscal gap and steady-state contribution rate estimates to the demographic projection, two scenarios are examined which use alternative fertility, life expectancy and immigration assumptions. PBO has chosen alternative scenarios which, from an economic and fiscal perspective, span a range of demographic transitions (i.e., "older" and "younger" demographic projections). Beginning in 2017, these alternative demographic projections use a combination of high and low assumptions[49] (Table 8-6) for the total fertility rate, life expectancy at birth and the immigration rate which would either increase or decrease, to the largest degree possible, the long-run fiscal impact of population ageing.

Table 8-6

Assumptions Underlying Alternative Demographic Projections

	"Older"	"Younger"	*Baseline*
Total fertility rate	1.5	1.9	*1.7*
Life expectancy at birth (in 2061)			
Males	88.8	85.8	*87.4*
Females	91.3	88.6	*90.0*
Immigration rate in 2061 (per 1,000)	5.9	9.5	*7.7*

Source: Office of the Parliamentary Budget Officer.

As a result of incorporating these various assumptions, growth in the Canadian population differs markedly, in that population growth in the older scenario is lower than in the baseline while population growth in the younger scenario is higher than in the baseline (Table 8-7). As a result, the older scenario sees total population in 2086 about 28 per cent below that of the baseline while the younger scenario sees total population in 2086 about 35 per cent above that of the baseline. Similarly, the old age dependency ratio in the older scenario is projected to reach 52.8 per cent in 2086, well in excess of the 44.2 per cent reached in the baseline projection, while the old age dependency ratio is projected to reach 37.6 per cent in the younger scenario in 2086. As a result, while the number of Canadians aged 15-64 relative to those 65 years of age and over will fall to 2.3 in the baseline by 2086, the number of Canadians aged 15-64 relative to those 65 years of age and over increases to 2.7 in the younger scenario and decreases to 1.9 in the older scenario by 2086.

Table 8-7

Population Growth and Old Age Dependency Ratios under Alternative Demographic Projections

per cent	"Older"	"Younger"	*Baseline*
Population growth			
2036	0.5	1.1	*0.8*
2061	0.3	1.2	*0.7*
2086	0.1	0.9	*0.6*
Old age dependency ratio			
2036	42.4	36.1	*39.2*
2061	50.7	37.3	*43.3*
2086	52.8	37.6	*44.2*

Source: Office of the Parliamentary Budget Officer.

Further, it is assumed that the lower (higher) GDP[50] resulting from an older (younger) population projection affects both federal and provincial-territorial-local revenue and program spending. For example, relative to the baseline projection an older population will reduce nominal GDP – the broadest measure of the tax base – and therefore decrease revenue. However, by assumption and all else equal, spending will also decrease given its direct link to GDP and GDP per capita.

Based on the older demographic projection, the federal fiscal gap rises to -1.0 per cent from the baseline estimate of -1.4 per cent of GDP (Table 8-8). Similarly, the provincial-territorial-

[49] Consistent with the low and high assumptions presented in Statistics Canada (2010) out to 2061.

[50] In the baseline scenario real GDP growth is projected to average 1.8 per cent annually over the period 2017 to 2086. As a result of reduced labour force growth and a lower employment rate in the older demographic scenario, real GDP growth is projected to average 1.3 per cent annually over the same period. In the younger demographic scenario, increased labour force growth and a higher employment rate increase real GDP growth, with growth averaging 2.2 per cent annually over the period 2017 to 2086.

local government fiscal gap increases to 2.2 per cent under the older demographic projection compared to 2.0 per cent of GDP in the baseline projection. In the younger demographic scenario, the federal (provincial-territorial-local) fiscal gap declines to -1.8 (1.8) per cent.

Both federal and provincial-territorial-local government spending on demographically-sensitive categories is impacted. Compared to the federal fiscal gap, the provincial-territorial-local fiscal gap is less sensitive to the alternative demographic projections. This reflects larger offsetting impacts from, for example, reduced spending pressures on education and social assistance under the older demographic scenario as spending on health rises above its baseline projection.[51]

Table 8-8

Fiscal Gap Estimates under Alternative Demographic Projections

per cent of GDP

	"Older"	"Younger"	*Baseline*
Federal government	-1.0	-1.8	*-1.4*
Provincial-territorial-local government	2.2	1.8	*2.0*

Source: Office of the Parliamentary Budget Officer.

Based on the older (younger) demographic projection, the CPP steady-state contribution rate increases (declines) to 10.29 (9.18) per cent from the baseline estimate of 9.73 per cent as additional (fewer) contributions are required to finance higher (lower) spending on retirement benefits while ultimately stabilizing the asset-to-expenditure ratio at its current value (Table 8-9).

[51] In fact, the direction of the impact on the provincial-territorial-local operating balance is opposite to that of the federal operating balance until about 2036. That is, while the federal operating balance deteriorates in the older demographic scenario relative to the baseline, the provincial-territorial-local operating balance initially *improves* as spending on education and social assistance relative to GDP decreases, which more than offsets higher health spending although over the longer term the impact on health spending dominates.

The impact on the QPP steady-state contribution rate is similar in magnitude, increasing (declining) to 10.51 (9.35) per cent in the older (younger) scenario, respectively, from the baseline estimate of 9.92 per cent.

Table 8-9

Steady-State Contribution Rate Estimates under Alternative Demographic Projections

per cent

	"Older"	"Younger"	*Baseline*
Canada Pension Plan	10.29	9.18	*9.73*
Quebec Pension Plan	10.51	9.35	*9.92*

Source: Office of the Parliamentary Budget Officer.

d) Alternative Economic Projections

PBO also considers alternative projections for real GDP growth (+/- 0.5 percentage points relative to the baseline), effective interest rates on government debt and CPP/QPP rates of return (+/- 50 basis points). Similar to the alternative demographic projections, it is assumed that beginning in 2017 changes to real GDP growth affect both federal and provincial-territorial-local revenue and program spending. Further, changes to interest rates and rates of return (beginning in 2017) are assumed not to impact GDP.

Alternative Real GDP Growth Projections

By the end of the projection horizon, the 0.5-percentage point reduction (increase) in real GDP growth considered lowers (raises) the projected *level* of real GDP by 29.2 per cent (40.9 per cent) compared to the baseline projection.[52]

[52] The 0.5-percentage point reduction (increase) in projected real GDP growth in these alternative scenarios is assumed to result from an equivalent reduction (increase) in labour productivity growth. As a result, the demographic and labour input projections are unchanged from their baseline levels.

For the federal government lower (higher) real GDP growth contributes to increasing (reducing) the fiscal gap. Although most of federal program spending moves one-for-one with the change in revenues and GDP the federal operating balance, as a share of GDP, is impacted since federal spending on elderly benefits is only partially indexed to GDP; as well, the CST escalator of 3 per cent is not linked to GDP growth. As a result, these programs – relative to GDP – increase (decrease) when GDP growth is lowered (increased), which results in a deterioration (improvement) in the projected federal operating balance-to-GDP ratio, leading to a larger (smaller) estimate of the fiscal gap compared to the baseline estimate.

Changes to the real GDP growth projection also affect the effective interest rate-GDP growth rate differential – which helps determine the size of the "sustainable" operating balance – so that a reduction (increase) in GDP growth means that a larger (smaller) operating balance is required to achieve a given debt-to-GDP ratio. The increase (reduction) in the interest rate-GDP growth differential, combined with the deterioration (improvement) in the projected federal operating balance-to-GDP ratio, increases (decreases) the federal fiscal gap to -0.8 (-2.0) per cent under the lower (higher) GDP growth scenario (Table 8-10).

Table 8-10

Fiscal Gap Estimates under Alternative Real GDP Growth Projections

per cent of GDP	Lower GDP growth	Higher GDP growth	*Baseline*
Federal government	-0.8	-2.0	*-1.4*
Provincial-territorial-local government	1.9	2.1	*2.0*

Source: Office of the Parliamentary Budget Officer.

In contrast, the provincial-territorial-local government fiscal gap is only marginally affected under the alternative real GDP growth scenarios. Further, the direction of the impact on the fiscal gap is opposite to the federal case. Provincial-territorial-local program spending and own-source revenue relative to GDP are unchanged when alternative projections of real GDP growth given the assumed indexation to GDP. However, the CST is not and therefore, relative to GDP, decreases (increases) when GDP growth increases (decreases), which – mirroring the impact on the federal government – results in a deterioration (improvement) in the projected provincial-territorial-local operating balance-to-GDP ratio. All else equal, this leads to a larger (smaller) estimate of the fiscal gap compared to the baseline estimate. Although the impact on the operating balance is small (approximately 0.1 percentage points of GDP), the impact of changes to the effective interest rate-GDP growth rate differential on the sustainable operating balance are offset – essentially one for one – by the impact of alternative GDP growth rates on the discounting of projected operating balances.[53]

Based on the lower (higher) GDP growth projection, the CPP steady-state contribution rate increases (declines) to 9.87 (9.55) per cent from the baseline estimate of 9.73 per cent to offset the impact of slower (faster) growth in contributory earnings (Table 8-11). The QPP steady-state contribution rate increases (declines) to 10.14 (9.68) per cent under the lower (higher) GDP projection from the baseline estimate of 9.92 per cent. The impact on the QPP steady-state rate is marginally larger, reflecting a slightly lesser degree of indexation to GDP growth for "other" benefits.

[53] Unlike the projected federal operating balance-to-GDP ratio which is relatively stable over the long-term, the provincial-territorial-local operating balance ratio declines steadily after 2016. Therefore, all else equal, a reduction in GDP growth decreases to a greater extent the present value of projected provincial-territorial-local operating balance ratio since it puts less weight on the larger operating deficits over the longer term.

Table 8-11

Steady-State Contribution Rate Estimates under Alternative Real GDP Growth Projections

per cent	Lower GDP growth	Higher GDP growth	*Baseline*
Canada Pension Plan	9.87	9.55	*9.73*
Quebec Pension Plan	10.14	9.68	*9.92*

Source: Office of the Parliamentary Budget Officer.

Table 8-12

Fiscal Gap Estimates under Alternative Effective Interest Rate Assumptions

per cent of GDP	Lower interest rate	Higher interest rate	*Baseline*
Federal government	-1.7	-1.2	*-1.4*
Provincial-territorial-local government	2.0	2.0	*2.0*

Source: Office of the Parliamentary Budget Officer.

Alternative Effective Interest Rate and Rate of Return Assumptions

Fifty-basis point changes to baseline effective interest rate assumptions on federal and provincial-territorial-local debt and to the rate of return on CPP and QPP investment portfolios are considered.[54]

Changes to the effective interest rates do not affect the projected federal and provincial-territorial-local operating balances; however, they do affect the calculation of its present value and the interest rate-GDP growth rate differential. A 50-basis point reduction (increase) in the effective interest rate results in a smaller (larger) federal fiscal gap compared to the baseline estimate (Table 8-12). This reflects the impact of a lower (higher) interest rate-GDP growth rate differential – a smaller (larger) operating balance is required to achieve the same debt-to-GDP ratio. However, the provincial-territorial-local government fiscal gap is essentially unchanged from its baseline estimate under alternative assumptions about the effective interest rate on its debt. In this case – similar to the alternative GDP growth scenarios – the impact of a lower (higher) interest rate-GDP growth rate differential is offset by the impact of the lower (higher) interest rate assumption on the present-value calculation of projected operating balances relative to GDP.

Based on the lower (higher) rate of return assumption, the CPP steady-state contribution rate increases (declines) to 9.97 (9.50) per cent from the baseline estimate of 9.73 per cent to offset the impact of slower growth in investment income (Table 8-13). Similarly, the QPP steady-state contribution rate increases (declines) to 10.08 (9.77) per cent based on the lower (higher) rate of return assumption compared to 9.92 per cent in the baseline projection.

Although the change to the rate of return assumption is the same for the CPP and QPP, the impact on the CPP steady-state rate is somewhat larger. Since the baseline CPP net cash flow is projected to diminish over the long term, increasing its reliance on investment income while the QPP net cash flow is projected to remain relatively stable and balanced, its asset position deteriorates (improves) to a larger extent when the rate of return is lower (higher). As a consequence, a larger change in the CPP contribution rate is required to achieve the same asset-to-expenditure endpoint.

[54] The 50-basis point reductions (increases) in effective interest rates and rates of return are assumed to result from equivalent reductions (increases) in the inflation-adjusted interest rates.

Table 8-13

Steady-State Contribution Rate Estimates under Alternative Rate of Return Assumptions

per cent

	Lower rate of return	Higher rate of return	*Baseline*
Canada Pension Plan	9.97	9.50	*9.73*
Quebec Pension Plan	10.08	9.77	*9.92*

Source: Office of the Parliamentary Budget Officer.

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Annex A
Summary of FSR 2012 and FSR 2011 Demographic and Economic Projections

Table A-1

per cent, unless otherwise indicated

		FSR 2012			FSR 2011		
		2035	**2060**	**2085**	**2035**	**2060**	**2085**
Demographic assumptions							
Fertility rate (births)		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		38.9	43.2	44.1	38.8	43.1	44.0
Economic projections							
Nominal GDP growth		3.9	3.9	3.7	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		1.9	1.9	1.7	1.9	1.9	1.7
Labour input growth		0.6	0.7	0.5	0.7	0.7	0.5
Labour productivity growth		1.2	1.2	1.2	1.2	1.2	1.2
Real GDP per capita growth		1.0	1.2	1.1	1.1	1.2	1.1
Unemployment rate		6.4	6.4	6.4	6.3	6.3	6.3
Employment rate		55.9	54.4	54.0	56.0	54.6	54.2
Participation rate		59.7	58.1	57.7	59.7	58.2	57.8
Average weekly hours worked (hours/week)		34.3	34.4	34.3	34.3	34.3	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
Summary of FSR 2012 and FSR 2011 Fiscal Projections

Table B-1

per cent of GDP, unless otherwise indicated

	FSR 2012			FSR 2011		
	2035	**2060**	**2085**	**2035**	**2060**	**2085**
Fiscal projections						
Federal government						
Revenue	15.0	15.0	15.0	15.0	15.0	15.0
Canada Health Transfer	1.6	1.6	1.6	2.4	4.0	6.8
Canada Social Transfer	0.5	0.4	0.3	0.5	0.4	0.3
Other transfers to governments	1.9	1.9	1.9	1.8	1.8	1.8
Elderly benefits	2.9	2.8	2.4	3.2	3.0	2.6
Employment Insurance benefits	0.9	0.9	0.9	0.9	0.9	0.9
Children's benefits	0.7	0.7	0.6	0.7	0.7	0.6
Other program spending	4.7	4.7	4.7	5.8	5.8	5.8
Operating balance	1.8	2.0	2.4	-0.2	-1.6	-3.9
Interest on the public debt	0.6	-1.8	-5.3	1.9	3.5	7.8
Net lending	1.2	3.8	7.8	-2.1	-5.0	-11.7
Net debt	6.9	-41.7	-116.6	37.2	74.1	169.6
*Provincial-territorial-local government**						
Own-source revenue	21.9	21.9	21.9	17.8	17.8	17.8
Health spending	10.5	12.7	14.5	10.9	13.3	15.2
Education spending	5.2	5.0	4.8	4.7	4.6	4.5
Social spending	1.3	1.3	1.3	1.1	1.1	1.1
Other program spending	9.7	9.7	9.7	5.8	5.8	5.8
Operating balance	-0.7	-2.8	-4.6	-1.1	-1.7	-0.8
Interest on the public debt	2.8	7.6	18.5	2.9	7.4	14.5
Net lending	-3.5	-10.4	-23.1	-4.0	-9.1	-15.3
Net debt	44.5	138.1	341.1	49.0	134.5	263.9
CPP/QPP						
Contributions	3.1	3.1	3.1	—	—	—
Expenditures	3.3	3.5	3.6	—	—	—
Net cash flow	-0.3	-0.4	-0.5	—	—	—
Investment income	1.2	1.6	2.2	—	—	—
Net lending	0.9	1.2	1.7	—	—	—
Net assets	19.5	26.3	35.6	—	—	—

Source: Office of the Parliamentary Budget Officer.
Note: FSR 2012 provides projections for the provincial-territorial-local government sector in calendar years.
FSR 2011 provides projections for the provincial-territorial government sector in fiscal years.

Annex C
Government Fiscal Projection Methodology

This annex describes PBO's long-term fiscal projection methodology for the federal and provincial-territorial-local 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 1961 to 2011) and the underlying National Accounts statistics on which they are based. These data ensure consistency across government sectors and can be used to put the provincial-territorial and local government sectors on a consolidated basis.

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

Revenue Projections

For long-term projections beyond 2016 PBO assumes that federal[55] and provincial-territorial-local[56] own-source revenue will remain constant as a share of nominal GDP (the broadest measure of the tax base) at 15.0 per cent and 21.9 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.[57] This approach is common to other independent fiscal institutions such as the Congressional Budget Office (CBO) in the United States. Moreover, the Office for Budget Responsibility (OBR) in the United Kingdom projects demographic pressures on revenues and finds the effect to be relatively small – less than 1 per cent of GDP.

Program Spending Projections

The general approach for projecting long-term federal and provincial-territorial-local 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*).[58]

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

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 C-1 shows the population shares for the age groups affecting

[55] The medium-term projection of federal revenues is based on PBO's updated April 2012 EFO projections, revised to include the latest economic data and March 2012 Fiscal Monitor results.

[56] The medium-term projection returns provincial-territorial-local own-source revenue to its historical average share of the economy, from a cyclical low of 21.2 per cent of GDP in 2011 to 21.9 per cent in 2016. The average historical share was calculated over the period 1980 to 2011 – the period following the transition to Established Programs Financing.

[57] 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.

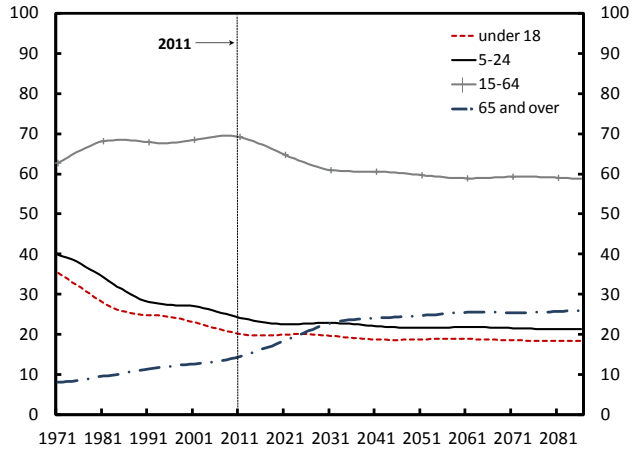
[58] In some studies this factor is called *excess cost growth* or *residual cost growth*.

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 less than 14.4 per cent of the population in 2011 to 26.0 per cent in 2086.

Figure C-1

Population Shares for Key Age Groups

per cent



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

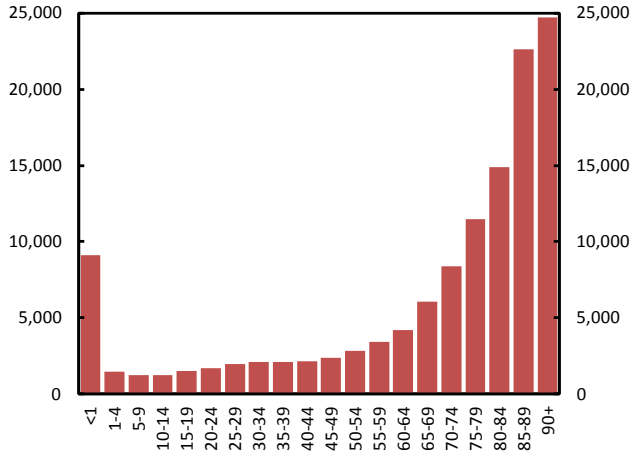
For categories in which benefits or spending are well targeted – for example federal spending on elderly benefits – the weights for age groups 65 and over are set equal to one and the weights for all other age groups are set equal to zero. In the case of provincial-territorial-local government health spending, the weights are based on health expenditure data on a per capita age group basis produced by CIHI (Figure C-2).[59] Table C-1 provides a summary of the demographically sensitive expenditure categories along with their targeted age groups and long-term enrichment assumptions in the baseline projection.

[59] CIHI provides data for provincial-territorial government health expenditures per capita by age group up to 2009, which is used as the base year in constructing the age composition factor over history and over the projection horizon.

Figure C-2

Provincial-Territorial Government Health Expenditures by Age Group, 2009

dollars per capita



Source: Canadian Institute for Health Information.

Table C-1

Key Spending Categories

per cent

	Share of program spending in 2011	Age groups	Long-term enrichment growth
Federal government:			
Elderly benefits	15.5	65+ to 67+	-0.5[a]
Employment Insurance	6.6	labour force 15+	+0.2[b]
Children's benefits	5.4	ages 0-17	0.0
Provincial-territorial-local government:			
Health	28.7	all ages[c]	+0.4[d]
Education	20.8	ages 5-24	0.0
Social benefits[e]	5.8	ages 15-64	0.0

Source: Office of the Parliamentary Budget Officer.
Note:
[a] Ensures that inflation-adjusted benefits increase at half the rate of real GDP per capita growth.
[b] Ensures that inflation-adjusted benefits increase at the rate of labour productivity growth.
[c] CIHI per capita expenditure data by age is provided for 20 age groups from less than 1 year old to 90+ years old.
[d] Estimated enrichment growth over the period 1976-2011.
[e] Includes social assistance, workers' compensation and other social insurance benefits.

Consistent with FSR 2011, growth in the enrichment factor for provincial-territorial-local health spending is set equal to its long-term historical average (1976 to 2011). For federal

spending on elderly benefits, PBO continues to assume that that the average inflation-adjusted payment per beneficiary is only partially indexed (at 50 per cent) to growth in real GDP per capita. This assumption implies that the enrichment factor for elderly benefits (as represented in the equation above) is negative. While the existing program does not include indexation to real income growth, PBO believes that recipients will benefit at least somewhat from the growth in living standards experienced by the remainder of the population over the 75-year projection horizon. Lastly, the long-term enrichment factor for EI is set such that the average benefit payment grows in line with nominal wages.

For spending on education, social benefits and children's benefits, the enrichment factor is assumed to be zero over the long term.[60] 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 2011, 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 provincial-territorial-local 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 liabilities. Rearranging these terms (i.e., liabilities less financial assets) results in net debt which is typically the concept used to assess fiscal sustainability.

Debt Accounting

Revenue and program spending form a government's operating balance. The operating balance less interest payments is equivalent to net lending in the GFS framework and mirrors the Public Accounts concept of the budgetary balance.

Federal and provincial-territorial-local 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 (2012), 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 (see Box 7-1 in Section 7). Incorporating these effects would simply accelerate any projected increases in debt-to-GDP ratios.

[60] 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.

Annex D
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:

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

For the CPP, *LFE* refers to employment in Canada excluding Quebec and for the QPP it refers to employment in Quebec.[61] 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.

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

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.

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

[61] 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.

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 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 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 premia from the CPP Actuarial Report[62] 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[63] 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.

[62] Asset shares of CPP investment portfolio are taken from Table 63 in the 25th Actuarial Report on Canada Pension Plan as at 31 December 2009, available at: http://www.osfi-bsif.gc.ca/app/DocRepository/1/eng/oca/reports/CPP/cpp25_e.pdf.

[63] 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 E
Fiscal Gap Definition

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

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

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 operating balances, which is the starting point for fiscal gap calculations.

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

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

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

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

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.

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

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

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

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

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:

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