ACTUARIAL REPORT 14th

on the

OLD AGE SECURITY PROGRAM

as at 31 December 2015
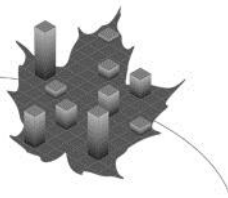
Canada

8 June 2017

The Honourable Jean-Yves Duclos, P.C., M.P.
Minister of Families, Children and Social Development
House of Commons
Ottawa, Canada
K1A 0A6

Dear Minister:

In accordance with section 3 of the *Public Pensions Reporting Act*, I am pleased to submit the
Actuarial Report prepared as at 31 December 2015, on the pension plan established under the *Old
Age Security Act.*

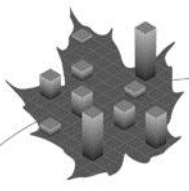Yours sincerely,

Jean-Claude Ménard, F.S.A., F.C.I.A.
Chief Actuary

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I. Executive Summary

This is the 14th Actuarial Report on the Old Age Security program since the implementation of the *Old Age Security Act* in 1952. It presents the results of an actuarial examination of the financial state of the Old Age Security (OAS) program as at 31 December 2015, and includes projections of future experience through the year 2060. The previous triennial report is the 12th Actuarial Report on the Old Age Security Program as at 31 December 2012, which was tabled in the House of Commons on 20 August 2014. The next triennial report is scheduled as at 31 December 2018.

The *Old Age Security Act* was subject to amendments[1] since the 12th OAS Program Actuarial Report. The most recent amendments relate to the *Budget Implementation Act, 2016, No.1*. The effects of these amendments (increased GIS top-up and restoring the ages of eligibility to 65 for the OAS basic pension and GIS and 60 for the Allowance benefits) were covered in the 13th Actuarial Report Supplementing the Actuarial Report on the Old Age Security Program as at 31 December 2012, which was tabled in the House of Commons on 17 August 2016. The effects of the amendments are included in the financial projections of this report.

The introduction of benefits under the Additional Canada Pension Plan (CPP) (commencing 1 January 2019) through Part 1 of Bill C-26, an *Act to amend the Canada Pension Plan, the Canada Pension Plan Investment Board Act and the Income Tax Act,* which received Royal Assent on 15 December 2016, has also been taken into account in the estimates presented in this report. It is important to note that the estimated impacts only relate to CPP beneficiaries since similar additional benefits had not been introduced in the Québec Pension Plan (QPP) at the time of writing of this report.

A. Purpose of Report

This report has been prepared in compliance with the timing and information requirements of the *Public Pensions Reporting Act*, which provides that the Chief Actuary shall prepare a triennial actuarial report on the benefits under the various Parts of the *Old Age Security Act*, being as follows:

- Part I: OAS Basic Pension
- Part II: Guaranteed Income Supplement (GIS)
- Part III: Allowance

Another important purpose of the report is to inform the general public of the current and projected financial state of the OAS program. The report provides information to evaluate the program's financial situation over a long period, provided the program remains unchanged. Such information should facilitate a better understanding of the financial state of the program and the factors that influence its costs, and thus contribute to an informed public discussion of issues related to it.

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[1] Amendments to the *Old Age Security Act* regarding payment of income-tested benefits to sponsored immigrants under Bill C-31: *Economic Action Plan 2014 Act, No. 1* received Royal Assent on June 19, 2014. As of the time of writing of this report, the coming into force of the amendments is yet to be determined. As such, these amendments are not reflected in this report due to the uncertain timing of their implementation and the estimated non-material impact on the OAS program's financial state. Once the coming into force date becomes known, the effects of the amendments will be included in future actuarial reports on the OAS program.
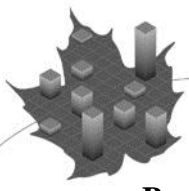
B. Scope of Report

Section II presents a general overview of the methodology used in preparing the actuarial estimates included in this report, which are based on the "best-estimate" assumptions described in section III. The results are presented in section IV and include information on key demographic and financial indicators and on the projection of beneficiaries, expenditures, and cost ratios. Section V presents the reconciliation of the results with those presented in the previous triennial (12th) report. Section VI presents a general conclusion, and section VII provides the actuarial opinion.

The various appendices provide supplemental information on the uncertainty of results based on sensitivity analysis of the key best-estimate assumptions using deterministic and stochastic approaches, the program provisions, detailed reconciliations of the results between the 12th OAS Program Actuarial Report and this report, a description of the data, assumptions and methodology used in this report, detailed projections of beneficiaries and expenditures, and lastly acknowledgements.

C. Main Findings

The key observations and findings of this report are:

- Demographic changes, notably the aging of the Canadian population, will have a major impact on the ratio of the number of people aged 20 to 64 to those aged 65 and over. This ratio is expected to fall from about 3.7 in 2016 to 2.0 in 2060.

- The number of beneficiaries of the OAS basic pension is expected to increase by 61% over the next fourteen years, growing from 5.8 million in 2016 to 9.3 million by 2030, mainly due to the retirement of the baby boom generation over that period. Thereafter, the growth in the number of beneficiaries is projected to slow down. By 2060, the number of OAS basic pension beneficiaries is projected to reach 12.7 million.

- OAS basic pension annual expenditures are projected to increase from $37.8 billion in 2016 to $80.3 billion in 2030 and $198.6 billion by 2060.

- The number of GIS and Allowance beneficiaries is expected to increase by 59% over the next fourteen years, growing from 1.9 million in 2016 to 3.1 million by 2030. The GIS recipient rate (i.e. the proportion of the Canadian population that has received, receives, or is projected to receive the GIS) is projected to slowly decrease from its current level of 31.0% in 2016 to 25.3% by 2060.

- GIS and Allowance annual expenditures are projected to increase from $11.2 billion in 2016 to $23.6 billion in 2030 and $47.1 billion by 2060.

- The introduction of the Additional CPP will affect the GIS and Allowance recipient rates and the amount of expenditures. Part of the reduction in the projected overall GIS recipient rate is attributable to the Additional CPP benefits that will gradually become payable starting in 2019. The impact of the Additional CPP will be very gradual and, by 2060, together with other factors lead to a projected overall GIS recipient rate of 25.3% instead of 27.2% in the absence of Additional CPP benefits (a reduction of 6.8% or 243,000 fewer beneficiaries). As well, in the presence of Additional CPP benefits, GIS

annual expenditures in 2060 are projected to be $46.0 billion instead of $49.0 billion (a reduction of 6.2% or of $3.0 billion).

- Total annual OAS program expenditures are projected to increase from $49 billion in 2016 to $104 billion in 2030 and $247 billion by 2060.

- The ratio of program expenditures to the GDP is projected to be 2.4% in 2016, which is similar to what the ratio was in the late 1980s. After 2016, the ratio is projected to reach a high of 3.2% in 2031. This level is somewhat higher than the historical peak of 2.7% reached in the early 1990s. After 2031, the ratio of expenditures to GDP is projected to slowly decrease to a level of 2.7% by 2060. This reduction is mainly attributable to expected slower growth in inflation compared to growth in wages and the GDP.

D. Uncertainty of Results

To measure the sensitivity of the long-term projected financial state of the program to future changes in the demographic and economic environments, different sensitivity tests were performed. The tests and results are presented in detail in Appendix A of this report.

The tests focus on varying the key best-estimate assumptions individually in order to measure the potential impact on the cost ratio of program expenditures to GDP. These tests show that the cost ratio could deviate significantly from its projected best-estimate values if other than best-estimate assumptions were to be realized. For example, if life expectancies at age 65 were to increase by about two more years than the best estimates of this report, then the ratio in 2060 would increase from 2.65% to 2.83%. As another example, if benefit rates were increased to partially reflect the growth in real wages, then the ratio in 2060 would increase from 2.65% to 3.60%.

Tests were also performed regarding the aging of the population and how it may differ from the best-estimate projection. Two demographically based scenarios were developed that portray generally younger and older populations. These scenarios produced cost ratios of program expenditures to the GDP in 2060 of 2.41% and 2.86%, respectively.

E. Conclusion

The retirement of the baby boomers over the next few decades is projected to increase the expenditures of the program. At the same time, it is expected that as the Additional CPP benefits grow over time, an increasing amount of CPP income will be included in the determination of program benefits and, as such, lower numbers of recipients and amounts of benefits will result than would otherwise be the case. For instance, in the absence of Additional CPP benefits, the projected overall recipient rate for the GIS in 2060 is 27.2% and projected GIS expenditures in that year are $49.0 billion, representing 0.53% of GDP. Under this report, Additional CPP benefits are projected to reduce the overall GIS recipient rate to 25.3% (a reduction of 6.8% or 243,000 fewer beneficiaries) and GIS expenditures to $46.0 billion (a $3 billion or 6.2% decrease) representing 0.49% of GDP. This 14th OAS Program Actuarial Report is the first actuarial report on the program to include the estimated impact of the Additional CPP benefits, which will start being payable in 2019. It is expected that the estimated impacts of the Additional CPP on the program presented in future actuarial reports will be further improved as data become available.

Total annual expenditures are expected to grow from 2.4% of GDP in 2016, a level similar to that in the late 1980s, to a high of about 3.2% in 2031, a level somewhat higher than the historical peak of 2.7% reached in the early 1990s. It is assumed that, for each cohort of individuals who
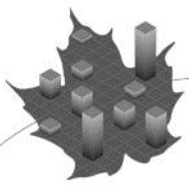
may become eligible for the GIS or Allowance, the initial retirement income will consist mainly of CPP benefits (including the new Additional CPP benefits) and Québec Pension Plan benefits that reflect increases in line with wage growth prior to retirement. At the same time, it is assumed that the income limits for the GIS and Allowance will have increased in line with inflation prior to retirement. Together this leads to reduced eligibility of new retirees for the GIS and Allowance. The fact that individuals are also assumed to invest in TFSAs slightly mitigates this decline over time. Ultimately, however, the fact that benefits are indexed to inflation as opposed to wages drives the cost of the OAS program relative to the GDP down over the long term, with the result that annual expenditures are expected to fall to 2.7% of GDP by 2060.

In comparison with the previous triennial (12th) OAS Program Actuarial Report, the amendments which increased the GIS top-up benefits and restored the ages of eligibility for the program benefits increased the projected expenditures by 0.33% of GDP in 2030 and 0.20% of GDP in 2060. Changes in the demographic assumptions regarding longevity increases and migration in combination with changes in the economic assumptions (especially lower real wage growth) also lead to increases in the cost ratio. These increases are somewhat countered by the update of experience, improvements in the methodology, and the impact of Additional CPP Benefits. The net result is higher expenditures relative to the GDP over the projection period as compared to the previous 12th OAS Program Actuarial Report.
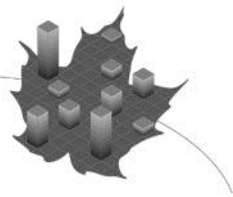
II. Methodology

The actuarial examination of the OAS program involves projections of its expenditures and cost measurement bases over a long period of time, so that the future impact of historical and projected trends in demographic and economic factors can be properly assessed. The actuarial estimates in this report are based on the provisions of the *Old Age Security Act* as at 31 December 2015, data regarding the starting point for the projections, and "best-estimate" assumptions regarding future demographic and economic experience.

Since the OAS program is financed from general tax revenues on a pay-as-you-go basis, there is no need to project either contributions or investment earnings. However, projections have been made of combined Canada Pension Plan (CPP) and Québec Pension Plan (QPP) contributory earnings[1], total employment earnings, and of the GDP, whose bases are then used for measuring the relative costs over the projection period.

The costing begins with a projection of the general population of Canada. This requires assumptions regarding demographic factors such as fertility, migration, and mortality.

Expenditures are made up of the benefits paid out and administrative expenses. Benefits are projected by applying assumptions regarding recipient rates for various types and levels of benefits to the projected population at the relevant ages, along with assumptions regarding increases in the maximum benefit rates. Administrative expenses are projected by considering the historical relationship between expenses and total benefit expenditures.

The combined CPP and QPP contributory earnings and total employment earnings cost measurement bases are derived by applying labour force participation and job creation rates to the projected population and by projecting future employment earnings. This requires assumptions about various factors such as wage increases, an earnings distribution and unemployment rates. The GDP is projected based on the historical relationship between the GDP and total employment earnings.

The assumptions and results presented in the following sections make it possible to measure the financial state of the OAS program over the projection period. A wide variety of factors influence both the current and projected financial position of the program. Accordingly, the results shown in this report differ from those shown in previous reports. Likewise, future actuarial examinations will reveal results that differ from the projections included in this report.

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[1] For the CPP, contributory earnings are of the Base CPP only, i.e., excludes Additional CPP contributory earnings above the Year's Maximum Pensionable Earnings (YMPE) starting in 2024.

III. Best-Estimate Assumptions

A. Introduction

The information required by statute, which is presented in section IV of this report, requires making several assumptions regarding future demographic and economic trends. The projections included in this report cover a long period of time (up to the year 2060) and the assumptions are determined by putting more emphasis on historical long-term trends than on more recent short-term trends. These assumptions reflect the Chief Actuary's best judgment and are referred to in this report as the "best-estimate" assumptions. The assumptions were chosen to be, independently and in aggregate, reasonable and appropriate, taking into account certain interrelationships between them. To the extent applicable, the assumptions are consistent with the best-estimate assumptions used in the 27th and 28th Actuarial Reports on the Canada Pension Plan as at 31 December 2015.

As the assumptions used are best estimates, they therefore do not include any margins for adverse deviations to reflect uncertainty or unfavourable future experience. Inclusion of margins for adverse deviations would likely result in experience for the OAS program developing better than projected. To account for the variability between actual experience as it develops and projected experience under the best-estimate assumptions, sensitivity analysis of the assumptions was performed. The sensitivity analysis of the assumptions is discussed in Appendix A - Uncertainty of Results of this report.

The *Old Age Security Act* was subject to amendments[1] since the 12th OAS Program Actuarial Report as at 31 December 2012. The most recent amendments relate to Division 9 of Part 4 of the *Budget Implementation Act, 2016, No.1*, which received Royal Assent on 22 June 2016. These amendments to the *Old Age Security Act* increased the single rate of the GIS top-up for the lowest-income pensioners by up to $947 annually, starting 1 July 2016 and repealed section 2.2 of the *Old Age Security Act*, which had set out a scheduled increase in the ages of eligibility for the OAS program benefits of two years over the period 2023 to 2029.

The cost estimates of these amendments under the *Budget Implementation Act, 2016, No. 1* are provided in the 13th Actuarial Report Supplementing the Actuarial Report on the OAS Program as at 31 December 2012. This 14th OAS Program Actuarial Report as at 31 December 2015 includes all the amendments made to the *Old Age Security Act* under the *Budget Implementation Act, 2016, No. 1*.

The introduction of benefits under the Additional CPP (commencing 1 January 2019) through Part 1 of Bill C-26, an *Act to amend the Canada Pension Plan, the Canada Pension Plan Investment Board Act and the Income Tax Act*, which received Royal Assent on 15 December 2016, has also been taken into account in the estimates presented in this report. It is important to note that the estimated impacts only relate to CPP beneficiaries since similar additional benefits had not been introduced in the QPP at the time of the writing of this report.

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[1] Amendments to the *Old Age Security Act*, regarding payment of income-tested benefits to sponsored immigrants under Bill C-31: *Economic Action Plan 2014 Act, No. 1* received Royal Assent on June 19, 2014. As of the time of writing of this report, the coming into force of the amendments is yet to be determined. As such, these amendments are not reflected in this report due to the uncertain timing of their implementation and the estimated non-material impact on the OAS program's financial state. Once the coming into force date becomes known, the effects of the amendments will be included in future actuarial reports on the OAS program.
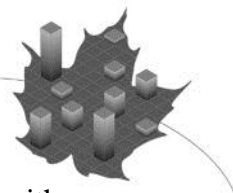
Table 1 presents a summary of the most important assumptions used in this report compared with those used in the previous (12th) triennial report. The assumptions are described in more detail in Appendix D of this report.

Table 1   Best-Estimate Demographic and Economic Assumptions

Canada	14th Report (as at 31 December 2015)			12th Report (as at 31 December 2012)		
Total fertility rate	1.65 (2019+)			1.65 (2015+)		
Mortality	Canadian Human Mortality Database (CHMD 2011) with assumed future improvements			Canadian Human Mortality Database (CHMD 2009) with assumed future improvements		
Canadian life expectancy	Males	Females		Males	Females	
at birth in 2016	86.7 years	89.7 years		86.3 years	89.3 years	
at age 65 in 2016	21.3 years	23.7 years		21.1 years	23.5 years	
Net migration rate	0.62% of population (2016+)			0.60% of population (2017+)		
Participation rate (age group 15-69)	77.5% (2035)			76.8% (2030)		
Employment rate (age group 15-69)	72.6% (2035)			72.1% (2030)		
Unemployment rate (age group 15+)	6.2% (2025+)			6.0% (2023+)		
Rate of increase in prices	2.0% (2017+)			2.2% (2021+)		
Real wage increase	1.1% (2025+)			1.2% (2020+)		
Recipient rates[(1)]		2016	2030	2060		2016	2030	2060
	OAS:	96.1%	96.7%	97.2%	OAS:	98.2%	99.6%	100.0%
	GIS:	31.0%	31.2%	25.3%	GIS:	31.4%	33.8%	28.7%
	Allowance:	3.2%	3.2%	2.6%	Allowance:	3.3%	2.6%	1.6%

(1) The recipient rate for each OAS program benefit refers to the proportion of the Canadian population that has received, receives, or is projected to receive that benefit. The recipient rates for the OAS basic pension are on a gross basis, that is, before application of the OAS Recovery Tax. The OAS basic pension recipient rates shown also account for voluntary deferrals, effective 1 July 2013. All recipient rates include benefits paid outside Canada and for this reason can exceed 100%.

B. Demographic Assumptions

The population projections start with the population of Canada on 1 July 2015, to which are applied fertility, migration, and mortality assumptions. The population projections are essential to determine the future number of OAS program beneficiaries.

The distribution of the population by age changed considerably with the arrival of the baby boom generation, and the population has been aging since. The causes of this aging are examined in the following subsections.

1. Fertility

The first cause of the aging of the Canadian population is the large drop in the total fertility rate that occurred between the end of the baby boom period (mid-1940s to mid-1960s) and latter half of the 1980s. The total fertility rate in Canada has dropped rapidly from a level of about 4.0 children per woman in the late 1950s to 1.6 by the mid-1980s. The total fertility rate rose slightly in the early 1990s, but then generally declined to a level of 1.5 by the late 1990s. Canada is one of many industrialized countries that saw their fertility rates increase starting in the 2000s. By 2008, the total fertility rate for Canada reached 1.68. However, in some industrialized countries,
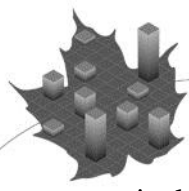
including Canada, the total fertility rate has decreased since 2008, which could be attributable to the economic downturn experienced in recent years. As of 2011, the total fertility rate for Canada stood at 1.61.

The overall decrease in the total fertility rate since the 1950s occurred as a result of changes in a variety of social, medical, and economic factors. Although there have been periods of growth in the total fertility rates in recent decades, it is unlikely that the rates will return to historical levels in the absence of significant societal changes. The assumed age-specific fertility rates of cohorts leads to an assumed total fertility rate for Canada that will increase from its 2011 level of 1.61 children per woman to an ultimate level of 1.65 in 2019.

2. Mortality

Another element that has contributed to the aging of the population is the significant reduction in age-specific mortality rates. This can be best measured by the increase in life expectancy at age 65, which directly affects how long retirement benefits will be paid to beneficiaries. Male life expectancy without future mortality improvements (i.e. without assuming any future reductions in mortality) at age 65 increased by 39% between 1966 and 2011, rising from 13.6 to 18.9 years. For women, life expectancy at age 65 without future improvements increased by 29%, from 16.9 to 21.8 years over the same period. Although the overall gains in life expectancy at age 65 since 1966 are similar for males and females (about 5 years), about 60% of the increase occurred after 1991 for males, while for females, about 60% of the increase occurred by 1991.

Mortality improvements are expected to continue in the future but at a slower pace than most recently observed over the 15-year period ending in 2011. Further, it is assumed that, ultimately, mortality improvement rates for males will decrease to the same level as females. The analysis of the Canadian experience over the period 1921 to 2011, including the recent slowdown trends observed in mortality improvement rates for OAS pensioners, was combined with an analysis of the possible drivers of future mortality improvements. The 15-year average mortality improvement rates by age and sex for the period ending in 2011 are the starting point for the projected annual mortality improvement rates from 2012 onward. For ages 65 and over, the annual mortality improvement rates for 2012 to 2014 were estimated using the trends derived from the administrative data on OAS pensioners, representing 98% of the general population. For 2012 onward (2015 onward for ages 65 and over), the rates are assumed to gradually reduce to their ultimate levels in 2032. Considering future mortality improvements, life expectancy at age 65 in 2016 is 21.3 years for males, and 23.7 years for females. This represents an increase of 0.2 of a year in life expectancies at age 65 in 2016 for both males and females, relative to the 12th OAS Program Actuarial Report projections.

3. Net Migration

Net migration (i.e. the excess of immigration over emigration) is unlikely to materially reduce the continued aging of the population unless (1) the level of immigration rises significantly above what has been observed historically and (2) the average age at immigration falls dramatically.

The net migration rate is assumed to increase from its current (2015) level of 0.55% of the population to an ultimate level of 0.62% of the population in year 2016 and to remain at that level thereafter. The ultimate rate of 0.62% corresponds to the average experience observed over the last 10 years.
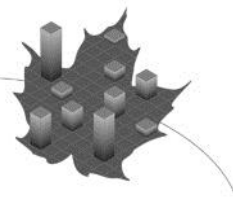
4. Population Projections

Table 2 shows the population for three age groups (0-19, 20-64 and 65 and over) throughout the projection period. The ratio of the number of people aged 20-64 to those aged 65 and over is a measure that approximates the ratio of the number of working-age people to retirees. Because of the aging population, this ratio drops from 3.7 in 2016 to about half its value or 2.0 in 2060.

The number of people reaching age 65 in any given year is a good indicator of the number of new basic pension beneficiaries coming into pay each year. This population is expected to increase significantly within the next fourteen years, growing from 412,000 in 2016 to 522,000 by 2030.

Table 2   Population of Canada (thousands)

Year	Total	Age 0-19	Age 20-64	Age 65 and Over	Ratio of 20-64 to 65 and Over	Reaching Age 65
2016	36,218	7,838	22,383	5,997	3.7	412
2017	36,592	7,867	22,509	6,216	3.6	419
2018	36,970	7,921	22,603	6,446	3.5	435
2019	37,351	7,994	22,666	6,691	3.4	456
2020	37,733	8,074	22,709	6,950	3.3	474
2021	38,115	8,167	22,739	7,209	3.2	480
2022	38,494	8,264	22,754	7,476	3.0	495
2025	39,611	8,539	22,774	8,298	2.7	524
2030	41,337	8,815	22,925	9,597	2.4	522
2035	42,850	8,992	23,483	10,374	2.3	475
2040	44,189	9,042	24,255	10,892	2.2	478
2045	45,425	9,100	24,989	11,336	2.2	523
2050	46,620	9,280	25,492	11,848	2.2	561
2055	47,825	9,578	25,838	12,409	2.1	610
2060	49,072	9,892	26,091	13,088	2.0	610

C. Economic Assumptions

The OAS program expenditures are presented as cost ratios using three different measurement bases, namely combined CPP/QPP contributory earnings[1], total employment earnings and the GDP. These cost bases are projected using economic assumptions for indicators such as labour force participation rates, job creation rates, unemployment rates, and real increases in average employment earnings. For benefit projection purposes, assumptions regarding the rate of increase in prices and recipient rates for the various benefits are also required.

One of the key elements underlying the best-estimate economic assumptions relates to the continued trend toward longer working lives. Older workers are expected to exit the workforce at a later age, which could alleviate the impact of the aging of the population on future labour force growth. However, despite the expected later exit ages, labour force growth is projected to weaken as the working-age population expands at a slower pace and baby boomers exit the labour force. As a result, labour shortages together with projected improvements in productivity growth are assumed to create upward pressure on real wages.

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[1] For the CPP, contributory earnings are of the Base CPP only, i.e., excludes Additional CPP contributory earnings above the Year's Maximum Pensionable Earnings (YMPE) starting in 2024.

1. Labour Force

Employment levels vary with the rate of unemployment, and reflect trends in increased workforce participation by women, longer periods of formal education among young adults, as well as changing retirement patterns of older workers.

As the population ages, older age groups with lower labour force participation will increase in size. As a result, the labour force participation rate for Canadians aged 15 and over is expected to decline from 65.8% in 2016 to 62.8% in 2035. A more useful measure of the working-age population is the participation rate of those aged 15 to 69, which is expected to increase from 74.3% in 2016 to 77.5% in 2035.

The increase in the participation rate for those aged 15 to 69 is mainly due to an assumed increase in participation rates for those aged 55 and over as a result of an expected continued trend toward longer working lives. Furthermore, labour shortages are expected to create attractive employment opportunities that will exert upward pressure on the participation rates for all age groups. It is also expected that future participation rates will increase with the aging of cohorts that have a stronger labour force attachment compared to previous cohorts due to higher education attainment. The cohort effect of stronger labour force attachment of women is expected to continue but at a much slower pace than in the past, resulting in a gradual narrowing of the gap between the age-specific participation rates of men and women.

As a result, the participation rates for females are projected to increase slightly more than for males. Overall, the male participation rate of those aged 15 to 69 is expected to increase from 78.4% in 2016 to 80.9% in 2035, while the female participation rate for the same age group is expected to increase from 70.2% in 2016 to 74.2% in 2035. Thereafter, the 2035 gap of 6.7% between males and females in this age group is expected to decrease to 6.6%.

The job creation rate (i.e. the change in the number of persons employed) in Canada was on average 1.6% from 1976 to 2015 based on available employment data, and it is assumed that the rate will be 0.6% in 2016. The job creation rate assumption is determined on the basis of expected moderate economic growth and an unemployment rate that is expected to increase from 6.9% in 2015 to 7.1% in 2016 before gradually decreasing to an ultimate level of 6.2% by 2025. The assumed job creation rate is on average about 0.8% from 2016 to 2020 and 0.7% from 2020 to 2025, which is slightly higher than the labour force growth rate. It is assumed that, starting in 2025, the job creation rate will follow the labour force growth rate, with both averaging 0.7% per year between 2025 and 2035, and 0.5% per year thereafter. The aging of the population is the main reason behind the expected slower long-term growth in the labour force and job creation rate.

2. Price Increases

Price increases, as measured by changes in the Consumer Price Index (CPI), tend to fluctuate from year to year. In 2011, the Bank of Canada and the Government renewed their commitment to keep inflation between 1% and 3% until the end of 2016. This commitment was renewed again in October 2016 to keep inflation within the same range until the end of 2021. In Canada, inflation was moderate at 1.1% in 2015. To reflect recent experience and the short-term expectation that inflation will remain subdued in coming quarters, the price increase assumption is set at 1.6% in 2016. Thereafter, the price increase assumption is set at 2.0%.
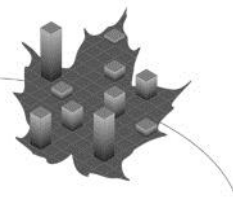
3. Real Wage Increases

Wage increases affect the financial balance of the OAS program in two ways. In the short term, an increase in the average wage translates into higher total employment earnings, combined CPP/QPP contributory earnings, and GDP, with little immediate impact on benefits. Therefore, costs in relation to these measurement bases will decrease. Over the longer term, higher average wages in relation to the level of prices could be expected to produce lower payouts for income-tested benefits such as the GIS and Allowance.

Increases in the nominal wage comprise increases in the real wage and increases in the level of prices ("inflation"). Put another way, the difference between nominal wage increases and inflation represents increases in the real wage, which is also referred to in this report as the "real wage increase". The long-term projected costs relative to the various measurement bases are more dependent on real wage increases than on the nominal level of wage increases assumed.

There are five main factors that influence increases in the real wage, namely general productivity, the extent to which changes in productivity are shared between labour and capital, changes in the compensation structure offered to employees, changes in the average number of hours worked, and changes in labour's terms of trade. Labour's terms of trade measure how shifts in the prices of goods produced by workers (measured by the Gross Domestic Product (GDP) deflator) compare to shifts in the prices of goods consumed by workers (CPI).

Based on the experience of the first six months of 2016, the real increases in average annual earnings and average weekly earnings are assumed to be 0.2% and -0.5%, respectively for 2016. Thereafter, average annual and weekly earnings are assumed to increase at the same pace, with real wage increases projected to gradually rise to an ultimate value of 1.1% by 2025. The ultimate real wage increase assumption is developed taking into account the relationships described above, historical trends, and an assumed labour shortage. The ultimate real wage increase assumption combined with the ultimate price increase assumption results in an assumed annual increase in average nominal wages of 3.1% in 2025 and thereafter.

The assumptions regarding the increase in average real annual employment earnings and job creation rates result in projected average annual real increases in total Canadian employment earnings of about 1.7% for the period 2016 to 2035. After 2035, this decreases to about 1.6% on average over the remainder of the projection period, reflecting the assumed 1.1% real increase in annual wages and projected average 0.5% annual growth in the working-age population.

Given historical trends and the long-term relationship between increases in the average real annual employment earnings and the Year's Maximum Pensionable Earnings (YMPE), it is assumed, for the purpose of projecting CPP/QPP contributory earnings, that the real wage increase assumption is also applicable to the increases in the YMPE from one year to the next. Table 3 summarizes the main economic assumptions over the projection period.

Table 3   Economic Assumptions

Year	Real Increase Average Annual Earnings	Real Increase Average Weekly Earnings	Price Increase	Labour Force (Canada)			
				Participation Rate (Ages 15+)	Job Creation Rate	Unemployment Rate	Labour Force Annual Increase
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
2016	0.2	-0.5	1.6	65.8	0.6	7.1	0.8
2017	0.6	0.6	2.0	65.6	1.0	6.9	0.7
2018	0.7	0.7	2.0	65.5	0.8	6.8	0.7
2019	0.8	0.8	2.0	65.3	0.8	6.7	0.7
2020	0.9	0.9	2.0	65.1	0.7	6.6	0.6
2021	1.0	1.0	2.0	64.9	0.7	6.5	0.6
2022	1.0	1.0	2.0	64.7	0.7	6.5	0.7
2023	1.1	1.1	2.0	64.5	0.7	6.4	0.6
2024	1.1	1.1	2.0	64.3	0.7	6.3	0.6
2025	1.1	1.1	2.0	64.0	0.7	6.2	0.6
2030	1.1	1.1	2.0	63.1	0.6	6.2	0.6
2035	1.1	1.1	2.0	62.8	0.8	6.2	0.8
2040	1.1	1.1	2.0	62.4	0.6	6.2	0.6
2045	1.1	1.1	2.0	62.1	0.5	6.2	0.5
2050	1.1	1.1	2.0	61.8	0.3	6.2	0.3
2055	1.1	1.1	2.0	61.3	0.3	6.2	0.3
2060	1.1	1.1	2.0	60.9	0.4	6.2	0.4

4. Recipient Rates

OAS recipient rates represent the proportion of the Canadian population that has received (historically), receives, or is projected to receive OAS program benefits. Recipient rates are different than coverage or eligibility rates for benefits, which are higher, since individuals upon becoming eligible for benefits don't necessarily apply for them immediately, but may rather defer application and commencement of their benefits (for reasons such as to receive recently introduced actuarially-adjusted higher benefits for voluntary deferrals or to increase benefits from partial to full amounts by accruing more years of residence).

The recipient rate for a given benefit is derived as the ratio of the number of beneficiaries receiving that benefit to the population. It is worth noting that recipient rates for the OAS basic pension presented in this report exclude the impact of the OAS Recovery Tax. The impact of the OAS Recovery Tax on the basic pension recipient rates is discussed in section IV of Appendix D of this report.

As shown in Table 4, the overall basic pension recipient rate for males is projected to increase from 95.9% in 2016 to 96.9% in 2060, while for females it is projected to increase from 96.2% to 97.5% over the same period. The rates for both sexes increase over time primarily due to the aging of the population. Moreover, the basic pension recipient rates include benefits paid outside of Canada and as such, could exceed 100%. It is assumed that such international recipient rates will increase slightly over time, which also leads to an increase in the overall basic pension recipient rates.
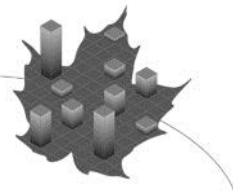
The GIS and Allowance recipient rates by age, sex, type and level of benefit for year 2016 were used as the starting point for determining the corresponding best-estimate assumptions. GIS and Allowance recipient rates are projected under the assumption that initial retirement income increases in line with the rate of wage growth, where such retirement income mainly comprises CPP benefits (including Additional CPP benefits starting in 2019) and QPP benefits. At the same time, it is assumed that the income limits for the GIS and Allowance will have increased in line with inflation prior to retirement. Together, this would normally result in a lower proportion of new retirees becoming eligible for these benefits over the projection period. However, the effect of investments in TFSAs on GIS and Allowance benefits is projected to partially offset the expected decline in recipient rates for these benefits. Section IV of Appendix D of this report discusses in more detail the effect of the Additional CPP on the GIS and Allowance benefits.

Furthermore, for the GIS and Allowance, experience adjustment factors are used to adjust the projected recipient rates so that characteristics and trends of historical recipient rates by age, sex, type and level of benefit over the period 2007 to 2016 would be reproduced more closely. These experience adjustment factors are used for the first five years of the projection period, so that there is a gradual change in the assumed recipient rates by level of benefit that reflects a transition from the historical experience to the longer term projections.

Table 4 presents a summary of the projected recipient rates by type of benefit.

Table 4   Recipient Rates[1], [2]

	Males			Females		
	2016	**2030**	**2060**	**2016**	**2030**	**2060**
OAS	**95.9**	**96.3**	**96.9**	**96.2**	**97.1**	**97.5**
GIS-Single	11.2	12.1	10.7	24.6	25.3	22.3
GIS-Spouse a Pensioner	11.2	10.7	7.4	9.3	9.5	6.6
GIS-Spouse not a Pensioner	2.5	2.0	1.4	0.7	0.7	0.5
GIS-Spouse with Allowance	1.6	1.2	1.0	0.2	0.2	0.1
GIS-All[3]	**26.4**	**26.1**	**20.5**	**34.9**	**35.7**	**29.6**
Allowance-Regular	0.5	0.7	0.6	3.8	4.6	4.1
Allowance-Survivor	0.3	0.2	0.1	1.7	0.9	0.3
Allowance-All	**0.8**	**0.9**	**0.7**	**5.5**	**5.5**	**4.4**

(1) Recipient rates for the OAS basic pension are on a gross basis, that is, before application of the OAS Recovery Tax. All recipient rates include benefits paid outside Canada and for this reason can exceed 100%. The OAS basic pension recipient rates shown also account for voluntary deferrals, effective 1 July 2013.

(2) Recipient rates pertain to ages 65 and older for OAS basic pension and GIS beneficiaries and to ages 60 to 64 for Allowance beneficiaries.

(3) Components may not sum to totals due to rounding.

IV. Results

A. Overview

The key observations and findings of this report are described below.

- Demographic changes, notably the aging of the Canadian population, will have a major impact on the ratio of the number of people aged 20 to 64 to those aged 65 and over. This ratio is expected to fall from about 3.7 in 2016 to 2.0 in 2060. Chart 1 shows an analysis of the Canadian population by age group.

- The number of beneficiaries of the OAS basic pension is expected to increase by 61% over the next fourteen years, growing from 5.8 million in 2016 to 9.3 million by 2030, mainly due to the retirement of the baby boom generation over that period. Thereafter, the growth in the number of beneficiaries is projected to slow down. By 2060, the number of OAS basic pension beneficiaries is projected to reach 12.7 million.

- OAS basic pension annual expenditures are projected to increase from $37.8 billion in 2016 to $80.3 billion in 2030 and $198.6 billion by 2060.

- The number of GIS and Allowance beneficiaries is expected to increase by 59% over the next fourteen years, growing from 1.9 million in 2016 to 3.1 million by 2030. The GIS recipient rate (i.e. the proportion of the Canadian population that has received, receives, or is projected to receive the GIS) is projected to slowly decrease from its current level of 31.0% in 2016 to 25.3% by 2060.

- GIS and allowance annual expenditures are projected to increase from $11.2 billion in 2016 to $23.6 billion in 2030 and $47.1 billion by 2060.

- The introduction of the Additional CPP will affect the GIS and Allowance recipient rates and the amount of expenditures. Part of the reduction in the projected overall GIS recipient rate is attributable to Additional CPP benefits that will gradually become payable starting in 2019. The impact of the Additional CPP will be very gradual and, by 2060, together with other factors, lead to a projected overall GIS recipient rate of 25.3% instead of 27.2% in the absence of Additional CPP benefits (a reduction of 6.8% or 243,000 fewer beneficiaries). As well, in the presence of Additional CPP benefits, GIS annual expenditures in 2060 are projected to be $46.0 billion instead of $49.0 billion (a reduction of 6.2% or of $3.0 billion).

- Total annual OAS program expenditures are projected to increase from $49 billion in 2016 to $104 billion in 2030 and $247 billion by 2060.

- As shown in Chart 2, the ratio of program expenditures to the GDP is projected to be 2.4% in 2016, which is similar to what the ratio was in the late 1980s. After 2016, the ratio is projected to reach a high of 3.2% in 2031. This level is somewhat higher than the historical peak of 2.7% reached in the early 1990s. After 2031, the ratio of expenditures to GDP is projected to slowly decrease to a level of 2.7% by 2060. This reduction is mainly attributable to expected slower growth in inflation compared to growth in wages and the GDP.
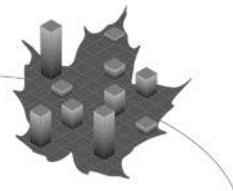
Over time, price-indexation of benefits that increases more slowly than the rate of growth in average employment earnings means that benefits will replace a decreasing share of an individual's pre-retirement earnings. In the past, this issue has been addressed through occasional ad hoc increases in the benefit rates. One of the sensitivity tests shown in Appendix A of this report provides an indication of the impact on projected results if benefit rates were increased to partially reflect the growth in real wages.

Chart 1   Analysis of Population of Canada by Age Group
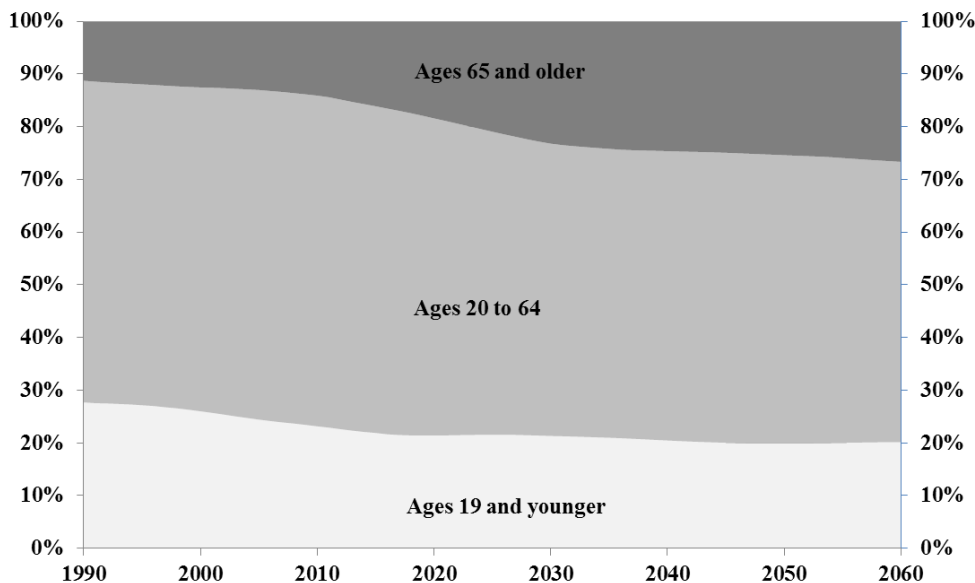
Chart 2   Expenditures as a Proportion of GDP
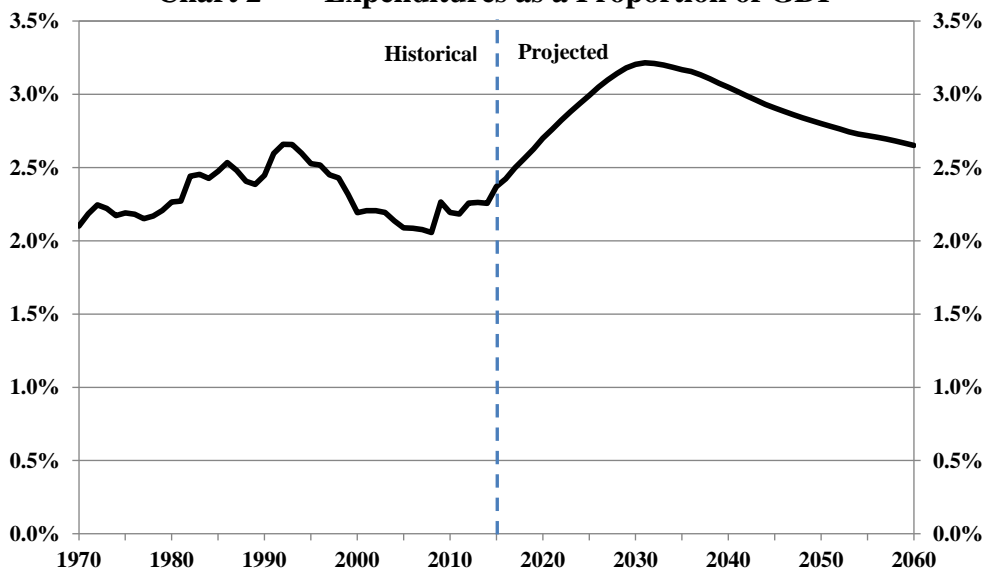
B. Number of Beneficiaries

Tables 5 and 6 present the historical and projected number of beneficiaries along with the respective overall recipient rates. The number of beneficiaries is the product of the population and the relevant recipient rates, which vary by year, age, sex, and type and level of benefit. Beneficiaries include those who receive benefits outside of Canada. In 2015, about 1.9% of the male population aged 65 and older was receiving a basic pension outside of Canada under international social security agreements, while the corresponding percentage for females was about 1.3%. These percentages are expected to slightly increase over the projection period.

The recipient rates shown in Table 6 reflect the eligible ages for program benefits, that is age 65 for the OAS basic pension and GIS, and ages 60 to 64 for the Allowance benefit. The OAS recipient rates also account for voluntary deferrals, which became effective 1 July 2013. The OAS basic pension recipient rates and number of beneficiaries shown in Tables 5 and 6 are on a gross basis; that is, they have not been adjusted to account for the application of the OAS Recovery Tax, which is a provision of the *Income Tax Act*.

The OAS Recovery Tax, which applies to high-income pensioners, effectively reduces recipient rates, since very high-income pensioners may have their benefit completely reduced. It is estimated that 6.9% (or 397,000) of all OAS pensioners in 2016 were affected by the Recovery Tax. Of this group, 127,000 or 2.2% of all OAS pensioners that year had their pensions completely reduced. In 2060, those affected by the Recovery Tax are projected to represent 9.0% (1.1 million) of all OAS pensioners, while those fully affected are projected to represent 2.7% (342,000) of pensioners. Section IV of Appendix D presents more detailed information on the projected impact of the OAS Recovery Tax on the number of OAS basic pension beneficiaries and total amounts payable.

As shown in Table 6, the number of beneficiaries for the basic pension is expected to increase by 61% over the next fourteen years, growing from 5.8 million in 2016 to 9.3 million by the end of 2030. After 2030, due to the relative stability in the growth of the population aged 65 and over and in the basic pension recipient rates, the number of beneficiaries is expected to continue to increase but at a slower pace until the end of the projection period.

The number of GIS beneficiaries is expected to increase by 61% over the next fourteen years, growing from 1.9 million in 2016 to 3.0 million by 2030. Over that period, the increase in the number of basic pension and GIS beneficiaries is mainly a result of the aging of the population and the retirement of the baby boomers.

It is assumed that, for each cohort of individuals who may become eligible for the GIS or Allowance, the initial retirement income will consist mainly of CPP benefits (including Additional CPP benefits starting in 2019) and QPP benefits that reflect increases in line with wage growth prior to retirement. At the same time, it is assumed that the income limits for the GIS and Allowance will have increased in line with inflation prior to retirement. Over the projection period, this combined effect would have the overall effect of reducing the number of individuals who might have otherwise been eligible for the GIS or Allowance benefits. However, the impact of TFSAs is expected to partially offset this decline in eligibility. Section IV of Appendix D provides more detailed information on the projected impact of Additional CPP benefits on the number and total amounts of GIS benefits payable.
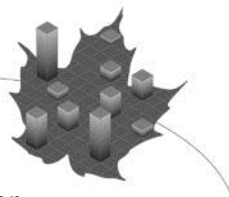
The expected decrease in the number of Allowance beneficiaries due to the difference between inflation and wage growth prior to retirement and Additional CPP benefits is assumed to eventually outweigh any increase in beneficiaries due to growth in the age group 60 to 64 and the effect of TFSAs. The number of Allowance beneficiaries is expected to increase by 5.5% over the next fourteen years, going from 73,000 in 2016 to 77,000 by the end of 2030, with the recipient rates remaining relatively stable around 3% over the same period. After 2030, the Allowance recipient rates slightly decrease while the growth in the population aged 60 to 64 stabilizes.

Table 5 Beneficiaries (Historical)[1]

Year	Eligible OAS Population	Number of Beneficiaries			Recipient Rates		
		OAS	GIS	Allowance	OAS	GIS	Allowance
	(thousands)	(thousands)	(thousands)	(thousands)	(%)	(%)	(%)
1966	1,222	1,199	-	-	98.1	0.0	0.0
1970	1,716	1,689	816	-	98.4	47.6	0.0
1975	1,957	1,925	1,069	70	98.4	54.6	7.8
1980	2,306	2,259	1,191	76	98.0	51.7	8.0
1985	2,648	2,595	1,290	91	98.0	48.7	8.1
1986	2,737	2,683	1,316	139	98.0	48.1	12.2
1987	2,839	2,778	1,336	140	97.9	47.1	12.2
1988	2,929	2,862	1,342	135	97.7	45.8	11.6
1989	3,028	2,948	1,339	128	97.4	44.2	10.9
1990	3,124	3,036	1,325	121	97.2	42.4	10.3
1991	3,212	3,127	1,309	115	97.3	40.8	9.6
1992	3,291	3,210	1,300	110	97.5	39.5	9.2
1993	3,366	3,289	1,313	108	97.7	39.0	8.9
1994	3,434	3,367	1,340	109	98.0	39.0	9.0
1995	3,506	3,447	1,338	108	98.3	38.2	8.9
1996	3,579	3,524	1,341	101	98.5	37.5	8.3
1997	3,655	3,594	1,364	100	98.3	37.3	8.3
1998	3,724	3,656	1,368	97	98.2	36.7	8.0
1999	3,786	3,715	1,372	97	98.1	36.2	7.9
2000	3,852	3,781	1,363	95	98.2	35.4	7.6
2001	3,912	3,852	1,360	93	98.5	34.8	7.2
2002	3,980	3,923	1,404	92	98.6	35.3	6.9
2003	4,052	3,999	1,450	92	98.7	35.8	6.6
2004	4,128	4,078	1,483	93	98.8	35.9	6.3
2005	4,206	4,163	1,515	94	99.0	36.0	6.2
2006	4,310	4,261	1,546	94	98.9	35.9	5.9
2007	4,413	4,362	1,580	94	98.9	35.8	5.5
2008	4,533	4,478	1,584	93	98.8	34.9	5.2
2009	4,661	4,603	1,595	90	98.8	34.2	4.8
2010	4,796	4,732	1,614	92	98.7	33.7	4.6
2011	4,950	4,879	1,662	90	98.6	33.6	4.4
2012	5,165	5,076	1,701	90	98.3	32.9	4.3
2013	5,381	5,262	1,738	84	97.8	32.3	4.0
2014	5,585	5,436	1,742	80	97.3	31.2	3.7
2015	5,781	5,597	1,798	77	96.8	31.1	3.4

(1) The OAS basic pension recipient rates shown account for voluntary deferrals, effective 1 July 2013. As shown in Table 37 of Appendix D, by age 75 the recipient rates for a given cohort of individuals reaches 100.0% for males and 99.8% for females. The historical OAS basic pension recipient rates and number of beneficiaries are on a gross basis, that is, before application of the OAS Recovery Tax. All recipient rates include benefits paid outside Canada and for this reason can exceed 100%.
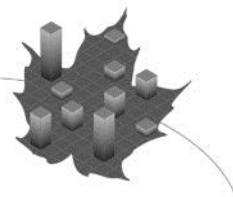
Table 6 Beneficiaries (Projected)[1]

Year	Eligible OAS Population	Number of Beneficiaries			Recipient Rates		
		OAS	GIS	Allowance	OAS	GIS	Allowance
	(thousands)	(thousands)	(thousands)	(thousands)	(%)	(%)	(%)
2016	5,997	5,761	1,860	73	96.1	31.0	3.2
2017	6,216	5,971	1,918	77	96.1	30.9	3.2
2018	6,446	6,194	1,987	74	96.1	30.8	3.0
2019	6,691	6,432	2,052	71	96.1	30.7	2.8
2020	6,950	6,683	2,127	70	96.2	30.6	2.7
2021	7,209	6,936	2,207	70	96.2	30.6	2.7
2022	7,476	7,197	2,292	71	96.3	30.7	2.7
2023	7,749	7,464	2,380	73	96.3	30.7	2.7
2024	8,021	7,730	2,463	74	96.4	30.7	2.7
2025	8,298	8,001	2,553	75	96.4	30.8	2.8
2026	8,577	8,274	2,647	76	96.5	30.9	2.9
2027	8,841	8,535	2,738	77	96.5	31.0	3.0
2028	9,109	8,798	2,832	77	96.6	31.1	3.1
2029	9,364	9,051	2,923	77	96.7	31.2	3.2
2030	9,597	9,283	2,991	77	96.7	31.2	3.2
2031	9,788	9,480	3,051	77	96.9	31.2	3.2
2032	9,947	9,645	3,100	77	97.0	31.2	3.2
2033	10,094	9,796	3,146	76	97.1	31.2	3.2
2034	10,236	9,941	3,187	75	97.1	31.1	3.2
2035	10,374	10,079	3,224	74	97.2	31.1	3.1
2036	10,508	10,213	3,258	73	97.2	31.0	3.1
2037	10,615	10,324	3,283	72	97.3	30.9	3.0
2038	10,710	10,421	3,305	72	97.3	30.9	2.9
2039	10,798	10,510	3,321	71	97.3	30.8	2.9
2040	10,892	10,602	3,336	70	97.3	30.6	2.8
2041	10,981	10,690	3,344	70	97.3	30.4	2.7
2042	11,066	10,773	3,347	70	97.4	30.2	2.6
2043	11,149	10,854	3,349	69	97.4	30.0	2.6
2044	11,238	10,939	3,350	69	97.3	29.8	2.5
2045	11,336	11,032	3,350	69	97.3	29.6	2.5
2050	11,848	11,522	3,344	71	97.3	28.2	2.4
2055	12,409	12,061	3,314	73	97.2	26.7	2.4
2060	13,088	12,724	3,312	74	97.2	25.3	2.6

(1) The OAS basic pension recipient rates shown account for voluntary deferrals, effective 1 July 2013. As shown in Table 37 of Appendix D, by age 75 the recipient rates for a given cohort of individuals reaches 100.0% for males and 99.8% for females. The historical OAS basic pension recipient rates and number of beneficiaries are on a gross basis, that is, before application of the OAS Recovery Tax. All recipient rates include benefits paid outside Canada and for this reason can exceed 100%.

C. Expenditures and Average Annual Benefits

The historical and projected expenditures and average annual benefits by type are presented in Tables 7 and 8. The amounts of OAS basic pension benefits presented in Tables 7 and 8 do not account for the OAS Recovery Tax in the determination of benefits. The OAS Recovery Tax reduces the OAS basic pension by 15 cents for each dollar of income above a minimum threshold. It is estimated that, in 2016, approximately 6.9% (or 397,000) of all OAS pensioners were affected by the Recovery Tax, resulting in the repayment of about $1.5 billion or 4.0% of the total amount of basic pensions payable. Section IV of Appendix D presents more detailed information on the projected impact of the OAS Recovery Tax on the basic pensions payable.

Total basic pension expenditures are projected to increase from $37.8 billion in 2016 to $80.3 billion by 2030 and $198.6 billion by 2060. The projected average annual basic pension of $6,558 in 2016 is equal to about 95% of the maximum annual OAS pension for 2016. Since the full impact of the introduction of partial pensions in 1977 (for those with less than 40 years of residence) has been reached , the average annual benefit as a percentage of the maximum is assumed to remain relatively stable at the level of 95% throughout the projection period. The OAS basic pension expenditures and average benefits also account for voluntary deferrals, which became effective 1 July 2013.

The amounts of GIS and Allowance expenditures presented in Table 8 account for Additional CPP benefits that will start being paid in 2019. Section IV of Appendix D presents more detailed information on the projected impact of the Additional CPP on these benefits. For each benefit, total expenditures are the product of the number of beneficiaries and respective average benefit by age, sex, and type and level of benefit.

Total GIS expenditures are projected to increase from $10.6 billion in 2016 to $22.9 billion by 2030 and $46.0 billion by 2060. The projected average annual GIS benefit is $5,719 in 2016, which is about 56% of the maximum annual GIS single rate for 2016. The distribution of the number of GIS beneficiaries by type and level of benefit is assumed to shift to lower benefit categories over the projection period due to the impact of TFSAs. However, this impact is slightly more than offset by the presence of Additional CPP benefits which increase the average benefit in the long term (2060) as there is a proportionally greater reduction in the number of beneficiaries (6.8%) than in the amount of GIS benefits paid (6.2%). For this reason, the average GIS benefit slightly increases to about 57% of the maximum GIS single rate by the end of the projection period.

Total Allowance expenditures are projected to increase from $532 million in 2016 to $710 million by 2030 and $1.2 billion by 2060. The projected overall average annual Allowance benefit is $7,252 in 2016, which is about 55% of the maximum regular annual benefit for 2016. The distribution of the number of Allowance beneficiaries by type and level of benefit is assumed to stay relatively stable over the projection period due to the impact of TFSAs. On the other hand, Additional CPP benefits tend to drag down the average Allowance benefit in the long term (2060) as there is a proportionally greater reduction in the amount of Allowance benefits (5.8%) than in the number of beneficiaries (5.2%). For this reason, the average Allowance benefit slowly decreases to about 50% of the maximum Allowance regular rate by the end of the projection period.

Projected total annual OAS program expenditures for all benefits and administrative expenses are $49 billion in 2016, rising to $104 billion in 2030 and $247 billion by 2060. OAS basic pension
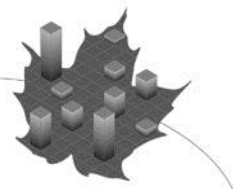
benefits are 77% of total expenditures in 2016, and this proportion is expected to increase to 81% by 2060.

Table 7   Expenditures and Average Annual Benefits (Historical) [1]

Year	Expenditures					Average Annual Benefit		
	OAS	GIS	Allowance	Administrative Expenses	Total	OAS	GIS	Allowance
	($ million)	($ million)	($ million)	($ million)	($ million)	($)	($)	($)
1966	1,007	-	-	5	1,012	840	-	-
1970	1,611	274	-	9	1,894	954	336	-
1975	2,883	896	13	10	3,802	1,498	838	189
1980	5,147	1,772	169	34	7,122	2,279	1,488	2,236
1985	8,696	3,278	295	60	12,329	3,351	2,542	3,244
1986	9,346	3,419	468	59	13,292	3,484	2,598	3,356
1987	10,070	3,577	482	59	14,188	3,625	2,677	3,446
1988	10,774	3,725	476	56	15,031	3,764	2,776	3,521
1989	11,579	3,851	464	62	15,956	3,927	2,877	3,621
1990	12,484	3,954	452	67	16,957	4,112	2,985	3,732
1991	13,545	4,102	447	63	18,157	4,331	3,133	3,892
1992	14,292	4,227	438	77	19,034	4,452	3,252	3,964
1993	14,872	4,393	430	90	19,785	4,522	3,346	3,974
1994	15,403	4,587	431	91	20,512	4,574	3,423	3,967
1995	15,832	4,601	411	106	20,950	4,593	3,439	3,802
1996	16,433	4,636	398	104	21,571	4,663	3,458	3,956
1997	16,944	4,710	393	106	22,153	4,715	3,453	3,935
1998	17,470	4,810	386	109	22,775	4,779	3,517	3,964
1999	17,903	4,894	388	99	23,284	4,819	3,567	3,990
2000	18,669	5,019	389	89	24,166	4,937	3,682	4,087
2001	19,508	5,160	390	95	25,153	5,065	3,795	4,205
2002	20,318	5,417	397	99	26,231	5,179	3,858	4,326
2003	21,217	5,710	411	97	27,435	5,306	3,937	4,473
2004	21,923	5,954	453	104	28,434	5,376	4,015	4,885
2005	22,701	6,334	469	104	29,608	5,453	4,182	4,978
2006	23,737	6,800	497	97	31,131	5,570	4,399	5,287
2007	24,711	7,346	513	112	32,682	5,665	4,649	5,457
2008	25,925	7,425	531	120	34,001	5,789	4,687	5,692
2009	27,149	7,708	523	121	35,501	5,898	4,831	5,814
2010	27,984	7,807	550	126	36,467	5,913	4,837	5,999
2011	29,528	8,434	539	134	38,635	6,053	5,074	5,964
2012	31,423	9,029	570	143	41,165	6,190	5,309	6,365
2013	32,893	9,349	532	149	42,923	6,251	5,379	6,319
2014	34,506	9,538	530	155	44,729	6,347	5,475	6,640
2015	36,167	10,240	512	163	47,082	6,462	5,695	6,692

(1) The historical OAS basic pension expenditures and average benefits are on a gross basis, that is, before application of the OAS Recovery Tax. All expenditures include benefits paid outside of Canada.

Table 8 Expenditures and Average Annual Benefits (Projected)[1]

Year	OAS	GIS	Allowance	Administrative Expenses	Total	OAS	GIS	Allowance
	($ million)	($ million)	($ million)	($ million)	($ million)	($)	($)	($)
2016	37,779	10,640	532	170	49,121	6,558	5,719	7,252
2017	39,902	11,582	570	181	52,235	6,683	6,038	7,384
2018	42,226	12,243	558	191	55,218	6,817	6,162	7,565
2019	44,738	12,867	551	202	58,358	6,955	6,271	7,738
2020	47,433	13,590	551	214	61,788	7,097	6,390	7,890
2021	50,232	14,375	561	226	65,394	7,242	6,513	8,023
2022	53,183	15,210	581	240	69,214	7,390	6,637	8,149
2023	56,280	16,090	602	254	73,226	7,540	6,762	8,275
2024	59,470	16,946	621	268	77,305	7,693	6,879	8,402
2025	62,791	17,878	640	282	81,591	7,848	7,003	8,531
2026	66,231	18,871	658	298	86,058	8,004	7,130	8,661
2027	69,670	19,865	673	313	90,521	8,163	7,256	8,783
2028	73,234	20,915	688	329	95,166	8,324	7,384	8,915
2029	76,820	21,946	700	346	99,812	8,487	7,508	9,047
2030	80,334	22,899	710	361	104,304	8,654	7,656	9,182
2031	83,641	23,818	717	376	108,552	8,823	7,806	9,307
2032	86,762	24,656	723	390	112,531	8,995	7,953	9,443
2033	89,843	25,508	727	403	116,481	9,171	8,107	9,592
2034	92,950	26,332	730	417	120,429	9,350	8,263	9,747
2035	96,095	27,155	733	431	124,414	9,534	8,423	9,905
2036	99,291	27,980	737	445	128,453	9,722	8,588	10,072
2037	102,337	28,729	741	458	132,265	9,913	8,751	10,229
2038	105,336	29,482	745	471	136,034	10,108	8,922	10,395
2039	108,329	30,211	750	484	139,774	10,307	9,096	10,565
2040	111,437	30,941	756	497	143,631	10,511	9,275	10,745
2041	114,575	31,629	766	511	147,481	10,718	9,460	10,955
2042	117,751	32,287	777	524	151,339	10,930	9,646	11,167
2043	120,983	32,946	790	537	155,256	11,146	9,836	11,380
2044	124,350	33,606	804	552	159,312	11,367	10,032	11,601
2045	127,896	34,278	821	566	163,561	11,593	10,232	11,827
2050	147,449	37,764	926	647	186,786	12,797	11,291	13,006
2055	170,452	41,488	1,035	740	213,715	14,133	12,519	14,232
2060	198,566	45,953	1,155	853	246,527	15,605	13,874	15,671

(1) The projected OAS basic pension expenditures and average benefits are on a gross basis, that is, before application of the OAS Recovery Tax. All expenditures include benefits paid outside of Canada.
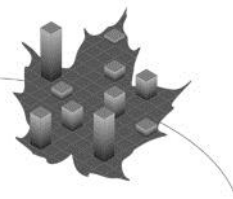
D. Cost Ratios

Since the program is financed from general revenues on a pay-as-you-go basis, it is useful to express its annual expenditures in relative terms rather than in absolute dollar terms. For this reason, the expenditures are presented as cost ratios using three different measurement bases. The three bases used are the GDP, combined CPP/QPP contributory earnings[1], and total employment earnings. The details regarding how these measurement bases are projected are provided in Appendix D of this report.

The projected expenditures shown in Tables 10, 12 and 14 reflect the eligible ages for program benefits, that is, age 65 for the OAS basic pension and GIS, and ages 60 to 64 for the Allowance benefit. The OAS basic pension expenditures also account for voluntary deferrals, which became effective 1 July 2013.

The GDP basis is derived from projected total employment earnings using the historical relationship between the two. Tables 9 and 10 present the historical and projected annual expenditures as a percentage of GDP.

The ratio of program expenditures to the GDP is projected to be 2.4% in 2016, which is similar to what the ratio was in the late 1980s. After 2016, the ratio is projected to reach a high of 3.2% in 2031. This level is somewhat higher than the historical peak of 2.7% reached in the early 1990s. After 2031, the ratio of expenditures to GDP is projected to slowly decrease to a level of 2.7% by 2060. This reduction is mainly attributable to expected slower growth in inflation compared to growth in wages and the GDP.

The combined CPP/QPP contributory earnings basis is derived from CPP contributory earnings as projected under the 27th CPP Actuarial Report as at 31 December 2015, adjusted to take into account QPP contributory earnings by using the historical relationship between the two. This measurement basis facilitates a direct comparison of the cost of the program with the costs of the CPP and QPP by using the same contributory basis. Tables 11 and 12 present the historical and projected annual expenditures as a percentage of combined CPP/QPP contributory earnings.

The total employment earnings basis is derived from CPP total employment earnings as projected under the 27th CPP Actuarial Report as at 31 December 2015, adjusted to account for Québec's total employment earnings. The adjustment is determined by using the historical relationship between total employment earnings as published by Statistics Canada and total employment earnings applicable to Canada less Québec for the purpose of the CPP. Tables 13 and 14 present the historical and projected annual expenditures as a percentage of total employment earnings.

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[1] For the CPP, contributory earnings are of the Base CPP only, i.e., excludes Additional CPP contributory earnings above the Year's Maximum Pensionable Earnings (YMPE) starting in 2024.

Table 9   Expenditures as Percentage of GDP (Historical)

Year	Gross Domestic Product	Expenditures as % of Gross Domestic Product[1]			Administrative Expenses	Total
		OAS	GIS	Allowance		
	($ billion)	(%)	(%)	(%)	(%)	(%)
1966	65	1.55	-	-	0.01	1.56
1970	90	1.79	0.30	-	0.01	2.10
1975	174	1.66	0.52	0.01	0.01	2.19
1980	314	1.64	0.56	0.05	0.01	2.27
1985	498	1.75	0.66	0.06	0.01	2.48
1986	524	1.78	0.65	0.09	0.01	2.53
1987	572	1.76	0.63	0.08	0.01	2.48
1988	624	1.73	0.60	0.08	0.01	2.41
1989	669	1.73	0.58	0.07	0.01	2.39
1990	693	1.80	0.57	0.07	0.01	2.45
1991	699	1.94	0.59	0.06	0.01	2.60
1992	716	2.00	0.59	0.06	0.01	2.66
1993	745	2.00	0.59	0.06	0.01	2.66
1994	790	1.95	0.58	0.05	0.01	2.60
1995	829	1.91	0.56	0.05	0.01	2.53
1996	857	1.92	0.54	0.05	0.01	2.52
1997	904	1.87	0.52	0.04	0.01	2.45
1998	937	1.86	0.51	0.04	0.01	2.43
1999	1,004	1.78	0.49	0.04	0.01	2.32
2000	1,102	1.69	0.46	0.04	0.01	2.19
2001	1,141	1.71	0.45	0.03	0.01	2.21
2002	1,189	1.71	0.46	0.03	0.01	2.21
2003	1,250	1.70	0.46	0.03	0.01	2.19
2004	1,331	1.65	0.45	0.03	0.01	2.14
2005	1,417	1.60	0.45	0.03	0.01	2.09
2006	1,492	1.59	0.46	0.03	0.01	2.09
2007	1,574	1.57	0.47	0.03	0.01	2.08
2008	1,653	1.57	0.45	0.03	0.01	2.06
2009	1,567	1.73	0.49	0.03	0.01	2.26
2010	1,662	1.68	0.47	0.03	0.01	2.19
2011	1,770	1.67	0.48	0.03	0.01	2.18
2012	1,823	1.72	0.50	0.03	0.01	2.26
2013	1,898	1.73	0.49	0.03	0.01	2.26
2014	1,983	1.74	0.48	0.03	0.01	2.26
2015	1,986	1.82	0.52	0.03	0.01	2.37

(1) The historical OAS basic pension expenditures are on a gross basis, that is, before application of the OAS Recovery Tax. All expenditures include benefits paid outside of Canada.

**Table 10   Expenditures as Percentage of GDP (Projected)**

| Year | Gross Domestic Product | Expenditures as % of Gross Domestic Product[1] | | | | |
		OAS	GIS	Allowance	Administrative Expenses	Total
	($ billion)	(%)	(%)	(%)	(%)	(%)
2016	2,027	1.86	0.52	0.03	0.01	2.42
2017	2,091	1.91	0.55	0.03	0.01	2.50
2018	2,155	1.96	0.57	0.03	0.01	2.56
2019	2,222	2.01	0.58	0.02	0.01	2.63
2020	2,289	2.07	0.59	0.02	0.01	2.70
2021	2,368	2.12	0.61	0.02	0.01	2.76
2022	2,452	2.17	0.62	0.02	0.01	2.82
2023	2,540	2.22	0.63	0.02	0.01	2.88
2024	2,632	2.26	0.64	0.02	0.01	2.94
2025	2,727	2.30	0.66	0.02	0.01	2.99
2026	2,821	2.35	0.67	0.02	0.01	3.05
2027	2,922	2.38	0.68	0.02	0.01	3.10
2028	3,028	2.42	0.69	0.02	0.01	3.14
2029	3,139	2.45	0.70	0.02	0.01	3.18
2030	3,254	2.47	0.70	0.02	0.01	3.21
2031	3,376	2.48	0.71	0.02	0.01	3.22
2032	3,504	2.48	0.70	0.02	0.01	3.21
2033	3,640	2.47	0.70	0.02	0.01	3.20
2034	3,780	2.46	0.70	0.02	0.01	3.19
2035	3,927	2.45	0.69	0.02	0.01	3.17
2036	4,070	2.44	0.69	0.02	0.01	3.16
2037	4,222	2.42	0.68	0.02	0.01	3.13
2038	4,380	2.40	0.67	0.02	0.01	3.11
2039	4,544	2.38	0.66	0.02	0.01	3.08
2040	4,712	2.36	0.66	0.02	0.01	3.05
2041	4,884	2.35	0.65	0.02	0.01	3.02
2042	5,062	2.33	0.64	0.02	0.01	2.99
2043	5,246	2.31	0.63	0.02	0.01	2.96
2044	5,434	2.29	0.62	0.01	0.01	2.93
2045	5,627	2.27	0.61	0.01	0.01	2.91
2050	6,669	2.21	0.57	0.01	0.01	2.80
2055	7,862	2.17	0.53	0.01	0.01	2.72
2060	9,298	2.14	0.49	0.01	0.01	2.65

(1)   The projected OAS basic pension expenditures are on a gross basis, that is, before application of the OAS Recovery Tax. All expenditures include benefits paid outside of Canada.

Table 11   Expenditures as Percentage of CPP/QPP Contributory Earnings (Historical)[1]

| Year | CPP/QPP Contributory Earnings | Expenditures as % of CPP/QPP Contributory Earnings[2] | | | | |
		OAS	GIS	Allowance	Administrative Expenses	Total
	($ billion)	(%)	(%)	(%)	(%)	(%)
1966	21	4.91	-	-	0.03	4.93
1970	27	5.93	1.01	-	0.03	6.97
1975	51	5.69	1.77	0.03	0.02	7.50
1980	94	5.45	1.88	0.18	0.04	7.55
1985	156	5.56	2.10	0.19	0.04	7.88
1986	172	5.44	1.99	0.27	0.03	7.74
1987	183	5.49	1.95	0.26	0.03	7.74
1988	196	5.48	1.90	0.24	0.03	7.65
1989	212	5.47	1.82	0.22	0.03	7.53
1990	223	5.61	1.78	0.20	0.03	7.62
1991	226	5.99	1.81	0.20	0.03	8.03
1992	231	6.18	1.83	0.19	0.03	8.23
1993	237	6.29	1.86	0.18	0.04	8.36
1994	245	6.29	1.87	0.18	0.04	8.37
1995	253	6.26	1.82	0.16	0.04	8.28
1996	258	6.37	1.80	0.15	0.04	8.36
1997	270	6.28	1.75	0.15	0.04	8.22
1998	288	6.07	1.67	0.13	0.04	7.92
1999	303	5.92	1.62	0.13	0.03	7.69
2000	320	5.83	1.57	0.12	0.03	7.55
2001	334	5.85	1.55	0.12	0.03	7.54
2002	345	5.88	1.57	0.11	0.03	7.59
2003	359	5.92	1.59	0.11	0.03	7.65
2004	374	5.87	1.59	0.12	0.03	7.61
2005	390	5.82	1.62	0.12	0.03	7.59
2006	411	5.78	1.65	0.12	0.02	7.58
2007	437	5.66	1.68	0.12	0.03	7.48
2008	457	5.67	1.62	0.12	0.03	7.43
2009	461	5.89	1.67	0.11	0.03	7.70
2010	484	5.78	1.61	0.11	0.03	7.53
2011	496	5.95	1.70	0.11	0.03	7.79
2012	529	5.94	1.71	0.11	0.03	7.78
2013	541	6.08	1.73	0.10	0.03	7.93
2014	562	6.14	1.70	0.09	0.03	7.96
2015	577	6.27	1.78	0.09	0.03	8.16

(1) For the CPP, contributory earnings are of the Base CPP only, i.e., excludes Additional CPP contributory earnings above the Year's Maximum Pensionable Earnings (YMPE) starting in 2024.

(2) The historical OAS basic pension expenditures are on a gross basis, that is, before application of the OAS Recovery Tax. All expenditures include benefits paid outside of Canada.

Table 12   Expenditures as Percentage of CPP/QPP Contributory Earnings (Projected)[1]

Year	CPP/QPP Contributory Earnings	Expenditures as % of CPP/QPP Contributory Earnings[2]				
		OAS	GIS	Allowance	Administrative Expenses	Total
	($ billion)	(%)	(%)	(%)	(%)	(%)
2016	593	6.37	1.79	0.09	0.03	8.28
2017	610	6.55	1.90	0.09	0.03	8.57
2018	631	6.69	1.94	0.09	0.03	8.75
2019	654	6.84	1.97	0.08	0.03	8.93
2020	676	7.02	2.01	0.08	0.03	9.14
2021	702	7.16	2.05	0.08	0.03	9.32
2022	728	7.30	2.09	0.08	0.03	9.50
2023	757	7.43	2.13	0.08	0.03	9.67
2024	786	7.56	2.16	0.08	0.03	9.83
2025	816	7.69	2.19	0.08	0.03	10.00
2026	847	7.82	2.23	0.08	0.04	10.16
2027	879	7.93	2.26	0.08	0.04	10.30
2028	913	8.02	2.29	0.08	0.04	10.43
2029	948	8.10	2.31	0.07	0.04	10.53
2030	986	8.15	2.32	0.07	0.04	10.58
2031	1,024	8.17	2.33	0.07	0.04	10.60
2032	1,065	8.14	2.31	0.07	0.04	10.56
2033	1,109	8.10	2.30	0.07	0.04	10.51
2034	1,153	8.06	2.28	0.06	0.04	10.44
2035	1,200	8.01	2.26	0.06	0.04	10.37
2036	1,246	7.97	2.25	0.06	0.04	10.31
2037	1,294	7.91	2.22	0.06	0.04	10.22
2038	1,345	7.83	2.19	0.06	0.04	10.12
2039	1,398	7.75	2.16	0.05	0.03	10.00
2040	1,451	7.68	2.13	0.05	0.03	9.90
2041	1,506	7.61	2.10	0.05	0.03	9.79
2042	1,563	7.53	2.07	0.05	0.03	9.68
2043	1,623	7.46	2.03	0.05	0.03	9.57
2044	1,683	7.39	2.00	0.05	0.03	9.47
2045	1,745	7.33	1.96	0.05	0.03	9.37
2050	2,082	7.08	1.81	0.04	0.03	8.97
2055	2,469	6.90	1.68	0.04	0.03	8.66
2060	2,934	6.77	1.57	0.04	0.03	8.40

(1)   For the CPP, contributory earnings are of the Base CPP only, i.e., excludes Additional CPP contributory earnings above the Year's Maximum Pensionable Earnings (YMPE) starting in 2024.

(2)   The projected OAS basic pension expenditures are on a gross basis, that is, before application of the OAS Recovery Tax. All expenditures include benefits paid outside of Canada.
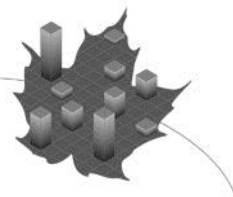
Table 13   Expenditures as Percentage of Total Employment Earnings (Historical)

Year	Total Employment Earnings	Expenditures as % of Total Employment Earnings[1]				
		OAS	GIS	Allowance	Administrative Expenses	Total
	($ billion)	(%)	(%)	(%)	(%)	(%)
1966	31	3.21	-	-	0.02	3.22
1970	46	3.53	0.60	-	0.02	4.15
1975	89	3.24	1.01	0.01	0.01	4.27
1980	156	3.29	1.13	0.11	0.02	4.55
1985	232	3.75	1.41	0.13	0.03	5.32
1986	247	3.78	1.38	0.19	0.02	5.37
1987	269	3.75	1.33	0.18	0.02	5.28
1988	295	3.65	1.26	0.16	0.02	5.10
1989	319	3.63	1.21	0.15	0.02	5.01
1990	333	3.74	1.19	0.14	0.02	5.09
1991	339	4.00	1.21	0.13	0.02	5.36
1992	343	4.17	1.23	0.13	0.02	5.55
1993	347	4.28	1.27	0.12	0.03	5.70
1994	356	4.33	1.29	0.12	0.03	5.76
1995	366	4.32	1.26	0.11	0.03	5.72
1996	376	4.37	1.23	0.11	0.03	5.74
1997	398	4.26	1.18	0.10	0.03	5.57
1998	421	4.15	1.14	0.09	0.03	5.41
1999	445	4.02	1.10	0.09	0.02	5.23
2000	486	3.84	1.03	0.08	0.02	4.98
2001	504	3.87	1.02	0.08	0.02	4.99
2002	521	3.90	1.04	0.08	0.02	5.04
2003	541	3.92	1.06	0.08	0.02	5.07
2004	571	3.84	1.04	0.08	0.02	4.98
2005	605	3.75	1.05	0.08	0.02	4.90
2006	645	3.68	1.05	0.08	0.02	4.83
2007	685	3.61	1.07	0.07	0.02	4.77
2008	716	3.62	1.04	0.07	0.02	4.75
2009	705	3.85	1.09	0.07	0.02	5.03
2010	728	3.85	1.07	0.08	0.02	5.01
2011	767	3.85	1.10	0.07	0.02	5.04
2012	800	3.93	1.13	0.07	0.02	5.15
2013	829	3.97	1.13	0.06	0.02	5.18
2014	861	4.01	1.11	0.06	0.02	5.20
2015	884	4.09	1.16	0.06	0.02	5.33

(1)   The historical OAS basic pension expenditures are on a gross basis, that is, before application of the OAS Recovery Tax. All expenditures include benefits paid outside of Canada.
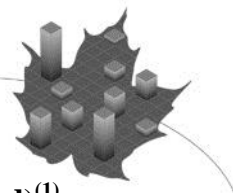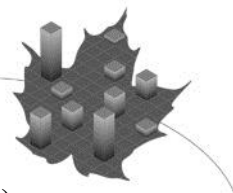
Table 14   Expenditures as Percentage of Total Employment Earnings (Projected)

		Expenditures as % of Total Employment Earnings[1]				
Year	Total Employment Earnings	OAS	GIS	Allowance	Administrative Expenses	Total
	($ billion)	(%)	(%)	(%)	(%)	(%)
2016	899	4.20	1.18	0.06	0.02	5.46
2017	924	4.32	1.25	0.06	0.02	5.65
2018	949	4.45	1.29	0.06	0.02	5.82
2019	975	4.59	1.32	0.06	0.02	5.98
2020	1,001	4.74	1.36	0.06	0.02	6.17
2021	1,036	4.85	1.39	0.05	0.02	6.31
2022	1,073	4.96	1.42	0.05	0.02	6.45
2023	1,111	5.06	1.45	0.05	0.02	6.59
2024	1,151	5.17	1.47	0.05	0.02	6.71
2025	1,193	5.26	1.50	0.05	0.02	6.84
2026	1,234	5.37	1.53	0.05	0.02	6.97
2027	1,278	5.45	1.55	0.05	0.02	7.08
2028	1,325	5.53	1.58	0.05	0.02	7.18
2029	1,373	5.59	1.60	0.05	0.03	7.27
2030	1,424	5.64	1.61	0.05	0.03	7.33
2031	1,477	5.66	1.61	0.05	0.03	7.35
2032	1,533	5.66	1.61	0.05	0.03	7.34
2033	1,592	5.64	1.60	0.05	0.03	7.32
2034	1,654	5.62	1.59	0.04	0.03	7.28
2035	1,718	5.59	1.58	0.04	0.03	7.24
2036	1,781	5.58	1.57	0.04	0.02	7.21
2037	1,847	5.54	1.56	0.04	0.02	7.16
2038	1,916	5.50	1.54	0.04	0.02	7.10
2039	1,988	5.45	1.52	0.04	0.02	7.03
2040	2,061	5.41	1.50	0.04	0.02	6.97
2041	2,137	5.36	1.48	0.04	0.02	6.90
2042	2,215	5.32	1.46	0.04	0.02	6.83
2043	2,295	5.27	1.44	0.03	0.02	6.76
2044	2,377	5.23	1.41	0.03	0.02	6.70
2045	2,462	5.20	1.39	0.03	0.02	6.64
2050	2,918	5.05	1.29	0.03	0.02	6.40
2055	3,439	4.96	1.21	0.03	0.02	6.21
2060	4,068	4.88	1.13	0.03	0.02	6.06

(1)   The projected OAS basic pension expenditures are on a gross basis, that is, before application of the OAS Recovery Tax. All expenditures include benefits paid outside of Canada.

V. Reconciliation with Previous Triennial Report

A. Introduction

The results presented in this report differ from those presented in the previous triennial report, the 12th OAS Program Actuarial Report, for a variety of reasons. Differences between the actual experience from 2013 through 2015 and that projected in the 12th OAS Program Actuarial Report are addressed in subsection B below. Since historical results provide the starting point for the projections shown in this report, these historical differences between actual and projected experience have an effect on the projections. Detailed reconciliations of the projected expenditures are presented in Appendix C.

B. Experience Update – 2013 to 2015

The components of change in the program expenditures from 31 December 2012 to 31 December 2015 are summarized in Table 15.

Table 15   Financial Results - 2013 to 2015[1]

($ million)

	Actual	Expected[2]	Difference Actual less Expected	% Change Difference/ Expected
Expenditures:				
OAS	103,565	104,473	(908)	(0.9%)
GIS	29,128	28,872	256	0.9%
Allowance	1,574	1,562	12	0.8%
Administrative Expenses	438	465	(27)	(5.8%)
Total Expenditures	**134,705**	**135,372**	**(667)**	**(0.5%)**
Gross Domestic Product	**5,867,000**	**5,801,000**	**66,000**	**1.1%**
Expenditures as % of GDP	**2.30**	**2.33**	**(0.03)**	**(1.3%)**

(1)   Components may not sum to totals due to rounding.
(2)   Expected expenditures and GDP shown are as per the 12th OAS Program Actuarial Report as at 31 December 2012.

OAS basic pension expenditures during the period were $908 million (or 0.9%) lower than projected. For the most part, this is because there were about 1% fewer beneficiaries than expected. GIS and Allowance expenditures were $268 million (or 0.9%) higher than anticipated mainly due to higher average benefits (about 2% higher) than projected which more than offset a lower than expected number of beneficiaries (about 1% fewer). Administrative expenses were $27 million or 5.8% lower than expected over the period.

Total GDP over the period was 1.1% higher than projected. As a result, overall expenditures relative to the GDP were about 1.3% lower than projected, being 2.30% of GDP instead of 2.33%.
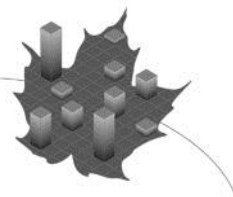
C. Changes in Expenditures as a Percentage of the GDP

Table 16 presents the main elements of all changes in the expenditures expressed as a percentage of the GDP since the 12th OAS Program Actuarial Report, including the changes that have arisen over the period 2013 to 2015 from amendments to the program, which were reflected in the 13th OAS Program Actuarial Report.

The amendments which increased the GIS top-up benefits and restored the ages of eligibility for program benefits increased the projected expenditures by 0.33% of GDP in 2030 and 0.20% of GDP in 2060. Changes in the demographic assumptions regarding longevity increases and migration in combination with changes in economic assumptions (especially lower real wage growth) also lead to increases in the cost ratio. These increases are somewhat countered by the update of experience, improvements in the methodology, and the impact of Additional CPP Benefits. The net result is higher expenditures relative to the GDP over the projection period as compared to the previous 12th OAS Program Actuarial Report.

Table 16   Reconciliation of Expenditures as a Percentage of GDP

	2016	2030	2060
	% of GDP		
12th OAS Program Actuarial Report	**2.44**	**2.73**	**2.21**
Legislated Amendments:			
13th OAS Program Actuarial Report			
• increase the single rate of the GIS for the lowest-income pensioners	0.01	0.33	0.20
• repeal increases to ages of eligibility to receive program benefits			
Total Amendments	**0.01**	**0.33**	**0.20**
Improvements in Methodology	0.00	(0.01)	(0.02)
Experience Update (2013 to 2015)	(0.04)	(0.01)	(0.03)
Changes in Demographic Assumptions	0.00	0.02	0.05
Changes in Economic Assumptions	0.02	0.14	0.26
Changes in Benefit Assumptions	(0.01)	0.01	0.01
Impact of Additional CPP*	0.00	0.00	(0.03)
14th OAS Program Actuarial Report	**2.42**	**3.21**	**2.65**

* Recognizes the impact of the introduction of Additional CPP benefits starting in 2019.
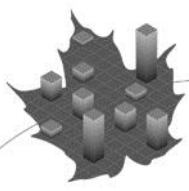
VI. Conclusion

The retirement of the baby boomers over the next few decades is projected to increase the expenditures of the program. At the same time, it is expected that as Additional CPP benefits grow over time, an increasing amount of CPP income will be included in the determination of program benefits and, as such, lower numbers of recipients and amounts of benefits will result than would otherwise be the case. For instance, in the absence of Additional CPP benefits, the projected overall recipient rate for the GIS in 2060 is 27.2% and projected GIS expenditures in that year are $49.0 billion, representing 0.53% of GDP. Under this report, Additional CPP benefits are projected to reduce the overall GIS recipient rate to 25.3% (a reduction of 6.8% or 243,000 fewer beneficiaries) and GIS expenditures to $46.0 billion (a $3.0 billion or 6.2% decrease) representing 0.49% of GDP. This 14th OAS Program Actuarial Report is the first actuarial report on the program to include the estimated impact of Additional CPP benefits, which will start being payable in 2019. It is expected that the estimated impacts of the Additional CPP on the program presented in future actuarial reports will be further improved as more data become available.

Total annual expenditures are expected to grow from 2.4% of GDP in 2016, a level similar to that in the late 1980s, to a high of about 3.2% in 2031, a level s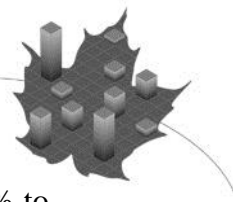omewhat higher than the historical peak of 2.7% reached in the early 1990s. It is assumed that, for each cohort of individuals who may become eligible for the GIS or Allowance, the initial retirement income will consist mainly of CPP benefits (including the new Additional CPP benefits) and QPP benefits that reflect increases in line with wage growth prior to retirement. At the same time, it is assumed that the income limits for the GIS and Allowance will have increased in line with inflation prior to retirement. Together this leads to reduced eligibility of new retirees for the GIS and Allowance. The fact that individuals are also assumed to invest in TFSAs slightly mitigates this decline over time. Ultimately, however, the fact that benefits are indexed to inflation as opposed to wages drives the cost of the OAS program relative to the GDP down over the long term, with the result that annual expenditures are expected to fall to 2.7% of GDP by 2060.

In comparison with the previous triennial (12th) OAS Program Actuarial Report, the amendments which increased the GIS top-up benefits and restored the ages of eligibility for the program benefits increased the projected expenditures by 0.33% of GDP in 2030 and 0.20% of GDP in 2060. Changes in the demographic assumptions regarding longevity increases and migration in combination with changes in economic assumptions (especially lower real wage growth) also lead to increases in the cost ratio. These increases are somewhat countered by the update of experience, improvements in the methodology, and the impact of Additional CPP Benefits. The net result is higher expenditures relative to the GDP over the projection period as compared to the previous 12th OAS Program Actuarial Report.

To measure the sensitivity of the long-term projected financial state of the program to changes in the future demographic and economic outlook, a number of sensitivity tests were performed. These tests focussed on varying the key best-estimate assumptions individually in order to measure the potential impact on the cost ratio of program expenditures to GDP.These tests show that the cost ratio could deviate significantly from its projected best-estimate values if other than best-estimate assumptions were to be realized. For example, if life expectancies at age 65 were to increase by about two more years than the best estimates of this report, then the ratio in 2060 would increase from 2.65% to 2.83%. As another example, if benefit rates were increased

to partially reflect the growth in real wages, then the ratio in 2060 would increase from 2.65% to 3.60%.

Tests were also performed regarding the aging of the population and how it may differ from the best-estimate projection. Two demographically based scenarios were developed that portray generally younger and older populations. These scenarios produced cost ratios of program expenditures to the GDP in 2060 of 2.41% and 2.86%, respectively.

The projected financial state of the OAS program presented in this report is based on the assumed demographic and economic outlook over the long term. Therefore, it remains important to review the program's long-term financial state on a regular basis by producing periodic actuarial reports. For this purpose, as required by the *Public Pensions Reporting Act*, the next such review will be as at 31 December 2018.
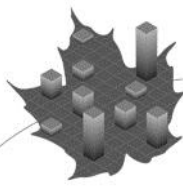
VII. Actuarial Opinion

In our opinion, considering that this 14th Actuarial Report on the Old Age Security program was prepared pursuant to the *Public Pensions Reporting Act*:

- the data on which this report is based are sufficient and reliable for the purposes of this report;

- the assumptions used are, individually and in aggregate, reasonable and appropriate for the purposes of this report; and,

- the methods employed are appropriate for the purposes of this report.

This report has been prepared, and our opinions given, in accordance with accepted actuarial practice in Canada, in particular, the General Standards (Part 1000) and the Practice-Specific Standards for Social Security Programs (Part 7000) of the Standards of Practice of the Canadian Institute of Actuaries.

As of the date of the signing of this report, we have not learned of any events, other than those already accounted for in this report, that would have a material impact on the projections presented in this report as at 31 December 2015.

_____   _____
Michel Montambeault, F.S.A., F.C.I.A.   Jean-Claude Ménard, F.S.A., F.C.I.A.
Senior Actuary   Chief Actuary

Ottawa, Canada
8 June 2017
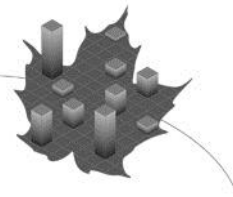
Appendix A – Uncertainty of Results

I. Introduction

The future expenditures of the OAS program depend on many demographic and economic factors, including fertility, mortality, migration, the labour force, average earnings, inflation, recipient rates, and indexation of benefits. The expenditures will depend on how these factors affect the size and composition of the beneficiary population and the general level of benefits. The cost measurement bases, which expenditures are measured relative to, namely combined CPP and QPP contributory earnings, total employment earnings, and the GDP, will depend on how the factors affect the size and composition of the working-age population, and the level and distribution of earnings.

II. Individual Sensitivity Tests

This actuarial report on the Old Age Security program is based on the projection of its expenditures over a long period of time. The information required by statute, which is presented in the Results section of this report, has been derived using best-estimate assumptions regarding future demographic and economic trends. The key best-estimate assumptions, i.e. those for which changes within a reasonable range have the most significant impact on the long-term financial results, are described in Appendix D. Both the length of the projection period and the number of assumptions required ensure that actual future experience will not develop precisely in accordance with the best-estimate assumptions. Individual sensitivity tests have thus been performed that consist of projecting the financial state of the program using alternative assumptions.

More than half of the individual assumption sensitivity tests (regarding mortality rates, the labour market, recipient rates, and benefit indexation) use a purely deterministic model based on judgment, while the other individual assumption sensitivity tests (regarding fertility rates, net migration rates, and real wage increases) are developed using a combination of judgment and stochastic modeling techniques. All of the tests are described in the sections below.

Stochastic modeling techniques estimate the probability distribution of an outcome for each selected assumption, and these distributions are used to quantify a range of possible outcomes. The fluctuation in each variable is projected by using standard time-series modeling, a method designed to make inferences based on historical data.

With the time series approach, a variable is modeled by an equation that captures a relationship between current and prior years' values of the variable. A year-by-year random variation consistent with the variation observed in the historical period is then introduced. Parameters for the equations are estimated using historical data for periods that range between 40 years and 53 years. Each time-series equation is designed such that, in the absence of random variation, the expected value of the variable is equal to the value assumed under the best-estimate assumption.

For the stochastically analyzed assumptions, a minimum of 10,000 outcomes are generated for each year in the projection period. Although the yearly outcome of each variable will fluctuate, it is the average outcome over the projection period that will determine the financial state of the program. Therefore, an 80% confidence interval is calculated for the cumulative average of each assumption to determine, with 80% probability, the range of possible outcomes over the entire
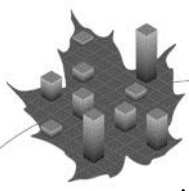
projection period (until 2060). If a shorter projection period were to be considered, such as ten or fifteen years, one could expect the average 80% confidence interval to be wider since the outcomes will not have had enough time to stabilize. The upper and lower values of the 80% confidence interval are used as the lower-cost and higher-cost assumptions, or vice versa depending on the assumption, for these individual sensitivity tests.

The results should be interpreted with caution and a full understanding of the inherent limitations of stochastic modeling. Results are very sensitive to model specifications, degrees of interdependence among variables, and the historical periods used for estimating the parameters. For some variables, using the variations exhibited in relatively recent or instead, earlier historical periods may not provide a realistic representation of the potential variation for the future. Furthermore, additional variability could result from incorporating statistical approaches that would more fully model change in the long-range central tendencies of the variables. The historical periods chosen for most variables are relatively homogeneous and do not reflect substantial shifts. The time-series modeling reflects what occurred in these historical periods. As a result, the variation indicated in this section should be viewed as the minimum plausible variation for the future. Structural shifts, as predicted by many experts and as seen in prior centuries, are not reflected in the current models. Rather, the projection models or time series are adjusted to reflect the best judgment over a long period.

The sensitivity tests for the stochastically modeled key assumptions were performed by varying those assumptions individually in a manner consistent with the results of the stochastic analysis and by keeping the remaining assumptions at their best-estimate levels. Each sensitivity test, for both the stochastically and deterministically modeled assumptions, was categorized as either a lower-cost scenario or a higher-cost scenario. In the lower-cost scenarios, the alternative assumptions have the effect of reducing the ratios of expenditures to GDP. Conversely, assumptions for the higher-cost scenarios increase the ratios of expenditures to GDP.

The alternative assumptions selected are intended to represent a wide range of potential long-term experience. However, the individual results cannot simply be combined because a change in any one particular assumption may have an impact on other assumptions to various degrees.

Table 17 summarizes the alternative assumptions used in the individual sensitivity tests. It is followed by a brief discussion of each assumption and the impact that the variation in each assumption has on the results.

Table 17   Individual Sensitivity Test Assumptions

	Canada	Lower-Cost	Best-Estimate	Higher-Cost
1	Total fertility rate	1.90	1.65	1.40
2	Mortality: Canadian life expectancy at age 65 in 2050 with future improvements[1]	Males 20.9 Females 23.2	Males 23.3 Females 25.6	Males 25.8 Females 27.9
3	Net migration rate	0.68%	0.62%	0.56%
4	Labour Market: Participation rate (aged 15-69)[1]	82.7% (2035)	77.5% (2035)	73.7% (2035)
	Unemployment rate[1]	4.2%	6.2%	8.2%
	Change in percentage points (pp) of basic pension recipient rates due to voluntary deferrals[1]	15 pp and 10 pp decreases at age 65 for males and females respectively with subsequent increases over the next four higher ages.	10 pp and 7 pp decreases at age 65 for males and females respectively with subsequent increases over the next four higher ages.	5 pp and 3 pp decreases at age 65 for males and females respectively with subsequent increases over the next four higher ages.
5	Real wage increase	1.9%	1.1%	0.3%
6	GIS and Allowance Recipient rates – TFSA effect only[1]	2050 GIS: 26.5% Allowance: 2.4%	2050 GIS: 28.2% Allowance: 2.4%	2050 GIS: 32.6% Allowance: 2.4%
7	GIS and Allowance Recipient rates – All effects (+/– 20%)[1]	2050 GIS: 23.2% Allowance: 2.0%	2050 GIS: 28.2% Allowance: 2.4%	2050 GIS: 33.2% Allowance: 2.9%
8	Benefit indexation[1]	CPI less 1%	CPI	CPI plus 60% of the real wage increase
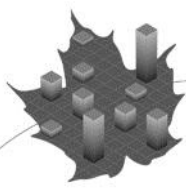
(1)   For these tests, a deterministic instead of a stochastic approach was used to derive the lower- and higher-cost estimates.

A. Fertility Rate

The best estimate assumption is that the total fertility rate for Canada will increase slightly from its 2011 level of 1.61 to an ultimate level of 1.65 in 2019. Based on historical fertility experience of the last 40 years (1972 to 2011), a stochastic approach was used to generate the low and high cost scenarios over the projection period ending in 2060. Factors such as higher labour force participation of women, later entry into marriages or common-law relationships, higher and longer periods of education, as well as others, make it unlikely that high fertility rates such as those experienced during the post-WWII baby boom period will be seen again in the future. Therefore, the experience period selected for the stochastic analysis excludes periods of high fertility rates.

It was projected that the average total fertility rate throughout the projection period until 2060 will be in the range 1.4 to 1.9 with 80% probability. Instead, if a 15-year projection period is considered, then the average total fertility rate will be in the range 1.5 to 1.8.

The lower-cost assumption has the total fertility rate increasing to an ultimate level of 1.9 in 2019, which is lower than the national population replacement rate. The total Canadian fertility rate has

not been above 1.9 since 1973. Under this scenario, the population grows to a level in 2050 that is 5.7% higher than under the best-estimate assumption. In addition, a higher ultimate total fertility rate leads to a younger population. Thus, the dependency ratio, defined as the ratio of those aged 65 and over to the working-age population (20-64), is 0.45 in 2050, slightly lower than the dependency ratio of 0.46 (or approximately 2.2 workers per retiree) under the best-estimate assumption.

The higher-cost assumption has the total fertility rate decreasing to an ultimate level of 1.4 in 2019. This is similar to the recent total fertility rates of Italy and Japan. Under this scenario, the population grows much more slowly, to a level in 2050 that is 5.6% lower than under the best-estimate assumption. A lower ultimate total fertility rate leads to an older population. In this scenario, the dependency ratio increases from the best-estimate value of 0.46 (or 2.2 workers per retiree) in 2050 to 0.48 (or 2.1 workers per retiree).

B. Mortality Rates

The calendar year life expectancies (without assumed future mortality improvements) at age 65 in 2011 are 18.9 years for males and 21.8 years for females. The best-estimate scenario provides for future mortality improvements, such that the cohort life expectancy at age 65 in 2011 is 20.8 years for males (or 1.9 years higher than the calendar year life expectancy), and 23.4 years (or 1.6 years higher) for females. The best-estimate ultimate value of the mortality improvement rates is 0.8%, which is reached in 2032. The following two sensitivity tests represent alternatives for the assumed mortality improvement rates.

Under the lower-cost scenario, mortality is assumed to improve at a slower rate than under the best-estimate scenario, reflecting that current level of mortality improvements might not be sustainable. The ultimate value of the mortality improvement rates is reduced to 0% in 2032 representing an absolute reduction of 0.8%. For years between 2011 and 2032, improvement rates gradually decrease from the year 2011 rates, corresponding to the average annual mortality improvement rates experienced over the last 15-year period ending in 2011, to 0%. As a result, the population grows to a level in 2050 that is 1.7% lower than under the best-estimate assumption. In addition, the dependency ratio decreases to 0.44 (or 2.3 workers per retiree) compared to a best-estimate of 0.46 (or 2.2 workers per retiree) due to lower life expectancies as well as lower projected number of retirees compared to the working-age population.

Under the higher-cost scenario, mortality is assumed to improve at a faster pace than under the best-estimate scenario. The ultimate value of the mortality improvement rate is doubled compared to the best-estimate value and corresponds to 1.6%, representing an absolute increase of 0.8%. As a result, the population grows to a level in 2050 that is 1.6% higher than under the best-estimate assumption. In addition, the dependency ratio increases to 0.49 (or 2.1 workers per retiree) due to higher projected life expectancies as well as higher projected numbers of retirees compared to the working-age population.

Table 18 presents the life expectancies that would result in 2050 from the different rates of improvement.
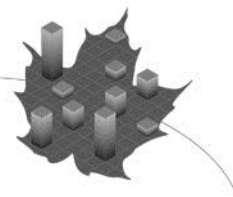
Table 18 Life Expectancy in 2050 under Alternative Assumptions[1]

(Canada)

		Lower Cost	Best Estimate	Higher Cost
At Birth	Males	82.0	89.1	94.7
	Females	85.4	91.8	96.7
At Age 65	Males	20.9	23.3	25.8
	Females	23.2	25.6	27.9

(1) These are cohort life expectancies that take into account future improvements in mortality of the general population and therefore differ from calendar year life expectancies, which are based on the mortality rates of the given attained year.

C. Net Migration Rate

Under the best-estimate assumption, the net migration rate (which assumes no growth in the number of non-permanent residents) is assumed to increase from its current (2015) level of 0.55% of the population to an ultimate level of 0.62% of the population in the year 2016.
A stochastic approach was used to generate lower- and higher-cost scenarios over the projection period ending in 2060 based on the net migration experience of the last 44 years (1972 to 2015). It is projected that average net migration (assuming no growth in non-permanent residents) throughout the entire projection period will be in the range of 0.56% to 0.68% of the population with 80% probability. If a 15-year projection period is considered, then the average net migration would be in the range of 0.53% to 0.71% of the population.

The lower-cost assumption has net migration reaching a level of 0.68% of the population in 2016 and remaining at that level thereafter. This is close to the average net migration rate over the three years ending in 2015. Under this scenario, the population grows to a level in 2050 that is 2.4% higher than under the best-estimate assumption. As well, the dependency ratio of those aged 65 and over to the working-age population (20-64) changes very little from the best estimate of 0.46 (or 2.2 workers per retiree) in 2050.

The higher-cost assumption has net migration reaching a level of 0.56% of the population in 2016 and remaining at that level thereafter. This is close to the average net migration rate experienced in the 1990s. Under this scenario, the population grows more slowly, to a level in 2050 that is 2.8% lower than under the best-estimate assumption. As well, the dependency ratio is 0.48 (or approximately 2.1 workers per retiree), which is slightly higher than the best estimate.

The dependency ratio only changes slightly under both the lower- and higher-cost assumptions compared to the best-estimate, since the impact in each case depends on the age distribution of the immigrants and emigrants. Since for this report, both groups, those aged 65 and above and those aged 20 to 64, are projected to be affected similarly by net migration, there is very little change in the dependency ratio.

D. Labour Market

Employment levels are reflected in the actuarial projection model through the assumptions made regarding the level of labour force participation and job creation rates by year, age and sex. These rates vary not only with the rate of unemployment, but also reflect trends in increased workforce participation by women, longer periods of formal education among young adults, and trends in the retirement patterns of older workers.
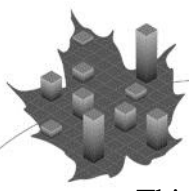
This sensitivity test analyzes the impact of stronger and weaker labour demand on the cost of the program.

Under the best-estimate scenario, the job creation rate assumption is determined on the basis of expected moderate economic growth and an unemployment rate that is expected to gradually decrease from 2016 level of 7.1% to an ultimate rate of 6.2% by 2025. Furthermore, the participation rates for all age groups are expected to increase due to the attractive employment opportunities resulting from labour shortages and the aging of cohorts with stronger labour attachments, especially for women and individuals with higher education attainment. The assumed increase in participation rates of those aged 55 and over is even more significant, given that it is also affected by the expected continued trend toward delayed retirement. Under the best-estimate scenario, the participation rate of those aged 15 to 69 is expected to increase from 74.3% in 2016 to 77.5% in 2035.

A deterministic model (instead of a stochastic model) was used to generate the lower-cost and higher-cost scenarios for these assumptions, since a stochastic model would not accurately reflect the assumed future trends in labour force participation and unemployment. The labour shortages and the trend toward delayed retirement are unlike any labour situation experienced in the past, and thus the historical data do not reflect any substantial shifts like the one being projected. Therefore, it was decided to use judgment in determining the low and high cost assumptions for labour force participation and unemployment rates.

Under the strong labour demand scenario, the job creation rate is robust resulting in a lower unemployment level, higher labour force participation rates, and later retirement due to the availability of employment. Such an environment has the effect of lowering the cost ratios. For this lower-cost scenario, the job creation rates are assumed to increase at a faster pace than under the best-estimate scenario, resulting in an unemployment rate of 4.2% in 2025 and thereafter. In addition, ultimate male participation rates in 2035 are assumed to increase more than expected as a result of a higher than anticipated impact of the labour shortage and the delayed retirement trend on future labour market participation. Furthermore, the ultimate gap in 2035 between male and female participation rates is equal to 3.4% as opposed to 6.7% under the best-estimate scenario. This results in an overall participation rate of 82.7% for those aged 15 to 69 in 2035. The lower unemployment rate and higher participation rate are assumed to encourage voluntary take-up at a later age of the actuarially-adjusted higher OAS pension. Therefore, by 2035, recipient rates at age 65 are assumed to gradually decrease to levels that are 5 and 3 percentage points lower than the best estimates, i.e. 75.8% and 82.8% for males and females, respectively.

Under the weaker labour demand scenario, the job creation rate is lower resulting in a higher unemployment level and lower labour force participation rates. Insufficient employment opportunities are likely to force some individuals to start their OAS pension at their earliest eligible age. Such an environment results in higher cost ratios. For this higher-cost scenario, the job creation rates are assumed to increase at a slower pace than under the best-estimate scenario, resulting in an unemployment rate of 8.2% in 2025 and thereafter. In addition, male and female participation rates are assumed to remain constant at their 2015 levels. This results in an overall participation rate of 73.7% for those aged 15 to 69 in 2035. The higher unemployment rate and lower participation rate are assumed to encourage individuals to start their OAS pensions earlier rather than later. Therefore, by 2035, individuals are assumed to voluntarily defer starting their pensions to a lesser extent compared to the best estimate. That is, the number of voluntary deferrals is assumed to be lower with recipient rates at age 65 assumed to gradually decrease less
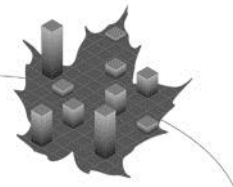
compared to the best estimate, i.e. by 5 and 3 percentage points compared to 10 and 7 percentage points, or 85.8% and 89.8% for males and females, respectively.

E. Real Wage Increases

Wage increases affect the financial balance of the OAS program in two ways. In the short term, an increase in the average wage translates into higher combined CPP/QPP contributory earnings, total employment earnings, and a higher GDP, with little immediate impact on benefits. This results in lower cost ratios relative to these measurement bases. Over the longer term, higher average wages may be expected to result in higher incomes among the retiree population and reduce the amounts of income-tested benefits that are indexed to inflation. This would also lower the cost ratios. However, the aging of the Canadian population has resulted in increased OAS program expenditures over time, which acts to increase the cost ratios. Overall, the long-term projected financial position of the OAS program is dependent on real wage increases, that is, the difference between the assumed annual rates of wage increase and price increase, which provides a comparison of earnings growth with inflation. In addition, the long-term financial position of the program is dependent on the age structure of the population and the levels of old-age income other than that provided by the program.

An ultimate real wage increase of 1.1% has been assumed for the year 2025 and thereafter for the best-estimate projections. The ultimate real wage increase assumption, combined with the ultimate price increase assumption of 2.0%, yields the assumption for the ultimate nominal annual increase in wages of 3.1% in 2025 and thereafter. During the initial years of the projection period, the real wage increase is assumed to rise gradually to its ultimate level.

Based on the overall real wage experience of the last 53 years (1962 to 2014), a stochastic approach was used to generate the lower- and higher-cost scenarios over the projection period ending in 2060. It was projected that the average real wage increase throughout the projection period until 2060 will be in the range 0.3% to 1.9% with 80% probability. Instead, if a 15-year projection period is considered, then the average real wage increase will be in the range -0.2% to 2.2%.

For the lower-cost scenario, the assumed real wage increase rises to an ultimate level of 1.9% in 2025. For the higher-cost scenario, the assumed real wage increase is held constant at a level of 0.3% for 2017 and thereafter.

F. GIS and Allowance Recipient Rates – TFSA effect only

The best-estimate projections use a formula described in Appendix D to project GIS and Allowance benefit recipient rates. Two sets of lower- and higher-cost scenarios are considered. First, the impact of TFSAs on the recipient rates is considered. In the lower-cost scenario, individuals save less in TFSAs than expected leading to less TFSA-related income, and as a result, there are fewer GIS and Allowance beneficiaries. This results in GIS recipient rates that are lower by about 1.7 percentage points and GIS and Allowance benefits that are 3% lower than under the best-estimate scenario in 2050. In the higher-cost scenario, individuals save more in TFSAs than expected, leading to more TFSA-related income and thus more GIS and Allowance beneficiaries. This results in GIS recipient rates that are higher by about 4.4 percentage points and GIS and Allowance benefits that are 15% higher than under the best-estimate scenario in 2050.
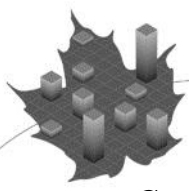
G. GIS and Allowance Recipient Rates – All effects
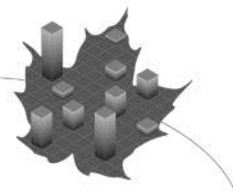
For the second set of recipient tests, the same formula used for the best estimates is used except that, for the lower-cost scenario, the resulting recipient rates for the GIS and Allowance are reduced by 20%. The reduction is phased in over five years and is maintained thereafter. It results in total GIS and Allowance benefits that are about 20% lower than in the best-estimate scenario. For the higher-cost scenario, the same formula is used except that the resulting recipient rates for total GIS and Allowance benefits are increased by 20%. The increase is phased in over five years and is maintained thereafter. It results in total GIS and Allowance benefits that are about 20% higher than in the best-estimate scenario.

H. Benefit Indexation

The best-estimate projections are based on the program provision for benefit rates to be indexed quarterly in accordance with price increases. Over time, indexing benefit rates more slowly than the rate of growth in average employment earnings means that benefits will replace a decreasing share of individuals' pre-retirement earnings. In the past, this issue has been addressed through occasional legislation providing ad hoc increases in the benefit rates.

For the lower-cost scenario, the benefit indexation is assumed at CPI minus 1%.

For the higher-cost scenario, the benefit rates are increased to partially reflect the growth in real wages. The assumption made for this test is that benefit rates would be indexed at rates equal to the assumed rate of growth in prices plus 60% of the assumed real wage increase. Accordingly, the ultimate annual benefit indexation rate is assumed to be 2.7% instead of 2.0% under the best-estimate assumptions. Over the medium term, about 30 years, the overall impact of this indexation formula on costs is roughly comparable to the indexation basis inherent in the CPP and QPP, which provide benefits based on wage increases prior to retirement and price increases thereafter.

I. Results

Table 19 summarizes the projected impact on the expenditures-to-GDP cost ratio under each of the alternative sets of assumptions.

Table 19   Sensitivity Test Results

	Assumption	Scenario	Expenditures as a Percentage of GDP		
			2016	**2030**	**2060**
		Best-Estimate	2.42	3.21	2.65
1	Total Fertility Rate	Lower-Cost	2.42	3.20	2.46
		Higher-Cost	2.42	3.21	2.87
2	Mortality Rates	Lower-Cost	2.42	3.18	2.46
		Higher-Cost	2.42	3.23	2.83
3	Net Migration Rate	Lower-Cost	2.42	3.18	2.60
		Higher-Cost	2.42	3.24	2.72
4	Labour Market	Lower-Cost	2.41	2.93	2.35
		Higher-Cost	2.43	3.48	2.94
5	Real Wage Increase	Lower-Cost	2.42	2.96	1.90
		Higher-Cost	2.42	3.56	3.83
6	GIS and Allowance Recipient Rates – TFSA effect only	Lower-Cost	2.42	3.19	2.64
		Higher-Cost	2.42	3.29	2.73
7	GIS and Allowance Recipient Rates – All effects	Lower-Cost	2.42	3.06	2.55
		Higher-Cost	2.42	3.35	2.75
8	Benefit Indexation	Lower-Cost	2.42	2.74	1.64
		Higher-Cost	2.42	3.51	3.60

III.   Younger and Older Populations

Demographic and labour force assumptions are modified in this section with the purpose of projecting younger and older populations compared to the best estimate. However, these alternative populations do not necessarily reflect probable scenarios. Using the demographic assumptions of the individual sensitivity tests, two alternative scenarios were examined. The first scenario is classified as the younger population scenario, since the ratio of those aged 65 and older to those aged 20 to 64 (working-age population) is lower than under the best-estimate assumptions. The second scenario has a ratio of those aged 65 and older to the working-age population that is higher than the best-estimate and is referred to as the older population scenario. Once the two populations were created, the labour force participation rates were modified to align with the new populations.

The demographic assumptions anticipated in these scenarios were determined using the lower- and higher-cost assumptions regarding fertility, mortality, and migration rates, as well as the labour force participation rates pertaining to the lower- and higher-cost labour market tests described in section II.
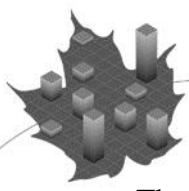
The choice of assumptions will always remain subjective to a certain extent and one could always argue that the range of possible projected outcomes presented herein is not realistic. However, one must keep in mind that these alternative scenarios are only presented to provide a reasonable range of possible future outcomes for the cost of the Plan.

A. Younger Population

Under the younger population scenario, it is assumed that the ultimate total fertility rate is 1.9 per woman for Canada. Mortality improvement rates are assumed to increase at a much slower pace than under the best-estimate scenario. The result is that life expectancies at age 65 decrease from their projected best-estimate by approximately 2.5 years for both males and females by 2050. Finally, net migration to Canada is assumed to reach a level of 0.68% of the population in the year 2016.

The combination of these younger population assumptions results in a dependency ratio of those aged 65 and over to the working-age population (20-64) of about 0.42 (or 2.4 workers per retiree) in 2050. This is 10% lower than under the best-estimate scenario where the ratio reaches a level of 0.46 (or 2.2 workers per retiree) in 2050. Under this younger population scenario, the population grows more rapidly, to a level in 2050 that is 6.5% higher compared to the best-estimate scenario.

It is assumed that under a better demographic outlook a possible labour shortage would be less severe. As a result, it is assumed that the labour force participation rates would be lower, especially at the younger and older ages.

B. Older Population

Under the older population scenario, it is assumed that the ultimate total fertility rate is 1.4 per woman for Canada. Mortality improvement rates are assumed to increase at a faster pace than under the best-estimate scenario. The result is that life expectancies at age 65 increase from their projected best-estimate levels by approximately 2.5 years for both males and females by 2050. Finally, net migration to Canada is assumed to fall to a level of 0.56% of the population in the year 2016.

The combination of these older population assumptions results in a dependency ratio of those aged 65 and over to the working-age population (20-64) of about 0.52 (or 1.9 workers per retiree) in 2050. This is 12% higher than under the best-estimate scenario where the dependency ratio reaches a level of 0.46 (or 2.2 workers per retiree) in 2050. Under this older population scenario, the population grows more slowly, to a level in 2050 that is 6.6% lower compared to the best-estimate scenario.

It is assumed that with a poorer demographic outlook a possible labour shortage would be more severe. For this purpose, it is assumed that the labour force participation rates would be higher, especially at the older ages.
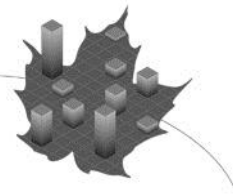
C. Results

Table 20 presents a summary of the assumptions used in this sensitivity analysis and the resulting OAS program expenditures as a percentage of GDP. The expenditures as a percentage of GDP are 2.41% and 2.86% for the younger and older population scenarios, respectively.

Table 20   Younger and Older Populations Sensitivity Test Assumptions

Canada	Younger Population		Best Estimate		Older Population	
Total fertility rate	1.90		1.65		1.40	
Mortality:						
Canadian life expectancy at age 65 in	Males	20.9	Males	23.3	Males	25.8
2050 with future improvements	Females	23.2	Females	25.6	Females	27.9
Net migration rate	0.68%		0.62%		0.56%	
Participation rate (age group 15-69)	73.7% (2035)		77.5% (2035)		82.7% (2035)	
Expenditures as % of GDP	**2.41 (2060)**		**2.65 (2060)**		**2.86 (2060)**	

Appendix B – Summary of Program Provisions

I. Introduction

The *Old Age Security Act* came into force on 1 January 1952. Benefits provided under the *Old Age Security Act* include the basic pension, the Guaranteed Income Supplement, and the Allowance, which started being paid in 1952, 1967, and 1975, respectively. The Allowance for the survivor benefit started in 1985.

Since the inception of the Old Age Security program, the *Old Age Security Act* has been amended several times. The *Old Age Security Act* was most recently amended[1] by the *Budget Implementation Act, 2016, No. 1*, which received Royal Assent on 22 June 2016. Under Division 9 of Part 4 of that *Act*, the single rate of the GIS for the lowest-income pensioners was increased by up to $947 annually, effective 1 July 2016. *The Budget Implementation Act, 2016, No. 1* also repealed section 2.2 of the *Old Age Security Ac*t, which had set out a scheduled increase in the ages of eligibility for OAS program benefits of two years over the period 2023 to 2029. The 13th Actuarial Report Supplementing the Actuarial Report on the Old Age Security Program as at 31 December 2012 was prepared in accordance with the *Public Pensions Reporting Act* to show the effect of these amendments on the long-term financial state of the OAS program. The 13th OAS Program Actuarial Report was tabled in the House of Commons on 17 August 2016.

This Appendix B is meant only to provide a summary of the provisions of the OAS program. The legislation shall prevail if there is a discrepancy between it and this summary.

II. Financing

All benefits provided under the *Old Age Security Act* are financed from federal general tax revenues.

III. Basic Pension

The OAS basic pension is a monthly benefit available, on application, to anyone age 65 or over who meets the residence and legal status requirements specified in the *Old Age Security Act*.

A. Eligibility Conditions

To qualify for an OAS basic pension, a person must be 65 years of age or older, and

- must be a Canadian citizen or a legal resident of Canada on the day preceding the approval of his or her application; or

- if the person no longer lives in Canada, must have been a Canadian citizen or a legal resident of Canada on the day preceding the day he or she stopped living in Canada.

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[1] Amendments to the *Old Age Security Act* regarding payment of income-tested benefits to sponsored immigrants under Bill C-31: *Economic Action Plan 2014 Act, No. 1* received Royal Assent on June 19, 2014. As of the time of writing of this report, the coming into force of the amendments is yet to be determined. As such, these amendments are not reflected in this report due to the uncertain timing of their implementation and the estimated non-material impact on the OAS program's financial state. Once the coming into force date becomes known, the effects of the amendments will be included in future actuarial reports on the OAS program.

A minimum of 10 years of residence in Canada after reaching age 18 is required to receive an OAS basic pension in Canada. To receive the OAS pension outside the country, a person must have lived in Canada for a minimum of 20 years after reaching age 18. An international social security agreement may assist a person to meet the 10- and 20-year requirements. As of 1 January 2011, the OAS basic pension is not payable to incarcerated individuals in accordance with the provisions of the *Eliminating Entitlements for Prisoners Act*.

B. Amount of Benefits

The amount of a person's pension is determined by how long he or she has lived in Canada, according to the following rules:

- A person who has lived in Canada, after reaching age 18, for periods that total at least 40 years may qualify for a full OAS pension.

- A person who has not lived in Canada for 40 years after reaching age 18 may still qualify for a full pension if, on 1 July 1977, he or she was 25 years of age or over, and

  - lived in Canada on that date, or

  - had lived in Canada before that date and after reaching age 18, or

  - possessed a valid immigration visa on that date.

In such cases, the individual must have lived in Canada for the 10 years immediately prior to the approval of the application for the pension. Absences during this 10-year period may be offset if, after reaching age 18, the applicant was present in Canada before those 10 years for a total period that was at least three times the length of absence. In this instance, however, the applicant must also have lived in Canada for at least one year immediately prior to the date of the approval of the application. For example, an absence of two years between the ages of 60 and 62 could be offset by six years of presence in Canada after age 18 and before reaching age 55.

- A person who cannot meet the requirements for the full OAS pension may qualify for a partial pension. A partial pension is earned at the rate of $1/40^{th}$ of the full monthly pension for each complete year of residence in Canada after reaching age 18. Once a partial pension has been approved, it may not be increased as a result of additional years of residence in Canada. As an example, an individual with 20 complete years of residence in Canada at the time of application for the OAS pension would be entitled to 50% (or 20/40) of the maximum monthly OAS pension for the remainder of his/her lifetime.

Effective 1 July 2013, individuals may opt to defer receiving the OAS basic pension by up to five years after the eligible age (i.e. age 65 or older for those meeting the minimum residency requirement after age 65) in exchange for a higher pension. The deferred pensions are actuarially adjusted upward by 0.6% per month for each month after the eligible age until the month in which the application for the pension is approved (the deferral period) but in no case later than age 70. For those eligible for a basic pension at age 65, the maximum pension adjustment is 36% at age 70. In the case where an individual, who is entitled to a partial pension, chooses to defer receipt of the pension, the pension amount paid is the greater of the actuarially adjusted pension over the individual's deferral period and the higher pension resulting from accruing additional years of residency over that period.
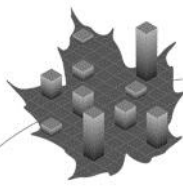
The OAS basic pension is subject to income tax. The maximum monthly pension payable at age 65 was $578.53 during the first quarter of 2017. The OAS basic pension is adjusted quarterly in line with changes in the CPI, as described in section VI.

The amount of the pension paid to persons with high incomes is reduced through a provision of the *Income Tax Act* often referred to as the "OAS Recovery Tax". For benefits payable in 2017, the reduction applies to individuals whose total net annual income exceeds $74,788 in that calendar year. For this purpose, an individual's total net annual income is after pension income splitting, if that option is elected by OAS beneficiaries who are married or common-law partners.

OAS Recovery Tax deductions are withheld at source. The deductions are estimates of the tax owed and are recalculated in July of each year based on the OAS recipient's previous year's net income. The Recovery Tax actually owed for a given year is determined the following year and compared to the deductions made, with the given year's tax liability adjusted accordingly.

The income threshold for the Recovery Tax is indexed upward in accordance with increases in the CPI. For every dollar of income above this limit, the amount of the basic pension is reduced by 15 cents. Income earned within a TFSA or withdrawals made from a TFSA are excluded from total net annual income for the purpose of determining the amount of the OAS Recovery Tax, which could then result in a higher basic pension payable.

As an example, an OAS recipient with a net annual income of $76,788 in 2017 would incur a Recovery Tax of $300 in 2017. The full 2017 annual OAS basic pension is thus eliminated when a pensioner's net annual income is $121,071 or above in 2017 (estimated as of the first quarter of 2017 based on annualized OAS benefits of $6,942.36).

IV. Guaranteed Income Supplement

The GIS is a monthly benefit paid to residents of Canada who receive an OAS basic pension (either the full amount or a partial amount) and who have little or no other income.

Payment of the GIS may begin in the same month as payment of the basic pension. The amount of the benefit varies according to income (see below). Most individuals receiving the GIS can continue to do so by filing their income tax returns, rather than making a new application each year. The amount of monthly payments may increase or decrease according to reported changes in a person's yearly income. Any income earned within a TFSA or withdrawals made from a TFSA are not considered as income for the purpose of determining the level of GIS benefit entitlement.

Unlike the OAS basic pension, the GIS is not subject to income tax. The GIS is not payable outside Canada beyond a period of six months following the month of departure from Canada, regardless of how long the person previously lived in Canada.

A. Eligibility Conditions

To receive the GIS, a person must be receiving an OAS basic pension. Eligibility for the GIS is determined every year based on the previous year's income. Income (as defined for purposes of the GIS and Allowance benefits under the *Old Age Security Act*) received in the previous year is used to calculate the amount of benefits paid during the period starting on 1 July of a calendar year and ending on 30 June of the following calendar year. However, if an individual or an individual's spouse or common-law partner has retired or has suffered a loss of income, an estimate of income may be substituted for the income of the preceding year.

In general, income as defined under the *Income Tax Act* is included subject to certain deductions. Deductions from income include any payments received under the OAS program (basic pension, GIS, and Allowance benefits) and employment income up to $3,500.

The resulting estimated income of an individual (or, the combined income of the individual and his or her spouse or common-law partner) cannot exceed certain limits as described later.

Persons admitted to Canada as sponsored immigrants after 6 March 1996 and qualifying for benefits after January 2001 are not eligible, generally speaking, to receive the GIS for the duration of a sponsorship, up to a maximum of ten years. Exceptions are made, however, if an immigrant's sponsor dies, is incarcerated for a period of more than six months, is convicted of a criminal offence relating to the sponsored individual, or undergoes personal bankruptcy.

A spouse or common-law partner who becomes involuntarily separated due to, for example, incarceration or institutionalization of his or her spouse or partner, is considered to be single in regard to applying for the GIS benefit.

Since a person may only receive the GIS if also in receipt of the OAS basic pension, the GIS is not payable to incarcerated individuals as per the provisions of the *Eliminating Entitlements for Prisoners Act*.
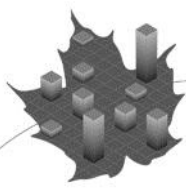
B. Amount of Benefits

The amount of the GIS to which a person is entitled depends on his or her length of residence in Canada, marital status, and income. If the person is married or living in a common-law relationship, the combined income of the person and his or her spouse or common-law partner is taken into consideration when the amount of the GIS benefit is calculated.

To be entitled to a full benefit, persons admitted to Canada after 6 March 1996 and qualifying for benefits after January 2001 must have resided in Canada for at least 10 years after reaching age 18. If a person meets these conditions except for the minimum 10 years of residence, then a partial benefit is payable provided, as noted in the previous section, that the person is not a sponsored immigrant who is still in the period of sponsorship. The partial benefit is calculated at the rate of 1/10th of the amount of the full benefit for each complete year of residence in Canada after age 18. The proportion payable is recalculated each year, taking into account additional residence in Canada during the previous year, building gradually to a full benefit after 10 years. The 10-year requirement for entitlement to a full benefit does not apply to persons for whom benefits were payable before February 2001 and who were Canadian citizens or permanent residents of Canada on or before 6 March 1996.

There are two rates of payment for a GIS benefit. The single rate applies to single individuals – including widowed, divorced or separated persons as well as individuals who have never married and to persons for whom their spouses or common-law partners do not receive either the OAS pension or the Allowance. The single rate also applies to spouses or common-law partners who become involuntarily separated from their spouses or partners as mentioned above. During the first quarter of 2017 the maximum monthly GIS single benefit (including the top-up, discussed below) is $864.09.

The married rate applies both to married couples and to couples living in common-law relationships, where either both spouses are OAS pensioners or where one spouse is eligible for the Allowance benefit. During the first quarter of 2017, the maximum monthly GIS married benefit (including the top-up, discussed below) is $520.17.

The single rate is higher than the married rate, reflecting the higher cost of living alone. However, each member of a married or common-law couple is entitled to his or her own benefit, so the combined benefits for a couple are higher than those for a single person.

As of 1 July 2011, top-up benefits are payable to GIS recipients who receive benefits at the single rate, as described above, and to couples that include a GIS recipient. As of 1 July 2016, the single rate of the GIS top-up for the lowest-income pensioners was increased by up to $947 annually or $78.92 monthly. For the first quarter of 2017, the top-up benefits are $133.83 and $37.94 per month for single-rate recipients and each spouse or common-law partner of a couple, respectively, and are adjusted quarterly in line with changes in the CPI, as described in section VI. The top-ups are reduced by 25 cents for every dollar of income in excess of $2,000 for GIS single recipients and $4,000 of combined income for couples. In the first quarter of 2017, the income limits for the top-ups are $8,432 for GIS single recipients, $16,864 for couples where the GIS recipient's spouse or common law partner does not receive a basic pension or Allowance, and $7,648 for couples where the GIS recipient's spouse or common law partner is either an OAS pensioner or Allowance recipient.

A special provision applies to persons who receive a partial OAS pension. In this case, the supplement is increased by the difference between the maximum OAS pension and the partial OAS pension in order to provide the same combined monthly pension and supplement to beneficiaries with the same level of income. The additional amount may result in the supplement exceeding the maximum GIS payable.

As an example, during the first quarter of 2017, a single person with no income who is entitled to a partial pension of $144.63 (25% of the maximum monthly OAS pension of $578.53) would be entitled to an additional supplement of $433.90 for a total supplement of $1,297.99 (i.e. $864.09 plus $433.90, including the top-up).

For a single, widowed, divorced or separated person, the maximum monthly GIS benefit is reduced by 50 cents for every dollar of monthly income (i.e. annual income divided by 12). This reduction is in addition to any reduction to the top-up. For example, a monthly income of $800 would reduce the maximum monthly GIS payable by $533.83 to $330.26 in the first quarter of 2017. In this case, the maximum allowable annual income before GIS stops being paid is $17,544 in the first quarter of 2017.

If both spouses or common-law partners are receiving the OAS basic pension, the maximum monthly GIS of each person is reduced by 25 cents for every dollar of other combined monthly income (i.e. annual income divided by 12), which is in addition to any reduction applied to the top-up. For example, a combined monthly income of $1,400 for a couple would reduce the maximum monthly GIS benefit payable to each spouse or common-law partner by $387.94 to $132.23 in the first quarter of 2017. In this case, the maximum allowable annual income before the GIS stops being paid is $23,184 in the first quarter of 2017.

A special provision applies in the case of a couple in which only one spouse or common-law partner is a pensioner and the other is not eligible for either the OAS pension or the Allowance. In this instance, the pensioner can receive the GIS at the higher rate paid to those who are single. Moreover, the maximum monthly GIS is reduced by 25 cents for every dollar of the couple's combined monthly income (i.e. annual income divided by 12), and the reduction of 25 cents is applied only when the combined monthly income of the couple exceeds the maximum monthly OAS pension, where that amount, if not a multiple of $4, is rounded to the next higher multiple of
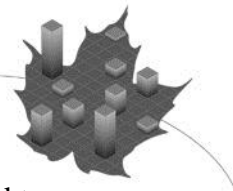
$4 (i.e. $580 in the first quarter of 2017). This reduction is in addition to any reduction applied to the top-up benefit. As an example, a couple with a combined monthly income of $2,000 would see their maximum monthly GIS benefit reduced by $488.83 to $375.26 in the first quarter of 2017. In this case, the maximum allowable annual income before GIS stops being paid is $42,048 in the first quarter of 2017.

In the case of a couple in which one spouse or common-law partner receives the GIS and the other receives the Allowance, the GIS is paid at the rate paid to those who are married, and the maximum monthly GIS is reduced by 25 cents for every dollar of the couple's combined monthly income (i.e. annual income divided by 12). The reduction of 25 cents is applied only when the combined monthly income of the couple exceeds four-thirds times the maximum monthly OAS pension, where that pension, if not a multiple of $3, is rounded to the next higher multiple of $3 (i.e. income above four-thirds of $579, or $772, in the first quarter of 2017). This reduction is in addition to any reduction applied to the top-up. As an example, a couple with a combined monthly income of $1,400 would see the pensioner's maximum monthly GIS benefit at the married rate reduced by $194.94 to $325.23 in the first quarter of 2017. In this case, for the first quarter of 2017, the maximum allowable annual income before the GIS stops being paid is $42,048.

GIS recipients whose spouse or common-law partner is incarcerated are considered to be single recipients for the purpose of determining the amount of the GIS benefit.

All GIS benefits including top-ups are adjusted quarterly in line with changes in the CPI, as described in section VI. No actuarial adjustment is applied to GIS benefits payable to OAS pensioners who defer receiving their basic pensions in exchange for actuarially-adjusted higher pensions.

V. Allowance

The Allowance monthly benefit is designed to recognize the difficult circumstances faced by couples living on the pension of only one spouse as well as by many widowed persons. Since 1999, most of those receiving the Allowance can continue to do so by filing their income tax returns, rather than making a new application each year. Effective 1 July 1999, income (as defined for purposes of the GIS and the Allowance benefits under the *Old Age Security Act*) received in the previous calendar year is used to calculate the amount of benefits paid during the period starting on 1 July of a calendar year and ending on 30 June of the following calendar year.

Like the GIS, Allowance benefits are not subject to income tax. In addition, also like the GIS benefit, Allowance benefits are not payable outside Canada beyond a period of six months following the month of departure from Canada, regardless of how long the person previously lived in Canada.

A. Eligibility Conditions

The Allowance may be paid to the spouse or common-law partner of a senior receiving OAS and GIS benefits, or to a survivor, who, in each case, is between the ages of 60 and 64 and who has lived in Canada for at least 10 years after reaching age 18. An applicant must also be a Canadian citizen or a legal resident of Canada on the day preceding the approval of the application. The same income exclusions and deductions that apply to the GIS also apply to the Allowance benefit.

The Allowance stops being paid when the person becomes eligible for a basic pension at age 65, leaves Canada for more than six months, or dies. For a couple, the Allowance stops being paid if
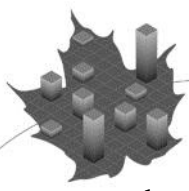
the older spouse or common-law partner ceases to be eligible for the GIS, or if the spouses separate, divorce, or dissolve their common-law partnership. In addition, in the case of survivors, the Allowance ceases if the person remarries. Sponsored immigrants are subject to the same conditions regarding eligibility as are described in the preceding section concerning the GIS. As of 1 January 2011, the Allowance is not payable to any individual incarcerated in an institution in accordance with the provisions of the *Eliminating Entitlements for Prisoners Act*. However, Allowance benefits to spouses or common-law partners of incarcerated individuals remain payable.

B. Amount of Benefits

The Allowance is an income-tested benefit. Like the GIS, if the recipient is married or living in a common-law relationship, the combined income of the recipient and his or her spouse or common-law partner is taken into account in determining the amount of the Allowance. In addition, to be entitled to the full Allowance, persons admitted to Canada after 6 March 1996 and qualifying for benefits after January 2001 must have resided in Canada for at least 10 years after reaching age 18. If a person to whom either of these conditions applies has less than 10 years of residence, a partial Allowance is payable, calculated at the rate of 1/10th of the amount of the full Allowance for each complete year of residence in Canada after age 18. The proportion payable is recalculated each year, taking into account additional residence in Canada during the previous year, building gradually to a full Allowance after 10 years.

As of 1 July 2011, top-up benefits are payable to Allowance recipients for both the regular benefit (i.e. Allowance spouses and common-law partners of GIS recipients) and the survivor benefit. As of 1 July 2016, the single rate of the GIS top-up for the lowest-income pensioners was increased by up to $947 annually or $78.92 monthly. In the first quarter of 2017, the top-up benefits are $37.94 and $133.83 for the regular and survivor Allowance benefits, respectively, and are adjusted quarterly in line with changes in the CPI, as described in section VI. The top-ups are reduced by 25 cents for every dollar of income in excess of $2,000 for Allowance (survivor) recipients and $4,000 of combined income for couples. In the first quarter of 2017, the income limits for the top-ups are $7,648 for the regular Allowance benefit and $8,432 for the survivor Allowance benefit.

The maximum amount payable to the spouse of a pensioner under the regular Allowance benefit is equal to the combination of a full OAS pension and the maximum GIS at the married rate. This amount was $1,098.70 (including the top-up) during the first quarter of 2017. The maximum amount payable for the survivor Allowance benefit is higher than the regular Allowance benefit, recognizing the higher cost of living alone. The maximum monthly survivor Allowance amount was $1,309.67 during the first quarter of 2017.

The OAS-equivalent portion of the maximum monthly Allowance benefit (regular and survivor) is reduced at a rate of 75 cents for every dollar of the person's or couple's monthly income (i.e. annual income divided by 12) until this portion is reduced to zero, which in the first quarter of 2017 corresponds to monthly income reaching $768. Up to this level of income the GIS portion remains payable at the maximum. For the regular Allowance benefit, both the GIS-equivalent portion of the Allowance and the pensioner's GIS are then reduced by 25 cents for every additional dollar of the couple's combined monthly income, i.e., in this case no regular Allowance benefit becomes payable if the annual income exceeds $32,448 in the first quarter of 2017. For the survivor Allowance benefit, the GIS-equivalent portion is reduced by 50 cents for every
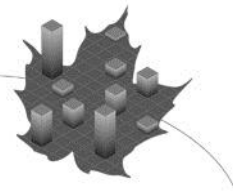
additional dollar of monthly income, i.e., in this case, for the first quarter of 2017, no survivor Allowance benefit becomes payable if annual income exceeds $23,616. The reductions to the Allowance benefits are in addition to any applied to the top-ups.

As examples, for a couple including a GIS recipient and Allowance recipient, with a combined monthly income of $1,400, the maximum monthly Allowance benefit would be reduced by $774.47 to $324.23 in the first quarter of 2017. For a survivor Allowance recipient with a monthly income of $800, the maximum benefit would be reduced by $728.36 to $581.31 in the first quarter of 2017.

In the case where a pensioner of a spouse of common-law partner is incarcerated, the couple's monthly income for the purpose of determining the spousal Allowance benefit is the monthly income of the spouse or common-law partner only.

All Allowance benefits including top-ups are adjusted quarterly in line with changes in the CPI, as described in section VI. No actuarial adjustment is applied to Allowance benefits payable to spouses or common-law partners of OAS pensioners who defer receiving their basic pensions in exchange for actuarially-adjusted higher pensions.

VI. Inflation Adjustments

All benefit amounts under the *Old Age Security Act* are adjusted at the beginning of each calendar quarter in line with changes in the CPI. However, if the CPI decreases, benefit amounts do not decrease, but are held constant until the CPI exceeds its previous peak.
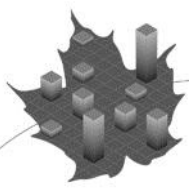
Appendix C – Detailed Reconciliations with Previous Triennial Report

The ratio of expenditures to GDP in a given year is an important measure of the cost of the program. One way of understanding the differences between the best-estimate projections in this report and those presented in the 12th OAS Program Actuarial Report as at 31 December 2012 is by looking at the effects of various factors on this cost ratio. The most significant effects are identified in the reconciliation presented in Table 21 and the discussion below.

The results presented in this report differ from those previously projected for a variety of reasons. Differences between the actual experience from 2013 through 2015 and that projected in the 12th OAS Program Actuarial Report for the same period were addressed in the Reconciliation with Previous Triennial Report section (V) of this report. Since historical results provide the starting point for the projections shown in this report, these historical differences between actual and projected experience have an effect on the projections. The impact of the experience update and changes in the assumptions and methodology that have significantly changed the projected results are addressed in this section.

The recent amendments made to the *Old Age Security Act*, namely the increase in the single rate of the GIS top-up for the lowest-income pensioners and the repeal of the increase of two years in the ages of eligibility for OAS program benefits, lead to an increase in the cost ratio over the long term. In 2016, the amendments cause the ratio to increase in absolute terms by 0.1%. The amendments lead to an absolute increase in the ratio of 0.33% in 2030 and 0.20% by 2060.

Overall, the experience update had the effect of reducing the cost ratio by 0.04% in 2016 and 0.03% ultimately in 2060. This was mainly due to lower than expected benefits and higher than expected GDP.

Key assumptions and changes made from the previous triennial report are outlined in Table 1 of this report. The effects of these changes are also shown in Table 21 and are summarized below:

- The assumed total fertility rates are similar to those assumed in the previous triennial report, and as such, have little impact on the cost ratios.

- The assumed level of net migration is higher than in the previous triennial report, and this leaves the long-term cost ratios relatively unchanged, because the resulting effect of projected higher growth in earnings and GDP mostly offsets the ultimate increase in expenditures.

- The higher mortality improvement rates at ages 85 and older assumed for this report increase the cost ratios, because beneficiaries are expected to receive their benefits over longer periods of time.

- The change in the assumed labour force participation and employment rates increases the cost ratios, since it results in projected lower levels of earnings and GDP relative to projected expenditures.

- The lower real wage increase assumption causes the cost ratios to rise due to the resulting projected lower increase in earnings and GDP compared to the previous triennial report.

- The change in the GDP deflator assumption causes the cost ratios to rise due to the resulting projected lower increase in GDP compared to the previous triennial report.

- The lower assumed inflation rate has no effect on the cost ratios. The reason for this is twofold. First, expenditures increase at a slower rate due to lower benefit indexation. Second, although nominal GDP continues to increase, its rate of growth slows to the same extent, since its rate of growth depends on the real wage increase, inflation, and the price differential between nominal GDP and total employment earnings.

- Changes to the recipient rates decrease the cost ratios over the long term.

- The introduction of Additional CPP benefits starting in 2019 is projected to gradually decrease the cost ratios over the projection period.

Some other assumptions, which are described in Appendix D, were also changed. For example, the experience adjustment factors used in the projection of earnings, the GDP, and benefits were revised to reflect more recent experience. Overall, the changes in these other assumptions had the effect of increasing the cost ratios over the long term.

Table 21   Detailed Reconciliation of Expenditures as a Percentage of GDP
(OAS, GIS and Allowance combined)

	2016	2030	2060
12th OAS Program Actuarial Report	**2.44**	**2.73**	**2.21**
I. Legislated Amendments:			
13th OAS Program Actuarial Report			
• increase in the single rate of the GIS top-up for lowest-income pensioners	0.01	0.33	0.20
• repeal of scheduled increase in benefit eligibility ages			
Total Amendments	**0.01**	**0.33**	**0.20**
II. Improvements in Methodology	**0.00**	**(0.01)**	**(0.02)**
III. Experience update (2013 to 2015)			
Demographic	0.01	0.02	0.00
Economic	(0.02)	(0.01)	(0.01)
Benefits	(0.03)	(0.02)	(0.02)
Subtotal:	**(0.04)**	**(0.01)**	**(0.03)**
IV. Changes in Assumptions			
Fertility	0.00	0.00	0.00
Net Migration	0.00	0.00	0.01
Mortality	0.00	0.02	0.04
Labour Market	0.01	0.01	0.00
Real Wage Increase	0.00	0.08	0.14
GDP Deflator	0.00	0.05	0.12
Price Increases	0.01	0.00	0.00
Recipient Rates	(0.02)	(0.03)	(0.02)
Other Assumptions	0.01	0.04	0.03
Additional CPP[*]	0.00	0.00	(0.03)
Subtotal:	**0.01**	**0.17**	**0.29**
Total of I to IV	**(0.02)**	**0.48**	**0.44**
14th OAS Program Actuarial Report	**2.42**	**3.21**	**2.65**

[*] Recognizes the impact of the introduction of Additional CPP benefits starting in 2019.

Appendix D – Assumptions and Methodology

I. Introduction

This section describes the data, assumptions, and methods that underlie the financial projections in the Results section of this report.

Future expenditures and cost ratios are projected over a long period of time, i.e. up to the year 2060, and depend on assumptions such as those regarding fertility, mortality, migration, labour force participation, job creation, unemployment, inflation, and employment earnings. These assumptions form the basis for the projections of future expenditures of the program and cost measurement bases.

Although the demographic and economic assumptions have been developed using the available information, the resulting estimates should be interpreted with caution. These estimates are not intended to be predictions, but rather projections of the future financial state of the program. To the extent applicable, these assumptions are consistent with the best-estimate assumptions used in the 27th and 28th CPP Actuarial Reports as at 31 December 2015.

II. Demographic Projections

The historical and projected populations of Canada are required for the calculation of future benefits. The population of Canada as at 1 July 2015 is used as a starting point. The population is then projected by age and sex from one year to the next by adding births and net migrants and subtracting deaths. Applying the fertility, migration, and mortality assumptions to the starting population develops the annual numbers of births, net migrants, and deaths.

A. Initial Population as at 1 July 2015

The starting point for the demographic projections is based on the most recent Statistics Canada population estimates as at 1 July 2015 for Canada, by age and sex. The estimates are based on the 2011 Census. The estimates are adjusted by ungrouping ages 100 and older into individual ages using the observed distribution of OAS program beneficiaries by age for ages 100 and older.

B. Fertility Rates

There are two definitions for the fertility rate: the total (or synthetic) fertility rate and the cohort fertility rate. The total fertility rate for a year is the average number of children that would be born to a woman in her lifetime if she experienced the age-specific fertility rates observed in, or assumed for, that calendar year. It is calculated as the sum of age group rates multiplied by their respective spans. In comparison, the cohort fertility rate is the average number of children born to a woman in her lifetime, for women born in a specific year.

The age-specific fertility rates are followed as these cohorts transition through age groups, giving a better idea of trends and variations between different generations over time. This is why fertility rates by age group (cohort rates) are used as the basis for the fertility rate assumption. Each age group was studied independently of other age groups. Although the historical cohort rates are used to set the assumption for the future, it is nonetheless useful and informative to consider the
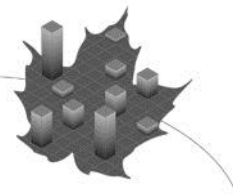
historical progression of the total fertility rates. Over time, the trends in the cohort rates are reflected in the total fertility rates.

The total fertility rate in Canada has declined significantly since the baby boom period, when the rate peaked at nearly 4.0 children per woman in the late 1950s. The baby bust period that followed in the mid-1960s pulled down the total fertility rates by the mid-1980s to a record low of 1.6 children per woman. The total fertility rate rose slightly in the early 1990s, but then generally declined to a level of 1.5 by the late 1990s. Canada is one of many industrialized countries that saw their total fertility rates increase starting in the 2000s. By 2008, the total fertility rate for Canada had reached 1.68. However, in some industrialized countries, including Canada, the total fertility rate has decreased since 2008, which could be attributable to the economic downturn experienced in recent years. In 2011, the total fertility rate for Canada was 1.61.

Historically, the cohort fertility rates in Canada have steadily declined for the last 30 years. For females born in 1941 who reached the end of their childbearing years (turned age 49) in 1990, the cohort rate was 2.61 for Canada. However, for females reaching the end of their childbearing years in 2011 (born 1962), the cohort fertility rate for Canada was 1.80.

Fertility rates are affected by many factors, including social attitudes, reproductive technologies, and economic conditions. It is assumed for this report that the recent economic downturn has caused a temporary downward effect on total fertility rates, with couples choosing to postpone having any or more children until economic conditions improve. This effect was taken into consideration along with historical trends in age-specific fertility rates over the last 10 years. The short periods of growth in the fertility rates that have occurred in recent decades are assumed to be temporary in nature, rather than having any long-term effects. In this report, as a result of projecting age-specific cohort rates, it is assumed that the total fertility rate from 2019 onward for Canada will be 1.65 children per woman, which is the same ultimate rate as was assumed for the 12th OAS Program Actuarial Report.

Finally, in accordance with the average experience over the last 10, 20, and 30 years, the assumed ratio of male to female newborns is 1.053, which is essentially the same as for the 12th OAS Program Actuarial Report. The cohort fertility rates per woman, together with each cohort's age-specific rates, all based on the year of birth of a woman, are shown in Table 22.

Table 23 shows the projected age-specific and total fertility rates by calendar year for Canada. Chart 3 shows the historical and projected total and cohort fertility rates for Canada.

Table 22   Cohort Fertility Rates by Age and Year of Birth
(Canada)

Year of Birth of Woman[1]	Annual Fertility Rates by Age Group (per 1,000 women)							Cohort Fertility Rates per Woman[2]
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	
1960 – 1964	27.4	84.9	119.4	85.9	33.6	6.9	0.4	1.79
1965 – 1969	24.0	78.5	113.9	85.8	40.1	9.2	0.8	1.76
1970 – 1974	24.6	72.2	100.0	95.8	50.6	12.2	1.0	1.78
1975 – 1979	25.0	60.9	97.4	107.0	54.4	17.1	1.0	1.81
1980 – 1984	18.7	51.0	100.6	107.7	62.6	17.1	1.0	1.79
1985 – 1989	13.7	51.2	93.1	114.5	62.6	17.1	1.0	1.77
1990 – 1994	14.2	40.0	90.1	114.5	62.6	17.1	1.0	1.70
1995 – 1999	10.3	35.1	90.1	114.5	62.6	17.1	1.0	1.65
1999 – 2003	9.7	35.1	90.1	114.5	62.6	17.1	1.0	1.65
2000 – 2004+	9.5	35.1	90.1	114.5	62.6	17.1	1.0	1.65

(1)   Ranges for years of birth correspond to the oldest to youngest ages for an age group. For example, in the first row of the table, 1960 is the year of birth for those aged 19, 24, 29, etc., 1961 is the year of birth for those aged 18, 23, 28, etc., and so forth.

(2)   Fertility rates below and to the right of the dotted line are projected.
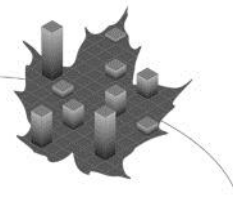
Table 23   Total Fertility Rates by Age and Calendar Year
(Canada)

Year	Annual Fertility Rates by Age Group (per 1,000 women)							Total
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	
2016	10.0	38.0	91.9	110.4	57.7	14.2	0.9	1.62
2017	9.8	37.1	91.3	111.8	59.3	15.2	0.9	1.63
2018	9.7	36.1	90.7	113.2	61.0	16.1	1.0	1.64
2019+	9.5	35.1	90.1	114.5	62.6	17.1	1.0	1.65

Chart 3   Historical and Assumed Total and Cohort Fertility Rates for Canada[1]
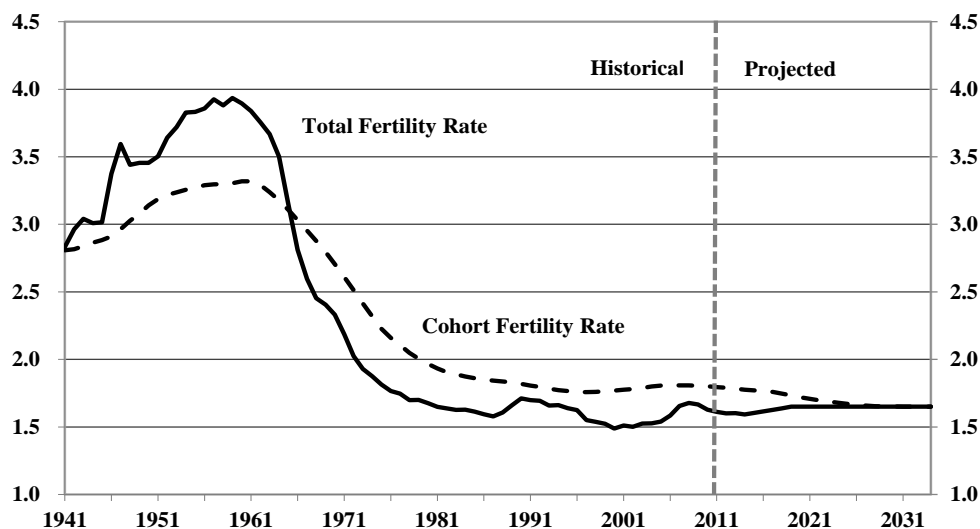
(1)   Cohort fertility rates are based on the age of a woman being 30 in a given calendar year.

C. Mortality

For this report, the mortality rate projections start from the 2011 mortality rates of the Canadian Human Mortality Database (CHMD). According to the CHMD, life expectancies at birth in 2011 for males and females in Canada were 79.5 and 83.7 years, respectively, without any assumed future improvements in mortality (i.e. reductions in mortality).

The average annual mortality improvement rates experienced in Canada over the 15-year period from 1996 to 2011 by age and sex were used as the basis for projecting annual mortality improvement rates from 2012 onward for ages under 65. For ages 65 and over, the annual mortality improvement rates for 2012 to 2014 were projected using the trends derived from the administrative data on OAS basic pension and GIS beneficiaries, representing 98% of the general population. Improvement rates by age and sex for years 2012 to 2031 (2015 to 2031 for ages 65 and over) were determined by cubical interpolation between:

- the improvement rates of year 2011 (2014 for ages 65 and over), and
- the ultimate improvement rates described below in respect of the period 2032 and thereafter.

For the year 2032 and thereafter for Canada, the ultimate annual rates of mortality improvement vary by age only and not by sex or calendar year. The ultimate mortality improvement rates are derived using a combination of backward- and forward-looking approaches. The analysis of the Canadian experience over the period from 1921 to 2011, including the recent slowdown trends observed in mortality improvement rates for OAS beneficiaries, was combined with an analysis of the possible drivers of future mortality improvements. Mortality improvement rates for males at most ages are currently higher than those for females but are assumed to decrease to the same level as female rates from 2032 onward.

The ultimate rate for both sexes for ages 0 to 89 is set at 0.8% per year from 2032 onward for Canada. For ages above 89, the ultimate improvement rate is set to reduce from 0.5% for the age group 90-94 to 0.2% for those aged 95 and older. Table 24 shows the initial (2012-2014), intermediate (2015-2031) and ultimate (2032+) assumed annual mortality improvement rates for Canada. The mortality improvement rates shown for 2012-2014 and 2015-2031 represent the average rates over these periods.

Table 24 Annual Mortality Improvement Rates for Canada

Age	Males 2012-2014[1]	Males 2015-2031[1]	Males 2032+	Females 2012-2014[1]	Females 2015-2031[1]	Females 2032+
	(%)	(%)	(%)	(%)	(%)	(%)
0	0.7	0.7	0.8	0.4	0.6	0.8
1-14	3.5	1.9	0.8	2.5	1.5	0.8
15-44	2.1	1.2	0.8	1.2	1.0	0.8
45-64	1.9	1.2	0.8	1.2	1.0	0.8
65-74	2.9	1.6	0.8	1.9	1.3	0.8
75-84	2.8	1.6	0.8	2.1	1.3	0.8
85-89	2.0	1.3	0.8	1.7	1.2	0.8
90-94	1.3	0.9	0.5	1.2	0.9	0.5
95+	0.4	0.3	0.2	0.5	0.4	0.2

(1) The mortality improvement rates shown for 2012-2014 and 2015-2031 represent average rates over these periods.

The resulting projected mortality rates in Table 25 indicate a continuous decrease in mortality rates over the long term. For example, the mortality rate at age 65 for males is expected to decrease from about 11 deaths per thousand people in 2016 to 7 deaths per thousand people by 2060. The gap in mortality rates between males and females at each age is also expected to decrease over the projection period.

Table 25   Mortality Rates for Canada
(annual deaths per 1,000 people)

Age	Males			Females		
	2016	**2030**	**2060**	**2016**	**2030**	**2060**
0	5.08	4.57	3.59	4.19	3.82	3.00
10	0.07	0.05	0.04	0.07	0.05	0.04
20	0.60	0.50	0.39	0.28	0.25	0.20
30	0.66	0.55	0.44	0.36	0.32	0.25
40	1.11	0.94	0.74	0.68	0.59	0.46
50	2.75	2.38	1.87	2.02	1.83	1.44
60	6.83	5.64	4.43	4.41	3.74	2.94
65	10.52	8.53	6.70	6.91	5.81	4.56
70	16.53	13.25	10.41	11.13	9.37	7.36
75	26.55	21.21	16.66	18.17	15.21	11.95
80	45.30	36.39	28.60	31.29	26.11	20.52
85	81.84	67.35	52.92	58.20	49.02	38.52
90	144.13	124.19	103.05	110.80	96.29	79.89
100	343.68	322.74	296.89	299.32	280.62	258.15

Chart 4 shows the historical and projected life expectancies at age 65 since 1966, based on each given year's mortality rates (i.e. without future mortality improvements).

Chart 4 Life Expectancies at Age 65 for Canada, without improvements after the year shown[1]
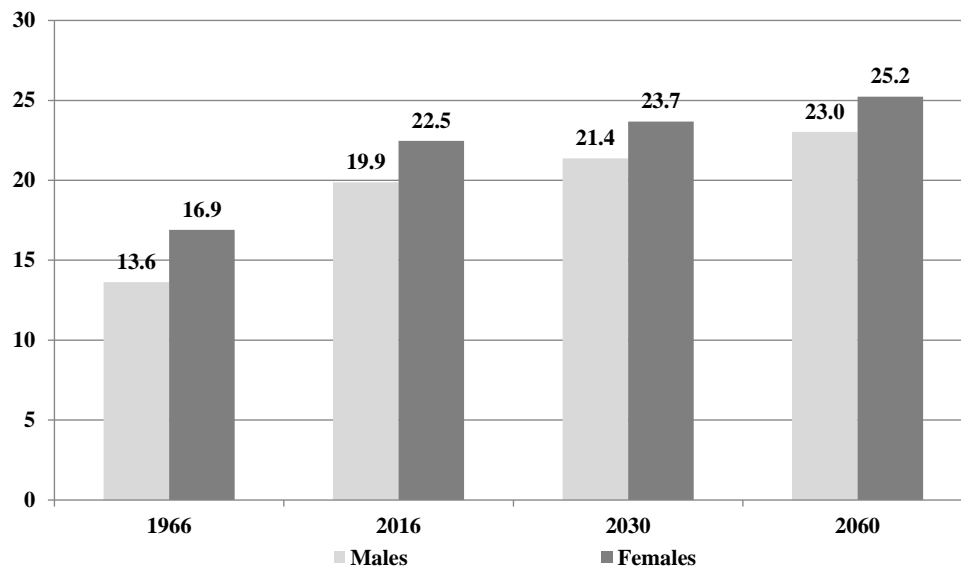
(1) These are calendar year life expectancies based on the mortality rates of the given attained year.
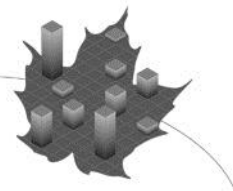
Table 26 shows projected Canadian life expectancies at various ages for the specified calendar years, also based on each given year's mortality rates (without future improvements). Table 27 is similar to Table 26, the only difference being that it takes into account the assumed mortality improvements after the specified calendar years (with future improvements). Given the continuing trend in increased longevity, Table 27 is considered to be more realistic than Table 26, especially for the older ages. At the same time, the extended length of the projection period increases the uncertainty of the results presented in Table 27 for younger ages.

From 2016 to 2060, Canadian life expectancy at age 65 (with assumed future mortality improvements) is projected to grow from 21.3 to 23.9 years for males and from 23.7 to 26.1 years for females, as shown in Table 27. The yearly increase in life expectancies at age 65 in the early years of the projection reflects the significant increase observed over the last decades. Thereafter, there is a projected slowdown in the increase in life expectancies consistent with the lower rate of improvement in mortality assumed for 2032 and thereafter.

Table 26 Life Expectancies for Canada, without improvements after the year shown[1]

Age	Males			Females		
	2016	2030	2060	2016	2030	2060
0	80.7	82.7	85.0	84.5	86.0	88.0
10	71.2	73.1	75.4	74.9	76.4	78.3
20	61.4	63.3	65.5	65.0	66.5	68.4
30	51.8	53.6	55.7	55.2	56.6	58.5
40	42.1	43.9	46.0	45.4	46.8	48.7
50	32.8	34.5	36.5	35.9	37.3	39.1
60	24.0	25.6	27.4	26.8	28.1	29.8
65	19.9	21.4	23.0	22.5	23.7	25.2
70	16.0	17.4	18.9	18.3	19.4	20.9
75	12.4	13.6	14.9	14.4	15.4	16.7
80	9.2	10.2	11.3	10.9	11.7	12.8
85	6.5	7.2	8.1	7.8	8.4	9.3
90	4.5	4.9	5.4	5.3	5.7	6.3
100	2.1	2.3	2.4	2.4	2.6	2.7

(1)   These are calendar year life expectancies based on the mortality rates of the given attained year.

Table 27 Life Expectancies for Canada, with improvements after the year shown[1]

Age	Males			Females		
	2016	2030	2060	2016	2030	2060
0	86.7	87.7	89.8	89.7	90.6	92.3
10	76.5	77.5	79.5	79.6	80.4	82.1
20	66.0	67.0	69.0	69.0	69.9	71.7
30	55.6	56.6	58.7	58.6	59.5	61.2
40	45.3	46.3	48.3	48.2	49.1	50.9
50	35.2	36.2	38.1	38.1	38.9	40.7
60	25.7	26.7	28.5	28.4	29.2	30.9
65	21.3	22.2	23.9	23.7	24.5	26.1
70	17.1	18.0	19.5	19.3	20.1	21.5
75	13.2	14.0	15.4	15.2	15.9	17.2
80	9.7	10.4	11.6	11.3	12.0	13.1
85	6.8	7.3	8.2	8.0	8.6	9.4
90	4.6	5.0	5.5	5.4	5.8	6.4
100	2.1	2.3	2.4	2.4	2.6	2.7

(1) These are cohort life expectancies that take into account assumed future improvements in mortality of the general population and therefore differ from calendar year life expectancies, which are based on the mortality rates of the given attained year.

D. Net Migration

Immigration and emigration are generally recognized as being volatile parameters of future population growth since they are subject to a variety of demographic, economic, social and political factors. During the period from 1972 to 2015, annual immigration to Canada varied between 84,000 and 271,000, annual emigration from Canada fluctuated between 40,000 and 86,000, and the annual number of returning Canadians fluctuated between 14,000 and 39,000.

During the period from 1972 to 2015, the annual net increase in the number of non-permanent residents fluctuated between -71,000 and 141,000. The number of non-permanent residents increased each year from 1999 to 2014, but then decreased in 2015. The government recently introduced several modifications to the Temporary Foreign Workers Program, making it more difficult for employers to hire temporary foreign workers. It is expected that these changes will result in there being no annual growth in the number of non-permanent residents in the future, that is, an annual net increase of zero. The immigration application process also changed in 2015 with the introduction of the Express Entry program. It is possible that the related administrative changes led to the significant decrease in immigration levels from 0.64% in 2014 to 0.55% in 2015.

However, it is assumed that higher immigration levels, in line with the government's policies, will resume as early as 2016. Therefore, the 2015 net migration rate of 0.55% of the population is expected to increase to 0.62% in 2016 and to remain stable at that level for the remainder of the projection period. The ultimate level of 0.62% generally corresponds to the average experience over the last 10 years and assumes that there will be no growth in the number of non-permanent residents.
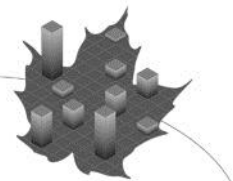
Chart 5 shows the net migration (immigration less emigration, plus the number of returning Canadians) experience since 1972 and the assumed rate for the future. The distributions of immigrants, emigrants, and returning Canadians by age and sex used for the demographic projections were derived from Statistics Canada data averaged over the period 2006 to 2015.

Chart 5   Net Migration Rate
(Canada)
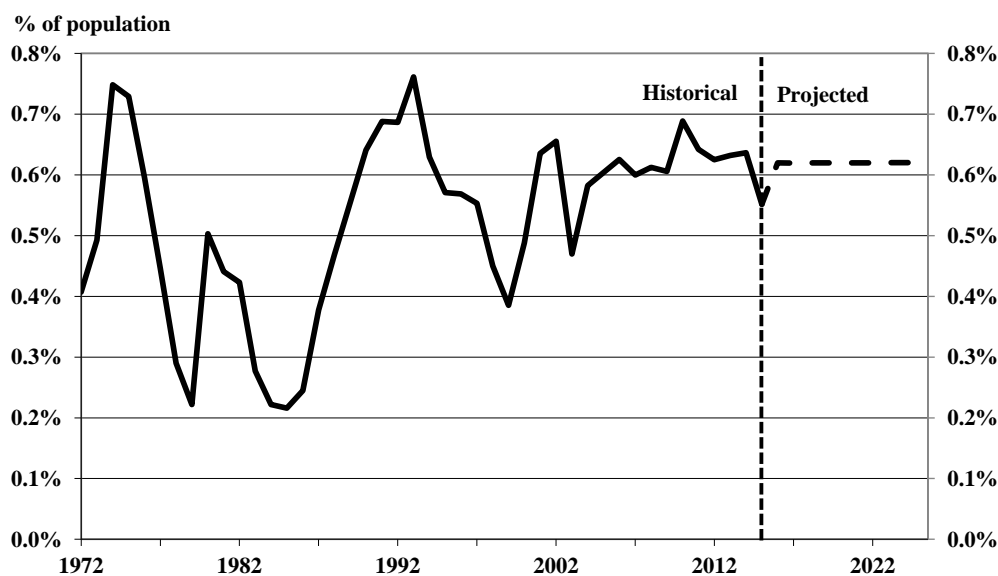
E. Projected Population and its Characteristics

The evolution of the Canada population age distribution since 1966 is shown in Chart 6. One can easily observe that the triangular shape of the 1960s has become more rectangular over time. This is projected to continue and indicates an aging population. The effects of the baby boom, baby bust, and echo generations can be seen. The chart also reveals that the number of people aged 85 and over is expected to increase dramatically over the coming decades.
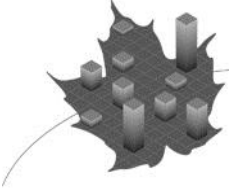
Chart 6   Age Distribution of the Canadian Population

(thousands)

1966

2016

2030

2050

■ **Baby boomers**
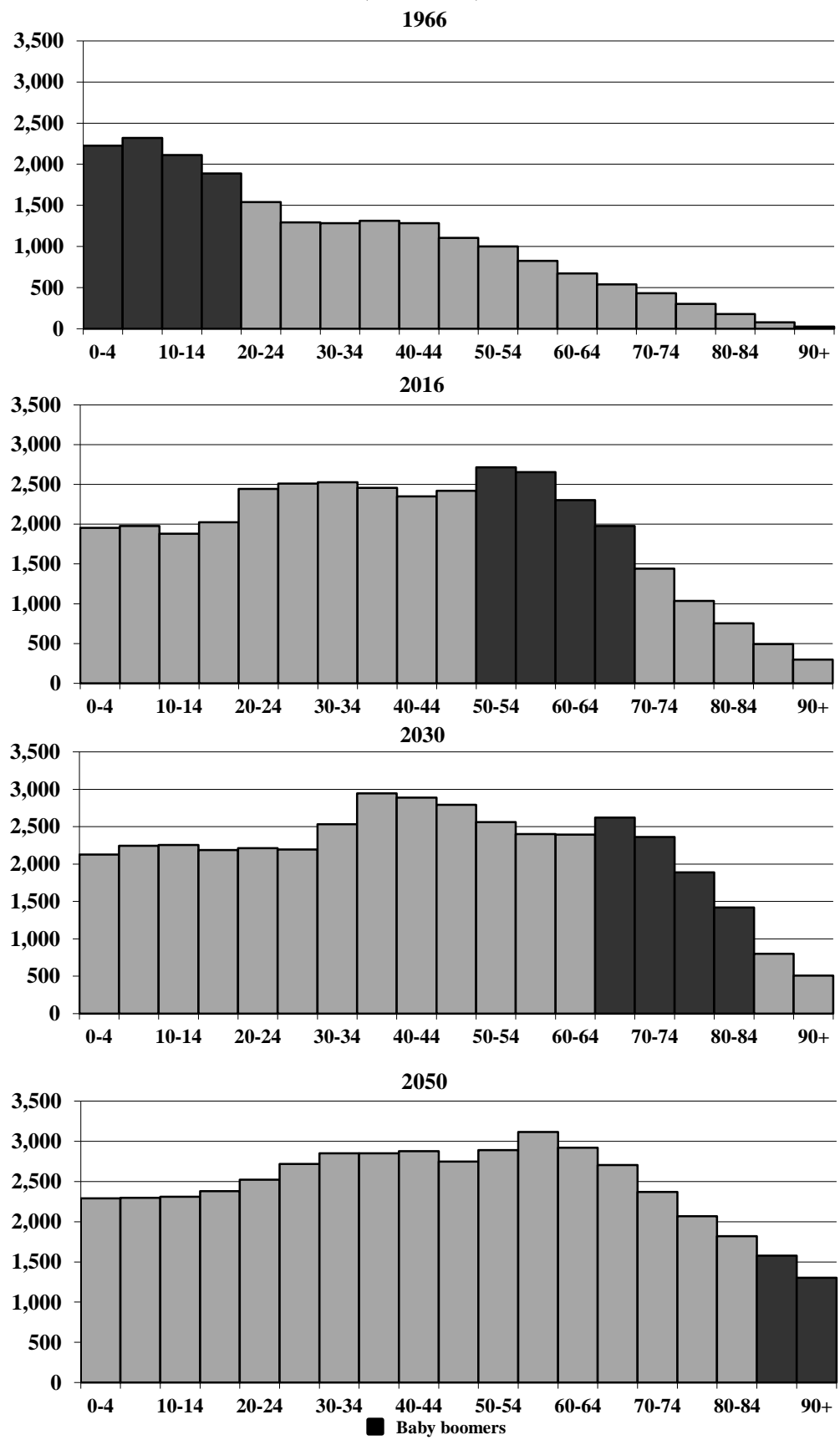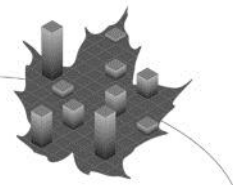
The population of Canada as at 1 July 2015 is 35.9 million. Table 28 presents the projected population of Canada as at 1 July for selected age groups and years. The number of people reaching age 65 is a good indicator of the number of new OAS basic pension beneficiaries coming into pay each year. This population is expected to increase significantly over the next fourteen years, growing from 412,000 in 2016 to 522,000 by 2030. Chart 7 shows the evolution of the total population of Canada and of the age groups below 20, 20 to 64, and 65 and older from 1970 to 2060.

Table 29 shows the variations in the relative proportions of various age groups for Canada throughout the projection period. The proportion of people aged 65 and over is expected to increase significantly from 16.6% of the total population in 2016 to 26.7% by 2060. The number of people aged 65 and older as a proportion of the number of people aged 20 to 64 close to doubles over the same period, from 26.8% in 2016 to 50.2% by 2060. This proportion significantly affects the ratio of OAS program benefit expenditures to GDP.

Table 28   Population of Canada by Age
(thousands)

Year	0-17	18-69	70+	0-19	20-64	65+	Total	Reaching Age 65
2016	6,985	25,212	4,020	7,838	22,383	5,997	36,218	412
2017	7,045	25,330	4,217	7,867	22,509	6,216	36,592	419
2018	7,115	25,446	4,409	7,921	22,603	6,446	36,970	435
2019	7,201	25,554	4,597	7,994	22,666	6,691	37,351	456
2020	7,294	25,654	4,786	8,074	22,709	6,950	37,733	474
2021	7,388	25,750	4,977	8,167	22,739	7,209	38,115	480
2022	7,475	25,849	5,170	8,264	22,754	7,476	38,494	495
2025	7,706	26,089	5,816	8,539	22,774	8,298	39,611	524
2030	7,942	26,420	6,975	8,816	22,925	9,597	41,337	522
2035	8,063	26,750	8,037	8,992	23,483	10,374	42,850	475
2040	8,060	27,556	8,572	9,042	24,255	10,892	44,189	478
2045	8,118	28,438	8,869	9,100	24,989	11,336	45,425	523
2050	8,315	29,163	9,142	9,280	25,492	11,848	46,620	561
2055	8,608	29,671	9,546	9,578	25,838	12,409	47,825	610
2060	8,889	30,118	10,064	9,892	26,091	13,088	49,072	610

Chart 7   Population of Canada
(millions)
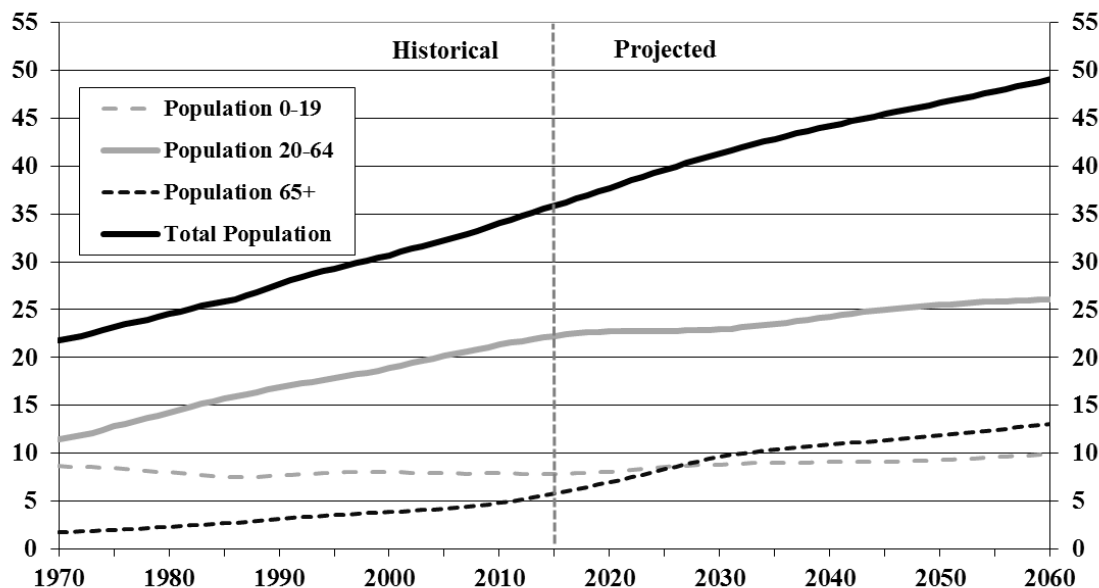
Table 29   Analysis of Population of Canada by Age

Year	% of Total Population			% of Total Population			Age 65+ As % of Age 20-64
	0-17	18-69	70+	0-19	20-64	65+	
2016	19.3	69.6	11.1	21.6	61.8	16.6	26.8
2017	19.3	69.2	11.5	21.5	61.5	17.0	27.6
2018	19.2	68.8	11.9	21.4	61.1	17.4	28.5
2019	19.3	68.4	12.3	21.4	60.7	17.9	29.5
2020	19.3	68.0	12.7	21.4	60.2	18.4	30.6
2021	19.4	67.6	13.1	21.4	59.7	18.9	31.7
2022	19.4	67.2	13.4	21.5	59.1	19.4	32.9
2025	19.5	65.9	14.7	21.6	57.5	20.9	36.4
2030	19.2	63.9	16.9	21.3	55.5	23.2	41.9
2035	18.8	62.4	18.8	21.0	54.8	24.2	44.2
2040	18.2	62.4	19.4	20.5	54.9	24.6	44.9
2045	17.9	62.6	19.5	20.0	55.0	25.0	45.4
2050	17.8	62.6	19.6	19.9	54.7	25.4	46.5
2055	18.0	62.0	20.0	20.0	54.0	25.9	48.0
2060	18.1	61.4	20.5	20.2	53.2	26.7	50.2

Table 30 shows the components of population growth, which is defined as the projected number of births plus net migrants less the projected number of deaths from 2016 to 2060, and Chart 8 presents these figures graphically. The number of births is projected to exceed deaths until 2037. Thereafter, all population growth is projected to come from migration.
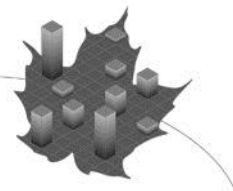
Over the period 2016 to 2025, the population of Canada is projected to grow at about 1% per year. The annual growth slows to about 0.7% between 2025 and 2040 and to about 0.5% thereafter. The population of Canada is expected to reach 49 million by 2060.

Table 30   Births, Net Migrants, and Deaths for Canada
(thousands)

	Population 1st July	Births	Net Migrants	Deaths	Change in Population	Annual Percentage Change		
						20-64	65+	Total
						(%)	(%)	(%)
2016	36,218	396	225	254	366	0.7	3.7	1.0
2017	36,592	406	227	259	374	0.6	3.6	1.0
2018	36,970	413	229	263	378	0.4	3.7	1.0
2019	37,351	418	232	268	381	0.3	3.8	1.0
2020	37,733	421	234	273	382	0.2	3.9	1.0
2021	38,115	423	236	278	381	0.1	3.7	1.0
2022	38,494	425	239	284	379	0.1	3.7	1.0
2025	39,611	424	246	303	367	0.0	3.5	0.9
2030	41,337	414	257	342	329	0.2	2.5	0.8
2035	42,850	410	266	389	287	0.5	1.3	0.7
2040	44,189	420	275	437	257	0.7	0.9	0.6
2045	45,425	438	282	479	242	0.5	0.9	0.5
2050	46,620	457	290	508	238	0.3	0.9	0.5
2055	47,825	469	297	523	243	0.2	1.1	0.5
2060	49,072	475	305	526	254	0.2	1.0	0.5

Chart 8   Components of Population Growth for Canada
(thousands)
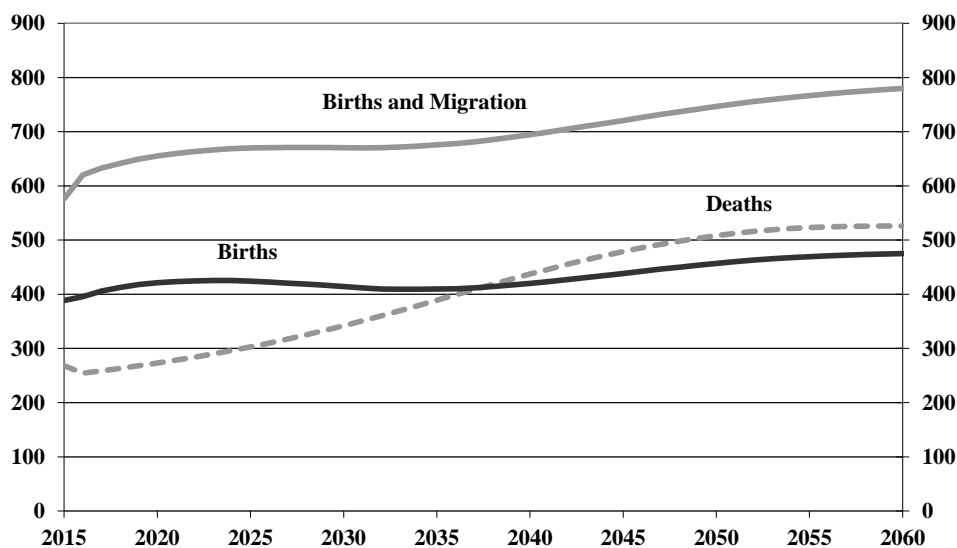
III. Economic Projections

The list of assumptions required to project the various economic indices, benefit expenditures, and cost measurement bases is quite extensive. The following sections cover the more important assumptions.

The economic outlook rests on the assumed evolution of the labour market, that is, labour force participation, employment, unemployment, inflation, and the increase in average employment earnings, as well as the increase in GDP. All of these factors must be considered together and form part of an overall economic perspective.

The projected expenditures presented in this report are also expressed as cost ratios relative to three different measurement bases, namely total employment earnings, combined CPP/QPP contributory earnings[1], and the GDP. For this purpose, average employment earnings, the proportion of persons with earnings, and the proportion of CPP contributors are required and are assumed exactly as under the 27th CPP Actuarial Report. For calculation purposes, these measures are assumed to apply to Canada as opposed to Canada less Québec. Adjustments are then made in the projections of total employment earnings, combined CPP/QPP contributory earnings, and the GDP to reflect historical differences between Québec and the rest of Canada.

A. Economic Perspective

The future expenditures of the OAS program and cost measurement bases depend on many demographic and economic factors. It is important to define the individual economic assumptions in the context of a long-term overall economic perspective. For this report, it is assumed that, despite the modest pace of recovery from the last economic downturn and an uncertain economic outlook for major foreign economies, a moderate and sustainable growth in the Canadian economy will persist throughout the projection period.

The actuarial examination of the OAS program involves the projection of its expenditures as well as cost measurement bases over a long period of time. Although best judgment is used regarding future economic trends, it is nonetheless difficult to anticipate all of the social and corresponding economic changes that may occur during the projection period. There will always be some degree of uncertainty. The projected aging of the population combined with the retirement of the baby boom generation over the next few decades will certainly create significant social and economic changes. It is possible that the evolution of the working-age population, especially the active population, will be quite different from what has been historically observed and what has been assumed for the purpose of this report.

B. Labour Market

Chart 9 shows the main components of the labour market that are used to determine the number of earners to calculate the total employment earnings shown in Table 14. The number of earners is defined as the number of persons who had earnings during a given calendar year. The proportion of earners assumption relies on the projected active population given in this report.

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[1] For the CPP, contributory earnings are of the Base CPP only, i.e., excludes Additional CPP contributory earnings above the Year's Maximum Pensionable Earnings (YMPE) starting in 2024.
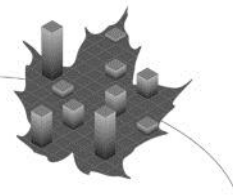
Chart 9   Components of the Labour Market

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                          ┌──────────────────────┐
                          │   Total Population    │
                          └──────────────────────┘
                                     │
        ┌────────────────────────────┴───────────────────────┐
┌───────────────────────────┐              ┌──────────────────────────┐
│ Population aged 15 and over│              │  Population aged 0 to 14  │
└───────────────────────────┘              └──────────────────────────┘
          │
   ┌──────┴────────────────────────┐
┌──────────────────┐      ┌──────────────────────┐
│ Active Population*│      │ Inactive Population*  │
│  (Labour Force)   │      └──────────────────────┘
└──────────────────┘
          │
   ┌──────┴──────┐
┌──────────┐ ┌────────────┐
│ Employed │ │ Unemployed │
└──────────┘ └────────────┘
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*   An active person is one who is in the labour force, meaning that the person is either employed or is looking for employment (unemployed). A person is said to be inactive in all other cases.
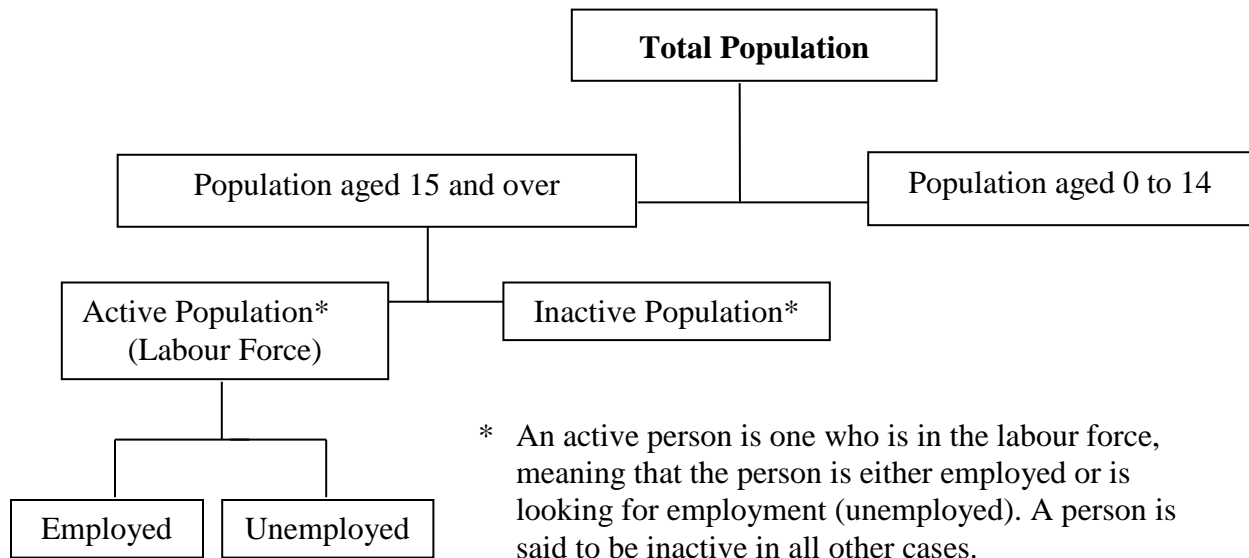
1.   Active Population

The overall labour force participation rates in Canada (the active population expressed as a proportion of the population aged 15 and over) from 1976 to 2015 clearly show a narrowing of the gap between male and female rates. Although the increase in participation rates of females aged 15 to 69 has slowed down since the mid-2000s, the increase was significant over the previous decades. Furthermore, participation rates for those aged 55 and older have increased significantly over the last decade for both men and women.

In 1976, overall male participation was about 78% compared to only 46% for females, which represents a gap of 32%. This gap has narrowed to 9% in 2015. It is assumed that females will continue to narrow the gap in participation rates but at a slower pace, with the gap gradually reducing to about 8% by 2035. In addition, over the next two decades, it is assumed that the participation of males and females aged 55 and over will continue to increase. Tables 31 to 33 provide projections of the active and employed populations and associated participation, employment, and unemployment rates for Canada.

Table 31 Active Population (Canada, ages 15 and over)

Year	Population[1]			Active Population			Employed		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
	(thousands)			(thousands)			(thousands)		
2016	14,549	14,988	29,537	10,259	9,171	19,430	9,478	8,573	18,051
2017	14,691	15,129	29,820	10,334	9,240	19,575	9,570	8,654	18,224
2018	14,832	15,270	30,102	10,403	9,306	19,709	9,643	8,723	18,366
2019	14,976	15,414	30,390	10,471	9,369	19,840	9,717	8,789	18,506
2020	15,119	15,557	30,676	10,535	9,431	19,966	9,787	8,854	18,641
2021	15,264	15,704	30,968	10,599	9,495	20,094	9,856	8,922	18,778
2022	15,414	15,855	31,269	10,664	9,562	20,226	9,927	8,992	18,918
2025	15,867	16,315	32,182	10,851	9,761	20,612	10,131	9,203	19,334
2030	16,573	17,045	33,618	11,133	10,086	21,219	10,396	9,507	19,903
2035	17,266	17,771	35,036	11,510	10,505	22,015	10,748	9,903	20,651
2040	17,896	18,457	36,353	11,861	10,827	22,687	11,073	10,207	21,280
2045	18,425	19,046	37,471	12,176	11,107	23,282	11,368	10,471	21,839
2050	18,878	19,542	38,420	12,421	11,315	23,737	11,597	10,668	22,265
2055	19,320	20,000	39,320	12,625	11,491	24,116	11,788	10,833	22,621
2060	19,810	20,489	40,299	12,855	11,698	24,553	12,003	11,027	23,030

(1) Adjusted to the basis used by Statistics Canada in its Labour Force Survey.

**Table 32 Labour Force Participation, Employment, and Unemployment Rates
(Canada, ages 15 and over)**

Year	Labour Force Participation Rate			Employment Rate			Unemployment Rate		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
	(%)			(%)			(%)		
2016	70.5	61.2	65.8	65.1	57.2	61.1	7.6	6.5	7.1
2017	70.3	61.1	65.6	65.1	57.2	61.1	7.4	6.3	6.9
2018	70.1	60.9	65.5	65.0	57.1	61.0	7.3	6.3	6.8
2019	69.9	60.8	65.3	64.9	57.0	60.9	7.2	6.2	6.7
2020	69.7	60.6	65.1	64.7	56.9	60.8	7.1	6.1	6.6
2021	69.4	60.5	64.9	64.6	56.8	60.6	7.0	6.0	6.5
2022	69.2	60.3	64.7	64.4	56.7	60.5	6.9	6.0	6.5
2025	68.4	59.8	64.0	63.9	56.4	60.1	6.6	5.7	6.2
2030	67.2	59.2	63.1	62.7	55.8	59.2	6.6	5.7	6.2
2035	66.7	59.1	62.8	62.2	55.7	58.9	6.6	5.7	6.2
2040	66.3	58.7	62.4	61.9	55.3	58.5	6.6	5.7	6.2
2045	66.1	58.3	62.1	61.7	55.0	58.3	6.6	5.7	6.2
2050	65.8	57.9	61.8	61.4	54.6	58.0	6.6	5.7	6.2
2055	65.3	57.5	61.3	61.0	54.2	57.5	6.6	5.7	6.2
2060	64.9	57.1	60.9	60.6	53.8	57.1	6.6	5.7	6.2
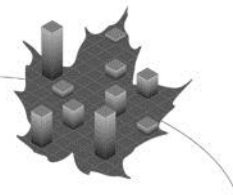
Table 33 Labour Force Participation Rates (Canada)

Age Group	Males				Females			
	2016	2025	2035	2050	2016	2025	2035	2050
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
15-19	49.0	53.0	55.0	55.0	51.8	55.0	58.0	58.0
20-24	77.7	81.0	82.0	82.0	75.6	78.0	80.0	80.0
25-29	89.2	91.0	92.0	92.0	81.1	83.0	86.0	86.0
30-34	92.5	93.0	94.0	94.0	80.6	83.0	85.0	85.0
35-39	92.9	94.0	94.0	94.0	82.2	84.0	86.0	86.0
40-44	92.6	93.0	94.0	94.0	83.6	86.0	87.0	87.0
45-49	91.2	93.0	93.0	93.0	84.2	86.0	87.0	87.0
50-54	88.2	90.0	91.0	91.0	81.8	83.0	85.0	85.0
55-59	79.9	82.0	84.0	84.0	68.9	72.0	75.0	75.0
60-64	60.4	62.0	64.0	64.0	48.4	52.0	54.0	54.0
65-69	32.2	34.0	35.0	35.0	20.4	22.0	23.0	23.0
70 and Over	10.2	11.0	12.0	12.0	4.5	5.5	6.0	6.0
15-69	78.4	79.3	80.9	80.3	70.2	71.5	74.2	73.5
15 and Over	**70.5**	**68.4**	**66.7**	**65.8**	**61.2**	**59.8**	**59.1**	**57.9**

Given that participation rates start to decline mostly after age 50, the aging of the population will exert downward pressure on the overall labour force participation rate in Canada. If current participation rates by age and sex were to apply throughout the projection period, the effect of population aging alone would cause the overall participation rate from Table 32 to fall from 65.8% in 2016 to 58.4% in 2050, instead of 61.8% as projected under the best-estimate assumptions. However, it is expected that a number of factors will contribute toward partially offsetting the decline that results from population aging.

The main assumption underlying the future overall participation rate is a significant increase in participation rates for those aged 55 and over as a result of an expected continued trend toward longer working lives. Government policies aimed at increasing participation rates of older workers, the ability to receive a CPP retirement pension prior to age 65 while remaining in the workforce (since 2012), the increase in life expectancy, and possible insufficient retirement savings are assumed to encourage older workers to delay their retirement and exit the labour force at a later age.

However, despite the assumed future increase in participation rates of older workers and a reliance on skilled immigrant workers, it is still expected that there will be moderate labour shortages in the future as the working-age population expands at a slower pace and as baby boomers retire and exit the labour force. The participation rates for all age groups are expected to increase due to the attractive employment opportunities resulting from labour shortages.

It is also expected that future participation rates will increase with the aging of cohorts that have a stronger labour force attachment compared to previous cohorts. The stronger labour force attachment of later cohorts is attributable to different reasons, including higher attained education. The aging of more educated workers with higher labour force attachment, and the exit from the workforce of less educated older workers is expected to create upward pressure on participation
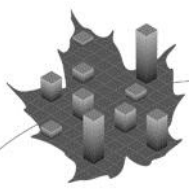
rates. Over the shorter term, the participation rates of younger age groups are assumed to gradually increase to their pre-recession levels. Finally, although historical increases in participation rates for women are not expected to continue in the future, their participation rates are expected to increase faster than the participation rates for men.

Based on the foregoing, the participation rates of both men and women are expected to increase over the projection period from their 2015 levels for all age groups, especially for those aged 55 and over. Nonetheless, these increases in participation rates are not sufficient to offset the decrease in the overall participation rate due to the demographic shift.

For the purpose of projecting the participation rates, the projection period has been divided into three periods: 2016 to 2025, 2025 to 2035, and from 2035 onward. From 2016 to 2025, and from 2025 to 2035, the projected participation rates are based on the expected impact of the above-mentioned factors through time for each age group and sex. From 2035 onward, the participation rates are held constant. This long-term assumption combined with a slow growth in the working-age population, results in a low rate of growth of approximately 0.5% for the Canadian active population (that is, the labour force) after 2035.

2. Employment

In Canada, the average annual job creation rate (i.e. the change in the number of persons employed) has been about 1.6% since 1976. However, this rate has varied over the years. It is assumed that the job creation rate will be 0.6% in 2016 and the unemployment rate 7.1%, based on the most recent experience and various economic forecasts. It is further assumed that over the short term, the job creation rate will be slightly higher than the labour force growth rate, so that the unemployment rate slowly decreases from its 2016 level of 7.1%.

Over the long term, the job creation rate is assumed to be the same as the labour force growth of 0.5%. This is projected to occur since the unemployment rate is not expected to fall below 6.2%, which is in line with various economic forecasts and reflects moderate economic growth. It is assumed that the unemployment rate will be slightly higher than assumed in the 12th OAS Program Actuarial Report, reaching 6.2% by 2025 and remaining at that level thereafter. Table 34 shows the projected number of employed persons, aged 18 to 69, in Canada.
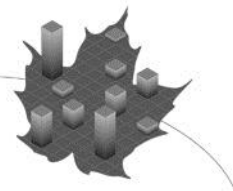
Table 34 Employment of Population (Canada, ages 18 to 69)

Year	Population Males	Females	Employed Males	Females	Employment Rate Males	Females
	(thousands)		(thousands)		(%)	
2016	12,612	12,600	9,115	8,276	72.3	65.7
2017	12,669	12,661	9,198	8,353	72.6	66.0
2018	12,725	12,720	9,261	8,416	72.8	66.2
2019	12,778	12,776	9,321	8,475	72.9	66.3
2020	12,826	12,828	9,378	8,532	73.1	66.5
2021	12,870	12,879	9,433	8,588	73.3	66.7
2022	12,917	12,931	9,486	8,645	73.4	66.9
2025	13,031	13,057	9,632	8,813	73.9	67.5
2030	13,186	13,234	9,812	9,066	74.4	68.5
2035	13,342	13,408	10,068	9,399	75.5	70.1
2040	13,741	13,815	10,358	9,676	75.4	70.0
2045	14,176	14,262	10,642	9,933	75.1	69.6
2050	14,533	14,630	10,862	10,125	74.7	69.2
2055	14,787	14,883	11,027	10,276	74.6	69.0
2060	15,014	15,105	11,204	10,446	74.6	69.2
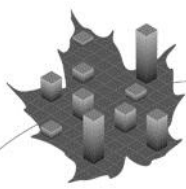
3. Number of Earners

The number of earners for any given year, namely anyone who had employment earnings during the year, is always more than the employed population and sometimes even close to the labour force because it includes all individuals who had earnings at any time during the year, whereas the employed population only indicates the average number of employed in any given year. The projected number of earners is obtained by a regression based on a highly correlated historical relationship between the number of employed persons and the number of earners over the period 1976 to 2013.

C. Annual Increase in Prices (Inflation Rate)

The inflation rate assumption is needed to determine the increase in benefits from one calendar quarter to the next. It is also used in the determination of the annual nominal increase in average employment earnings.

Price increases, as measured by changes in the CPI, tend to fluctuate from year to year. Over the last 50 years, the trend was generally upward through the early 1980s and then downward until the introduction of the inflation-control targets in the early 1990s, at which point inflation began to stabilize. The average annual increases in the CPI over the 50, 20 and 10-year periods ending in 2015 were 4.1%, 1.9% and 1.7%, respectively. In 2011, the Bank of Canada and the Government renewed their commitment to keep inflation between 1% and 3% until the end of 2016. This commitment was renewed again in October 2016 to keep inflation within the same range until the end of 2021.

In Canada, inflation was moderate at 1.1% in 2015. To reflect recent experience and the short-term expectation that inflation will remain subdued in the coming quarters, the price increase assumption is set at 1.6% in 2016. It is expected that the Bank of Canada will maintain its inflation target policy, and as such, the assumption is set at 2.0% for the year 2017 and thereafter. The 2.0% inflation rate corresponds to the average forecast from various economists and falls in the middle of the Bank of Canada control range. It is kept constant for the entire projection period. The 2.0% inflation rate assumption is lower than the assumption of 2.2% used in the 12th OAS Program Actuarial Report but is close to the average level of inflation that has been experienced over the last two decades.

D. Real Wage Increases

The assumed increase in average annual employment earnings (AAE) is used to project the total employment earnings, while the assumed increase in Average Weekly Earnings (AWE) is used to project the increase in the YMPE from one year to the next, which serves to determine the CPP/QPP contributory earnings basis. The difference between real (net of inflation) increases in the AWE and the AAE has been relatively small over the period from 1966 to 2014, that is, an absolute difference of approximately 0.03% per year. For several years in the 1990s this difference was more pronounced; however, the real increases in AAE and AWE have shown a tendency to converge toward each other over time. Taking these factors into consideration, the real increases in AWE and AAE are assumed to be the same for 2017 and thereafter.

The real wage increase has fluctuated significantly from year to year. For example, the ten-year average annual real wage increase, as measured by the difference between the increases in the nominal AWE and the CPI, was 0.1% for the period ending in 2005 and 0.9% for the period ending in 2015. The average annual real wage increase was also 0.9% for the 49-year period ending in 2015.

The real wage increase can also be measured using the difference between the increase in the nominal average wage and the CPI. In this case, the nominal average wage is defined as the ratio of the total nominal earnings to total civilian employment in the Canadian economy as a whole. Historically, the nominal average wage increase has been similar to the nominal AAE increase, and therefore it is assumed that they can be used interchangeably.

The real wage increase is related to the growth in total labour productivity as follows:

Real Wage Increase = Growth in Labour Productivity + Growth in Compensation Ratio + Growth in Earnings Ratio + Growth in Average Hours Worked + Growth in Price Differential.

In addition to the factors included in the above equation, labour demand has a significant impact on real wage increases. Real wages are subject to downward pressure as the demand for workers decreases. On the other hand, one could expect upward pressure on wages if the size of the labour force fails to keep pace with a growing economy.

Labour productivity in the above equation is defined as the ratio of the real GDP to total hours worked in the Canadian economy. The average annual growth in labour productivity was 1.7% for the 53-year period ending in 2014 and 0.9% for the 14-year period ending in 2014. Long-term

productivity is expected to increase as a result of anticipated labour shortages and the government's policies aimed at enhancing productivity growth. At the same time, increasing labour force participation rates of older workers and a reliance on immigration for future labour force growth are expected to moderate the labour shortage and its impact on productivity. Labour productivity growth of 1.2% is assumed for the long term.

The compensation ratio is the ratio of the total compensation received by workers to the nominal GDP. Changes in the compensation ratio reflect the extent to which changes in productivity are shared between labour and capital. The compensation ratio has decreased on average by 0.1% per year for the 53-year period ending in 2014 with a more significant decrease between 1992 and 2000 (an average decrease of 0.8% per year). However, starting in 2000 the compensation ratio stabilized with a negligible average decrease over the period 2000 to 2014. It is assumed that there will be no growth in the compensation ratio over the long term.

The earnings ratio is the ratio of total workers' earnings, defined as the sum of total wages, salary disbursements, and total self-employment earnings, to total compensation. Changes in the earnings ratio reflect changes in the compensation structure offered to employees. The historical decline in the earnings ratio of 0.2% per year from 1961 to 2014 has been primarily due to the faster growth in supplementary labour income, such as employer contributions to pension plans, health benefit plans, the CPP, and the Employment Insurance program, compared to earnings. Given that a significant portion of the historical decrease in the earnings ratio can be explained by the increase in CPP contributions resulting from the increase in the contribution rate from 3.6% in 1986 to 9.9% in 2003, the earnings ratio is not expected to decline as fast as it has in the past. However, as a result of the aging of the population, it is expected that the cost of pension plans and health programs will continue to increase in the future and exert downward pressure on the earnings ratio. Based on the foregoing, it is assumed that the long-term earnings ratio will decline by 0.1% per year.

The average hours worked is defined as the ratio of total hours worked to total employment in the Canadian economy. The average annual growth rate for average hours worked was -0.3% over the 53-year period ending in 2014. The decrease in the average hours worked was significant between 1976 and 1983, with an average annual decrease over that period of 0.7% per year. Despite short-term fluctuations, the average hours worked stabilized after 1983, with an average decrease of 0.1% per year between 1983 and 2014. In the future, the assumed steady increases in productivity and the higher participation rates of older workers, who generally work fewer hours, could continue to apply negative pressure on the average hours worked. However, higher wages due to productivity gains may encourage workers to work longer hours, and the assumed future increases in life expectancy may encourage older workers to work longer hours than in the past. It is assumed that in the long term, the average hours worked will remain at its 2014 level.

Finally, the price differential or "labour's terms of trade" is the ratio of the GDP deflator (defined as the ratio of nominal to real GDP) to the CPI. Including this ratio is necessary because labour productivity is expressed in real terms by using real GDP, while current dollar earnings are converted to real earnings using the CPI. The average annual growth in the price differential was 0.1% between 1961 and 2014. However, during this period, the price differential experienced significant fluctuations. It increased at an average rate of 1.1% per year between 1961 and 1976
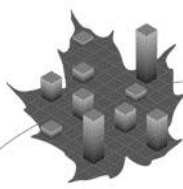
and decreased at an average rate of 0.6% per year between 1976 and 2002. In more recent years, the decline has reversed, such that between 2002 and 2014 the price differential increased by 0.5% per year. This recent trend is due to Canada's improving international terms of trade. However, it is not clear for how long such growth could be sustained. It is assumed that the long-term price differential will remain stable after 2014.

The result of the foregoing discussion is that the assumed real wage increase is 1.1% per year over the long term. Table 35 summarizes the historical information and the assumptions described above.

Table 35 Real Wage Increase and Related Components[1]

	1961-2014 Average	1990-2014 Average	2000-2014 Average	Ultimate Assumption
Labour Productivity Growth	1.7%	1.3%	0.9%	1.2%
+ Compensation Ratio Growth	-0.1%	-0.2%	0.0%	0.0%
+ Earnings Ratio Growth	-0.2%	-0.2%	-0.2%	-0.1%
+ Average Hours Worked Growth	-0.3%	-0.2%	-0.3%	0.0%
+ Price Differential Growth	0.1%	0.1%	0.3%	0.0%
Real Wage Increase	1.2%	0.7%	0.7%	1.1%

(1) Components may not sum to totals due to rounding.

Based on the experience of the first six months of 2016, the real increases in average annual earnings and average weekly earnings are assumed to be 0.2% and -0.5%, respectively for 2016. Thereafter, average annual and weekly earnings are assumed to increase at the same pace, with real wage increases projected to gradually rise to an ultimate value of 1.1% by 2025. This is consistent with the assumed moderate economic growth implicitly reflected in the assumption on the unemployment rate, which is expected to decrease until it reaches its ultimate level of 6.2% in 2025.

Table 36 shows the assumptions regarding the annual increases in prices, real AAE, and real AWE.

Table 36 Inflation, Real AAE and AWE Increases

Year	Price Increases	Real Increases Average Annual Earnings (AAE)	Real Increases Average Weekly Earnings (AWE), (YMPE)
	(%)	(%)	(%)
2016	1.60	0.20	-0.50
2017	2.00	0.60	0.60
2018	2.00	0.70	0.70
2019	2.00	0.80	0.80
2020	2.00	0.90	0.90
2021	2.00	1.00	1.00
2022	2.00	1.03	1.03
2023	2.00	1.05	1.05
2024	2.00	1.08	1.08
2025+	2.00	1.10	1.10

E. Total Employment Earnings

Total employment earnings were obtained by applying the Canada less Québec proportion of earners and average employment earnings (both as determined under the 27th CPP Actuarial Report) to the entire population of Canada. The estimated total employment earnings were compared with historical statistics from Statistics Canada of total employment earnings for Canada. The estimates are on average for 2006 to 2015 about 4.6% lower than the corresponding experience data. For this reason, projected employment earnings for Canada have been multiplied by an experience adjustment factor, which is graded from its 2015 actual-to-expected ratio to the ultimate level over five years. The ultimate factor of 105% corresponds to the actual-to-expected ratio over the most recent ten years.

F. Combined CPP and QPP Contributory Earnings

Combined CPP and QPP contributory earnings[1] were obtained by applying the CPP proportion of contributors and average contributory earnings (both as determined under the 27th CPP Actuarial Report) to the entire population of Canada. Total contributory earnings were then compared to actual combined CPP and QPP contributory earnings for 1966 to 2015. Such validation reveals that, on average, this approach produces combined contributory earnings about 1% higher than the actual figures. For this reason, projected contributory earnings for Canada have been multiplied by an experience adjustment factor, which is graded from the 2015 actual-to-expected ratio to the ultimate level over five years. The ultimate factor of 99% corresponds to the actual-to-expected ratio over the most recent ten years.
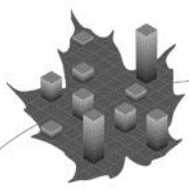
G. Gross Domestic Product

The GDP is perhaps the most suitable basis for a comparison of costs since benefits are financed through general revenues and not on the basis of employment earnings. Historical GDP was compared to historical total employment earnings from 1966 to 2015 and was found to be about 2.1 times as much. For this reason, GDP was projected as total employment earnings multiplied by an experience adjustment factor and further adjusted by a price differential. Including a price differential is necessary because total earnings are expressed in nominal terms by using the CPI, while the nominal GDP is expressed in terms of the GDP deflator. For this report, as described in section D above, the price differential is assumed to be 0%. An experience adjustment factor of 2.3 that is equal to the average ratio of GDP to total employment earnings over the most recent five years is assumed for 2017 and thereafter, and the price differential is assumed to be equal to 0% per year.

IV. Recipient Rates and Distribution by Level of Benefit

The recipient rate for an OAS program benefit refers to the proportion of the Canadian population that has received, receives, or is projected to receive that benefit. Since benefits are computed for age-sex cohorts as opposed to individuals, recipient rates by age, sex, type and level of benefit are required. Data from Service Canada for each type of benefit consist of the number of beneficiaries as at June of each year (1983 to 2016) by sex, age, and six levels of benefit as a percentage of the maximum benefit (0-19%, 20-39%, 40-59%, 60-79%, 80-99%, and 100% and over). The highest level of benefit (100% of the maximum and over) includes those GIS beneficiaries with partial OAS pensions, who consequently see their supplement increased by the difference between the

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[1] For the CPP, contributory earnings are of the Base CPP only, i.e., excludes Additional CPP contributory earnings above the Year's Maximum Pensionable Earnings (YMPE) starting in 2024.

maximum OAS pension payable and the partial pension. The additional amount may result in the supplement exceeding the maximum GIS payable.

Service Canada also provided statistics on beneficiaries as at 31 December for each year from 2001 to 2015 and as at 31 July for 2016. The actual recipient rates in each of the cells described above are obtained by dividing the number of beneficiaries in each cell by the relevant population of Canada. The data include benefits paid outside Canada.

A. OAS Basic Pension

The historical recipient rates of sex-distinct cohorts for the basic pension were studied to determine the best-estimate assumption. The ultimate OAS basic pension recipient rates are set equal to the projected recipient rates for the cohort reaching age 65 in 2016. The assumed evolution of recipient rates from age 65 to ages 90 and over for the cohort aged 65 in 2016 is based on historical trends in the increase in recipient rates from one age to the next as observed for cohorts that have reached age 65 prior to 2016. Each cohort reaching age 65 after 2016 is assumed to experience the same recipient rates by age as those assumed for the cohort aged 65 in 2016.

Recipient rates for cohorts aged 66 and over in 2016 are projected from their 2015-smoothed values up to ages 90 and over using age-to-age increases based on the experience over the last five years. This approach is applied to both domestic and international recipient rates separately and produces basic pension recipient rates that increase from one age to the next for any of the given cohorts.

To project the effect of voluntary deferrals, it is assumed that the recipient rates at age 65 decrease by 10 and 7 percentage points for males and females respectively. The decrease at age 65 is then subsequently recovered gradually over the next five years of age (66 to 70) for males and the next three years of age (66 to 68) for females. It is assumed that only those individuals with sufficient income, and who would thus not qualify for the GIS, would consider deferring their pensions.

The basic pension recipient rates for cohorts reaching age 65 in 2016 and thereafter are assumed to increase from 80.8% at age 65 to 101.7% at ages 90 and over for males and from 85.8% at age 65 to 100.9% at ages 90 and over for females. It is worth noting that basic pension recipient rates include benefits paid outside Canada under international social security agreements, and as such, can exceed 100%. For example, the recipient rates for the basic pension paid outside Canada were about 1.9% for males and 1.3% for females in 2016. These percentages are expected to slightly increase over the projection period. Table 37 presents the projected OAS basic pension recipient rates by age and sex for cohorts reaching age 65 in 2016 and thereafter.

Table 37   OAS Basic Pension Recipient Rates by Age (%)[1]

Age	Cohort Reaching Age 65 in 2016 and Thereafter	
	Males	**Females**
65	80.8	85.8
66	89.4	94.3
67	91.9	96.2
68	94.8	97.7
69	97.3	98.1
70	98.7	98.5
75	100.0	99.8
80	100.9	100.4
85	101.4	100.6
90+	101.7	100.9

(1) Recipient rates for the OAS basic pension are on a gross basis, that is, before application of the OAS Recovery Tax. The recipient rates shown include benefits paid outside Canada and for this reason can exceed 100%. The recipient rates shown also account for voluntary deferrals, effective 1 July 2013.

The basic pension recipient rates by age and sex were further broken down by level of benefit using distributions of recipient rates by level of benefit, expressed as a percentage of the maximum benefit (based on the number of years of residence in Canada). The historical distributions by level of benefit were derived from OAS beneficiary data as at 31 December of each year over the period 2007 to 2015.

The distribution by level of benefit at age 65 is projected from its actual value in 2015 to the year 2017 using historical trends by years of residence over the period 2007 to 2015. The projected distribution takes into account the introduction of partial benefits in 1977, which will have full effect in 2017. The age 65 distribution projected to 2017 is assumed to apply thereafter.

For any given cohort reaching age 65 on or after 2017, the distributions by level of benefit for ages 66 and over are projected based on historical data that reveal that, for any given cohort, there is a large proportion of beneficiaries coming into pay who have only a small number of years of residence and thus receive partial benefits. As a result, as a cohort progresses in age, the proportion of beneficiaries receiving a full pension is assumed to decrease while the proportion of beneficiaries receiving a partial benefit is assumed to increase. Finally, the distributions for cohorts aged 66 and over in 2016 are linearly interpolated from their actual values in 2015 to their ultimate values. Table 38 shows the evolution of male and female basic pension recipient rates by age and level of benefit.
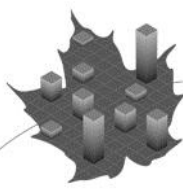
Table 38   OAS Basic Pension Recipient Rates by Age, Sex, and Level of Benefit (%)[1]

	Cohort Reaching Age 65 in								
	2016			2030			2060		
	Level of Benefit			Level of Benefit			Level of Benefit		
Age	Partial	Full	Total	Partial	Full	Total	Partial	Full	Total
Males									
65	6.5	74.3	80.8	6.7	74.1	80.8	6.7	74.1	80.8
66	9.3	80.1	89.4	9.4	80.0	89.4	9.4	80.0	89.4
67	10.3	81.6	91.9	10.5	81.4	91.9	10.5	81.4	91.9
68	10.9	83.9	94.8	11.3	83.5	94.8	11.3	83.5	94.8
69	11.7	85.6	97.3	12.0	85.3	97.3	12.0	85.3	97.3
70	12.2	86.5	98.7	12.6	86.1	98.7	12.6	86.1	98.7
75	14.3	85.7	100.0	14.7	85.3	100.0	14.7	85.3	100.0
80	15.9	85.0	100.9	16.2	84.7	100.9	16.2	84.7	100.9
85	17.3	84.1	101.4	17.6	83.8	101.4	17.6	83.8	101.4
90+	19.4	82.3	101.7	18.7	83.0	101.7	18.7	83.0	101.7
All Ages	14.3	84.0	98.3	14.6	83.8	98.4	14.8	83.8	98.6
Females									
65	7.2	78.6	85.8	7.5	78.3	85.8	7.5	78.3	85.8
66	10.1	84.2	94.3	10.2	84.1	94.3	10.2	84.1	94.3
67	11.0	85.2	96.2	11.2	85.0	96.2	11.2	85.0	96.2
68	11.5	86.3	97.7	11.8	85.9	97.7	11.8	85.9	97.7
69	12.0	86.1	98.1	12.3	85.8	98.1	12.3	85.8	98.1
70	12.3	86.2	98.5	12.8	85.7	98.5	12.8	85.7	98.5
75	14.1	85.7	99.8	14.4	85.4	99.8	14.4	85.4	99.8
80	15.2	85.2	100.4	15.5	84.9	100.4	15.5	84.9	100.4
85	15.9	84.7	100.6	16.1	84.5	100.6	16.1	84.5	100.6
90+	17.0	83.9	100.9	16.1	84.8	100.9	16.1	84.8	100.9
All Ages	14.0	84.9	99.0	14.3	84.8	99.0	14.3	84.8	99.1

(1) Recipient rates for the OAS basic pension are on a gross basis, that is, before application of the OAS Recovery Tax.
The recipient rates shown include benefits paid outside Canada and for this reason can exceed 100%. The recipient rates
shown also account for voluntary deferrals, effective 1 July 2013.

The OAS Recovery Tax reduces the amount of the basic pension payable for high-income pensioners (see section III of Appendix B) through a repayment amount. The projected Recovery Tax amounts and number of beneficiaries affected by it presented in this report reflect that various factors may have an impact. These include: pension income splitting, TFSA utilization, and future sources of additional income such as the new Additional CPP benefits, which will start being payable in 2019.

The projections included in the 28th CPP Actuarial Report as well as micro-modelling based on OAS program beneficiaries data as of July 2016, provided by Service Canada, have been used to estimate the projected impact of Additional CPP benefits on the Recovery Tax. [1] Given the absence of experience data for the Additional CPP and limited data regarding the TFSAs (introduced in 2009), the results presented in Tables 39 and 40 should be interpreted with caution.

[1] The OAS program beneficiaries and benefits payable as at July 2016 were projected through the year 2060 by assuming that CPP income would grow in line with wages, while other than CPP income would grow at a rate halfway between inflation (changes in the CPI) and wage growth. The income limits for the Recovery Tax are assumed to grow in line with inflation. For each projection year, CPP income is then increased to reflect the projected Additional CPP benefits (based on the 28th CPP Actuarial Report). The projected number of beneficiaries is next adjusted to account for population aging between 2016 and the given projected year, and the impact of the Recovery Tax is reevaluated.

Over time it is expected that these estimates will be further improved upon as data become available.

For the year 2013, the number of beneficiaries who are fully or partially affected by the OAS Recovery Tax were estimated from Service Canada and Canada Revenue Agency (CRA) data. The proportions of beneficiaries affected (fully or partially) by the Recovery Tax in 2014 and thereafter were projected by assuming that initial retirement income will increase in line with wage growth, while the Recovery Tax income limits increase in line with inflation. To simulate this, a formula was developed that is a function of each cohort's average career employment earnings (over the ages of 18 to 65) and the inflation rate. The link with inflation is required since the income limit above which the Recovery Tax applies has moved in line with inflation since the year 2001.

Table 39 presents the projected number and percentage of OAS beneficiaries affected by the Recovery Tax. The percentage of beneficiaries affected by the OAS Recovery Tax is projected to increase from 6.9% in 2016 (2.2% full and 4.7% partial) to 9.0% (2.7% full and 6.3% partial) by 2060.

As shown in Chart 10, over the short term the effect of Additional CPP benefits on the number of recipients affected by the Recovery Tax is expected to be small given that Additional CPP benefits will only start in 2019. However, it is expected that as an increasing number of individuals receive Additional CPP benefits over time, the impact of the Additional CPP benefits will increase. It is estimated that Additional CPP benefits will increase the number of recipients affected by the Recovery Tax by 13,000 (i.e. from 710,000 to 723,000) or 1.8% in 2040 and by 76,000 (from 1,069,000 to 1,145,000) or 7.1% in 2060. In 2060, due to Additional CPP benefits, the number of individuals subject to a full repayment of their pensions is projected to increase by 18,000 (i.e. from 324,000 to 342,000) or 5.6% and the number of individuals subject to a partial repayment is projected to increase by 58,000 (from 745,000 to 803,000) or 7.8%.

Table 39   OAS Beneficiaries Affected by the OAS Recovery Tax

	Full Repayment of OAS Pension		Partial Repayment of OAS Pension		Total		
Year	Number	% All OAS Beneficiaries	Number	% All OAS Beneficiaries	Number[1]	% All OAS Beneficiaries	All OAS Beneficiaries
	(thousands)	(%)	(thousands)	(%)	(thousands)	(%)	(thousands)
2016	127	2.2	270	4.7	397	6.9	5,761
2017	132	2.2	280	4.7	412	6.9	5,971
2018	137	2.2	291	4.7	428	6.9	6,194
2019	143	2.2	302	4.7	445	6.9	6,432
2020	149	2.2	314	4.7	463	6.9	6,683
2021	155	2.2	326	4.7	481	6.9	6,936
2022	161	2.2	338	4.7	498	6.9	7,197
2025	178	2.2	372	4.6	550	6.9	8,001
2030	206	2.2	422	4.5	627	6.8	9,283
2035	223	2.2	451	4.5	674	6.7	10,079
2040	235	2.2	488	4.6	723	6.8	10,602
2045	255	2.3	547	5.0	802	7.3	11,032
2050	277	2.4	620	5.4	897	7.8	11,522
2055	302	2.5	702	5.8	1,005	8.3	12,061
2060	342	2.7	803	6.3	1,145	9.0	12,724

(1)   Components may not sum to totals due to rounding.
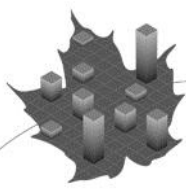
**Chart 10   Impact of Additional CPP on OAS Beneficiaries Affected by Recovery Tax
(number in 000s and % affected)**
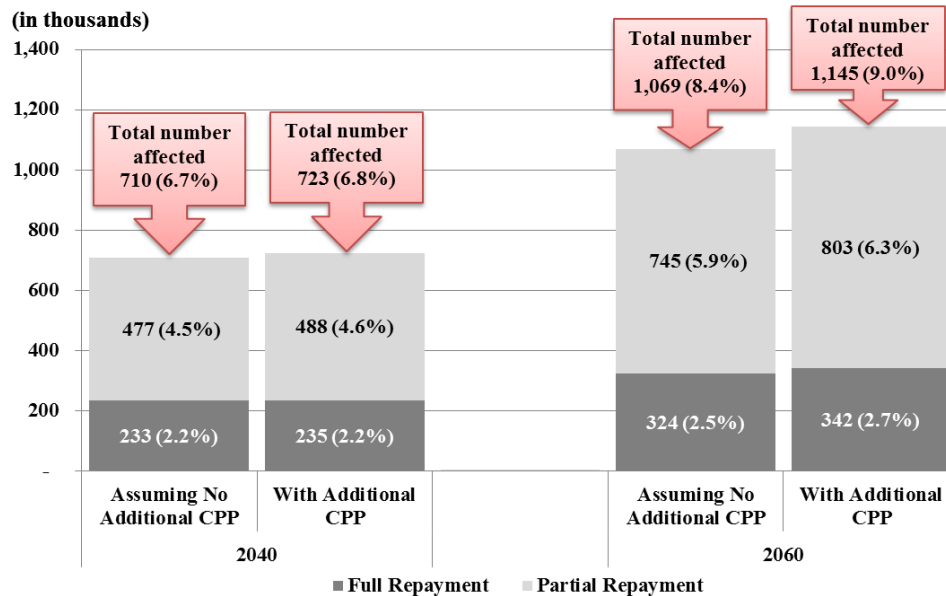
To estimate the total repayment amount due to the Recovery Tax, the number of beneficiaries affected by a full repayment of their pensions was further broken down between beneficiaries receiving a full basic pension (96.7%) and those receiving a partial basic pension (3.3%). This was also done for beneficiaries affected by a partial repayment and, in this case, 98.1% of beneficiaries receive a full basic pension while 1.9% of beneficiaries receive a partial basic pension.

The impact of the OAS Recovery Tax on total benefits payable is obtained using the projected number of beneficiaries who are affected and the assumed reduction in their average benefit (100% reduction for those with a full repayment and a 33.3% reduction in benefit for those with a partial repayment). It is estimated that, in 2016, the Recovery Tax will have the effect of reducing the total amount of basic pensions payable by about $1.5 billion or 4.0%. Table 40 presents the projected repayment amounts.

As shown in Chart 11, over the short term the effect of Additional CPP benefits on the repayment amounts is expected to be small given that Additional CPP benefits will only start being payable in 2019. As an increasing number of individuals receive Additional CPP benefits over time, the projected impact of the Additional CPP benefits on repayment amounts will likewise increase. In 2040, Additional CPP benefits are expected to increase the amount of the Recovery Tax by $60 million (i.e. from $4.4 billion to $4.46 billion) or a 1.4% increase. In 2060, Additional CPP benefits are expected to increase the amount of the Recovery Tax by $740 million (from $9.53 billion to $10.27 billion) or 7.8%. In 2060, due to Additional CPP benefits, the amount of full repayments of the basic pension is projected to increase by $320 million (from $5.28 billion to $5.6 billion) or 6.1% and the amount of partial repayments is projected to increase by $420 million (from $4.25 billion to $4.67 billion) or 9.9%.
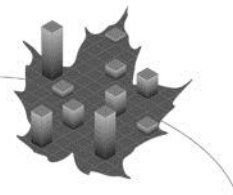
Table 40   Financial Impact of OAS Recovery Tax

Year	Repayment for Those Subject to Full Repayments		Repayment for Those Subject to Partial Repayments		Total Repayment	
	Amount ($ million)	% of Total OAS Pensions	Amount ($ million)	% of Total OAS Pensions	Amount[1] ($ million)	% of Total OAS Pensions
2016	865	2.3	648	1.7	1,513	4.0
2017	916	2.3	685	1.7	1,600	4.0
2018	972	2.3	725	1.7	1,696	4.0
2019	1,033	2.3	769	1.7	1,802	4.0
2020	1,098	2.3	815	1.7	1,914	4.0
2021	1,164	2.3	863	1.7	2,026	4.0
2022	1,233	2.3	911	1.7	2,144	4.0
2025	1,453	2.3	1,065	1.7	2,518	4.0
2030	1,853	2.3	1,333	1.7	3,186	4.0
2035	2,219	2.3	1,576	1.6	3,794	3.9
2040	2,576	2.3	1,884	1.7	4,460	4.0
2045	3,089	2.4	2,345	1.8	5,434	4.2
2050	3,715	2.5	2,950	2.0	6,666	4.5
2055	4,478	2.6	3,697	2.2	8,175	4.8
2060	5,601	2.8	4,674	2.4	10,276	5.2

(1)   Components may not sum to totals due to rounding.

Chart 11   Impact of Additional CPP on Amount of OAS Recovery Tax (amounts and % of total pensions payable)
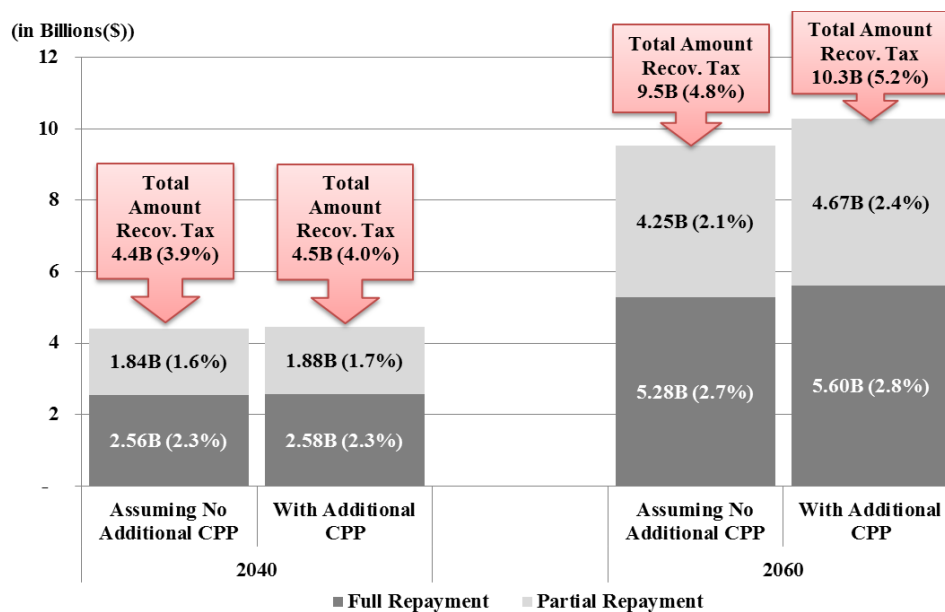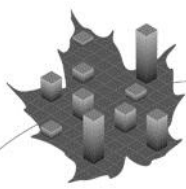
B. GIS and Allowance

The actual recipient rates as at July 2016 for the GIS and Allowance benefits for each age, sex, type and level of benefit are used as the starting point for determining the best-estimate assumptions.

The formulas used in the projection of the GIS and Allowance recipient rates take into account the assumption that, for each cohort of individuals who may become eligible for these benefits, the initial retirement income will consist mainly of CPP benefit (including Additional CPP benefits starting in 2019) and QPP benefits that reflect increases in line with wage growth prior to retirement. At the same time, it is assumed that the income limits for the GIS and Allowance will have increased in line with inflation prior to retirement. Together this would lead to a smaller percentage of individuals expected to become GIS or Allowance beneficiaries over the projection period. However, this decline in eligibility is slightly offset by the projected effect of TFSAs over time; that is, the projections also take into account that TFSA-related income is excluded from the determination of GIS and Allowance benefits, which leads to an increase in both the number of GIS and Allowance beneficiaries and amount of benefits.

For this report, experience adjustment factors were developed to adjust the projection formula so that characteristics and trends of historical recipient rates by age, sex, type and level of benefit observed over the last ten years would be reproduced more closely, while simultaneously incorporating the assumed future impacts of Additional CPP benefits and TFSAs. The factors were used for the first five years of the projection period. Given the additive nature of the experience adjustment factors, minimum values of recipient rates were set in order to eliminate the possibility of negative recipient rates. Minimum recipient rates were set by type of benefit in relation to the lowest prevailing recipient rates in the year 2016 at the benefit level category for a given type of benefit.

The changes in the assumed distributions by level of benefit are also automatically taken into account by the formulas as are the increasing patterns of recipient rates by age. Table 41 presents the projected GIS and Allowance recipient rates for cohorts reaching the ages 60 and 65 by age, sex, type and level of benefit, while Charts 12 through 15 present the recipient rates by year of birth.
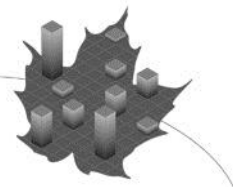
Table 41   GIS and Allowance Recipient Rates (%)[1]

	Cohort Reaching Age 65 in								
	2016			2030			2060		
	Level of Benefit:			Level of Benefit:			Level of Benefit:		
Age	Partial	Full	Total	Partial	Full	Total	Partial	Full	Total
GIS – Males									
65	9.0	2.9	11.9	10.6	3.2	13.8	7.9	2.7	10.6
70	20.6	4.8	25.3	18.9	4.5	23.4	13.9	3.7	17.6
75	24.1	5.0	29.1	22.0	4.5	26.5	16.1	3.7	19.7
80	25.3	4.7	30.0	22.5	4.2	26.7	16.4	3.3	19.7
85	24.8	4.3	29.1	22.1	3.8	25.9	16.2	2.9	19.0
90+	23.8	4.0	27.8	21.5	3.5	25.0	14.6	2.6	17.2
All Ages	**22.2**	**4.6**	**26.7**	**20.3**	**4.1**	**24.4**	**14.8**	**3.3**	**18.1**
GIS - Females									
65	12.6	3.5	16.1	10.2	2.9	13.1	7.5	2.4	9.9
70	22.8	5.1	27.9	21.2	4.7	25.9	15.5	3.9	19.4
75	30.3	6.9	37.2	28.0	6.3	34.3	20.6	5.1	25.7
80	35.6	8.0	43.6	32.0	7.2	39.3	23.7	5.8	29.5
85	39.5	8.1	47.7	35.5	7.3	42.8	26.8	5.8	32.6
90+	45.8	7.9	53.7	41.1	7.1	48.2	30.2	5.7	36.0
All Ages	**31.7**	**6.7**	**38.4**	**29.0**	**6.1**	**35.1**	**21.9**	**5.0**	**26.9**
	Cohort Reaching Age 60 in								
	2016			2030			2060		
	Level of Benefit:			Level of Benefit:			Level of Benefit:		
Age	Partial	Full	Total	Partial	Full	Total	Partial	Full	Total
Allowance – Males									
60	0.3	0.0	0.3	0.3	0.0	0.3	0.2	0.0	0.3
61	0.5	0.0	0.5	0.5	0.0	0.5	0.4	0.0	0.4
62	0.8	0.0	0.8	0.8	0.0	0.9	0.6	0.0	0.7
63	1.0	0.1	1.0	1.0	0.0	1.1	0.8	0.0	0.9
64	1.3	0.1	1.4	1.5	0.1	1.6	1.2	0.0	1.3
All Ages	**0.8**	**0.0**	**0.8**	**0.8**	**0.0**	**0.9**	**0.7**	**0.0**	**0.7**
Allowance - Females									
60	2.1	0.1	2.2	1.6	0.1	1.7	1.3	0.1	1.4
61	3.8	0.2	4.0	3.6	0.2	3.8	3.0	0.1	3.1
62	4.9	0.3	5.2	5.1	0.2	5.4	4.2	0.2	4.4
63	6.1	0.4	6.5	6.9	0.3	7.2	5.8	0.2	6.1
64	7.7	0.4	8.1	8.9	0.4	9.2	7.4	0.3	7.7
All Ages	**4.9**	**0.3**	**5.2**	**5.2**	**0.2**	**5.5**	**4.3**	**0.2**	**4.5**

(1)   The GIS and Allowance recipient rates shown account for the Additional CPP and TFSAs.

Chart 12   GIS Single Recipient Rates (Males)

Legend: Born 1940 — Born 1955 — Born 1970 — Born 1985
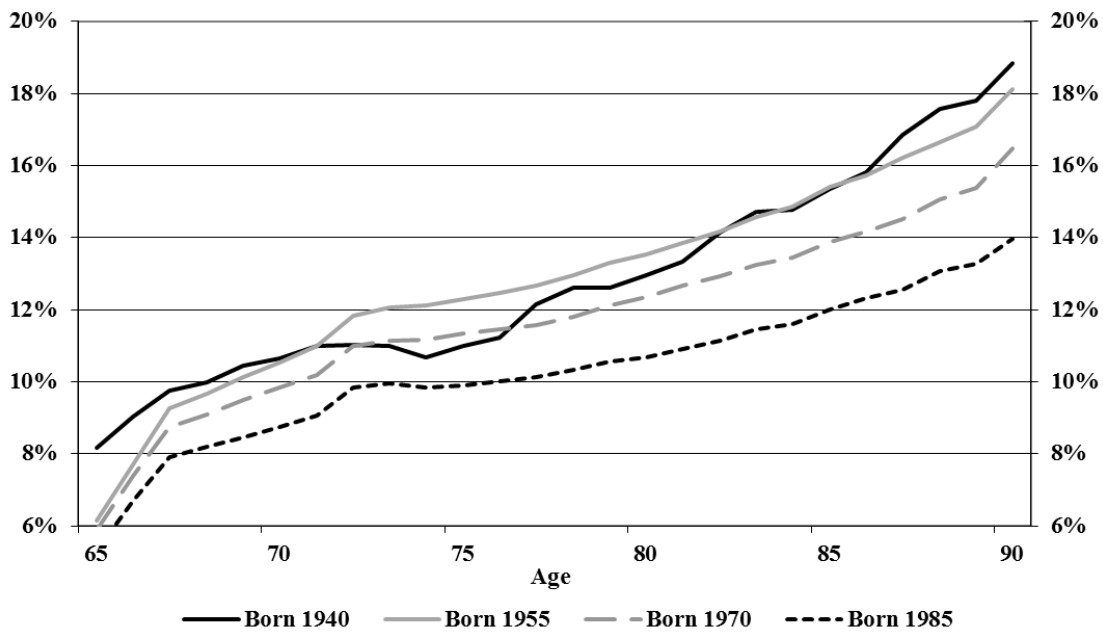
Chart 13   GIS Single Recipient Rates (Females)

Legend: Born 1940 — Born 1955 — Born 1970 — Born 1985
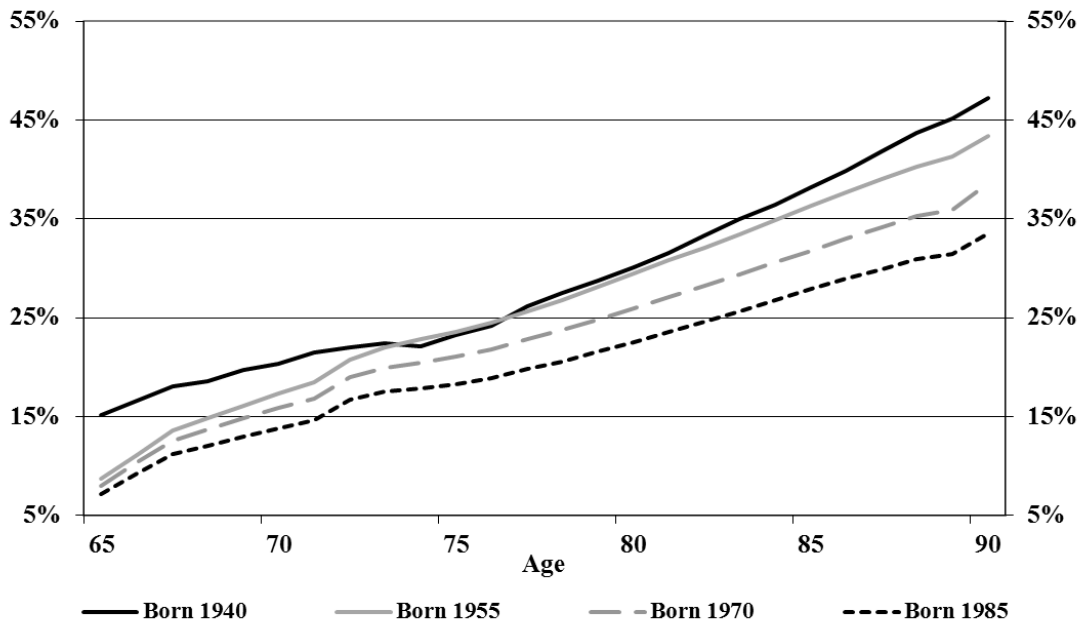
Chart 14   Allowance Recipient Rates (Males)

Born 1940   Born 1955   Born 1970   Born 1985
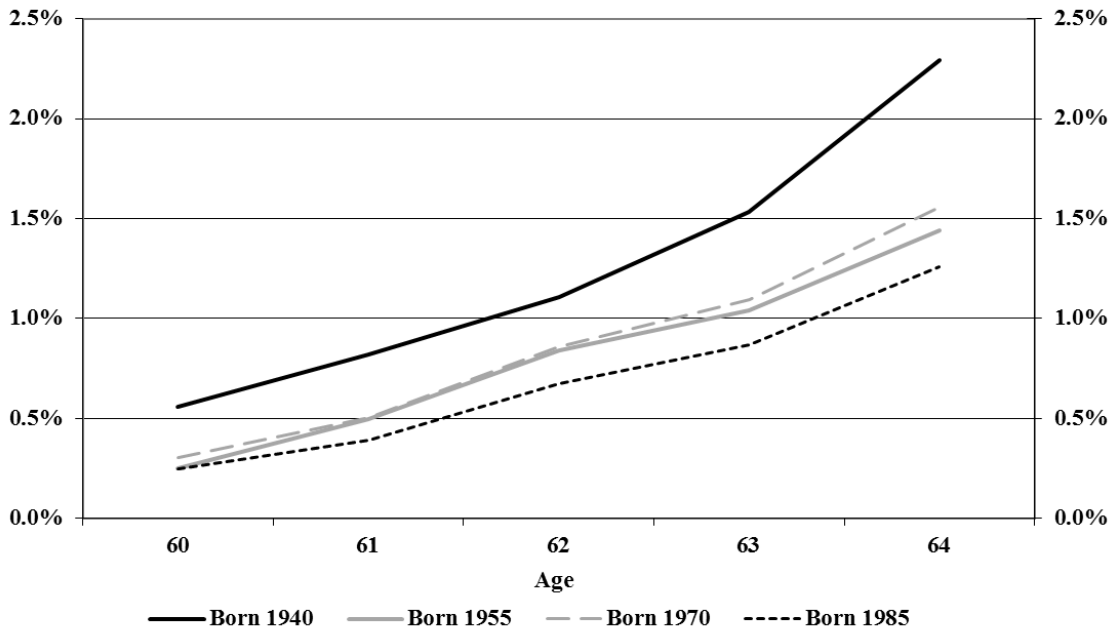
Chart 15   Allowance Recipient Rates (Females)
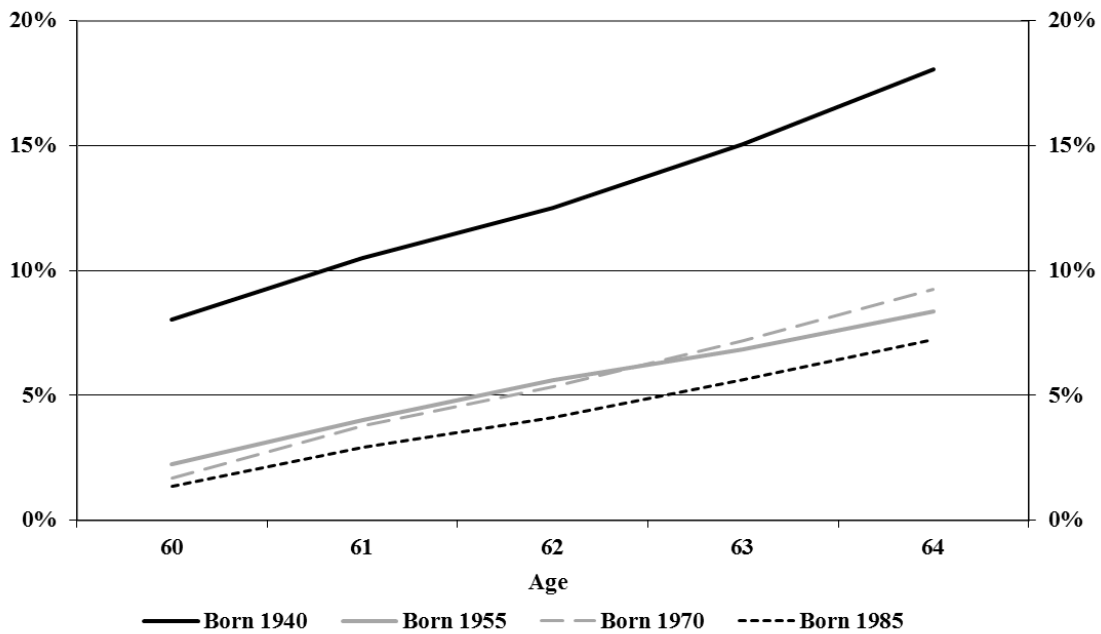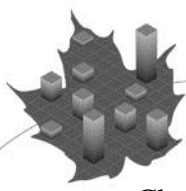
Born 1940   Born 1955   Born 1970   Born 1985

Chart 16 and Table 42 show the impact of the Additional CPP on GIS benefits. Given that the Additional CPP will only begin in 2019,[1] the results presented should be interpreted with caution. Over time it is expected that these estimates will be further improved upon as Additional CPP data become available. Over the near term, the effect of Additional CPP benefits on the GIS recipient rates is expected to be small, since Additional CPP benefits will only start being payable in 2019. However, it is expected that as an increasing number of individuals receive Additional CPP benefits over time, the impact on GIS recipient rates will likewise increase.

In 2040, Additional CPP benefits are estimated to decrease the projected overall GIS recipient rate by 0.2 percentage points (pp) (from 25.2% to 25.0%, a relative decrease of 0.8%) for males and by 0.3 pp for females (from 35.9% to 35.6%, a relative decrease of 0.8%). By 2060, the projected decrease in the overall GIS recipient rate is 1.4 pp (from 21.9% to 20.5%, a relative decrease of 6.4%) for males and 2.2 pp for females (from 31.8% to 29.6%, a relative decrease of 6.9%). Although not shown, slightly lower reductions (5.2%) are projected for the overall Allowance recipient rate.

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[1] The OAS program beneficiaries and benefits payable as at July 2016 were projected through the year 2060 by assuming that CPP income would grow in line with wages, while other than CPP income would grow at a rate halfway between inflation (changes in the CPI) and wage growth. The income limits for the GIS and Allowance benefits are assumed to grow in line with inflation. For each projection year, CPP income is then increased to reflect the projected Additional CPP benefits (based on the 28th CPP Actuarial Report). The projected number of beneficiaries is next adjusted to account for population aging between 2016 and the given projected year, and the GIS and Allowance benefits are reevaluated.
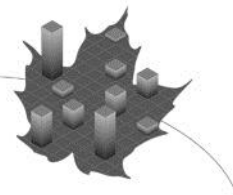
Chart 16 Impact of Additional CPP on GIS Recipient Rates by Level of Benefit

Males

Total GIS Recip. Rate 25.2%
Total GIS Recip. Rate 25.0%
Total GIS Recip. Rate 21.9%
Total GIS Recip. Rate 20.5%

	Assuming No Additional CPP	With Additional CPP		Assuming No Additional CPP	With Additional CPP
Partial GIS	4.3%	4.3%		3.7%	3.7%
Full GIS	20.9%	20.7%		18.2%	16.8%
	2040			2060	

■ Full GIS   ■ Partial GIS

Females

Total GIS Recip. Rate 35.9%
Total GIS Recip. Rate 35.6%
Total GIS Recip. Rate 31.8%
Total GIS Recip. Rate 29.6%

	Assuming No Additional CPP	With Additional CPP		Assuming No Additional CPP	With Additional CPP
Partial GIS	6.3%	6.3%		5.4%	5.4%
Full GIS	29.7%	29.4%		26.4%	24.2%
	2040			2060	

■ Full GIS   ■ Partial GIS

Over the short term, the effect of Additional CPP benefits on GIS benefits is expected to be small given that the Additional CPP benefits will only start in 2019. However, as shown in Table 42, as more individual receive Additional CPP benefits over time, the projected impact on GIS benefits will likewise increase. In 2040, Additional CPP benefits are estimated to decrease the amount of GIS benefits by $371 million (from $31.3 billion to $30.9 billion, a decrease of 1.2%). By 2060, GIS benefits are projected to be $3.0 billion lower (from $49.0 billion to $46.0 billion, a decrease of 6.2%). Although not shown, slightly lower reductions (5.8%) are projected for the overall Allowance benefits.

Table 42   Impact of Additional CPP on GIS Expenditures

Year	Number of GIS beneficiaries (thousands)		Change		GIS Expenditures ($ billlion)		Change	
	Assuming No Additional CPP	With Additional CPP	(thousands)	(%)	Assuming No Additional CPP	With Additional CPP	($ billion)	(%)
2030	2,994	2,991	-3	-0.1%	22.9	22.9	0.0	-0.2%
2040	3,365	3,336	-29	-0.9%	31.3	30.9	-0.4	-1.2%
2050	3,450	3,344	-105	-3.0%	39.1	37.8	-1.3	-3.3%
2060	3,555	3,312	-243	-6.8%	49.0	46.0	-3.0	-6.2%

C. Average Benefits in Relation to Maximum Benefits

For each cell, determined by age, sex, type and level of benefit, the average benefit paid was compared to the maximum benefit rate over the past five years ending in 2016. Except for the "Full" (100% and over) category for the GIS shown in Table 44, it is assumed that these averages relative to the corresponding maximum benefits will remain constant in future years in accordance with their average levels over the most recent five-year period and in the absence of TFSAs and voluntary deferrals of the basic pension. With the assumed effects of TFSAs and voluntary deferrals, the aforementioned averages increase over time. The projected maximum benefits by type are presented in Table 43, and the assumed average benefits as a percentage of their maximum amounts by level (partial, full, and overall average level of benefit) and type are presented in Table 44.

For the GIS, it is possible for a beneficiary to receive more than 100% of the maximum benefit if he or she is receiving a partial OAS basic pension. In these cases, the maximum GIS benefit is increased by the difference between the full and partial basic pension. For this purpose, it is assumed that the average benefit as a percentage of the maximum will be kept at the 2012-2016 levels throughout the projection period.
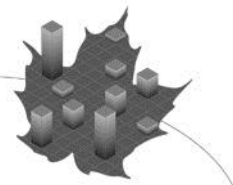
Table 43   Projected Maximum Monthly Benefits

Year	OAS [1]	GIS[2]		Allowance[2]	
		Single	Married	Regular	Survivor
(1 July)	($)	($)	($)	($)	($)
2016	573.37	856.39	515.53	1,088.90	1,297.99
2017	584.08	872.39	525.16	1,109.24	1,322.23
2018	595.76	889.83	535.66	1,131.42	1,348.68
2019	607.68	907.63	546.38	1,154.05	1,375.65
2020	619.83	925.78	557.30	1,177.13	1,403.17
2021	632.23	944.30	568.45	1,200.68	1,431.23
2022	644.87	963.18	579.82	1,224.69	1,459.85
2025	684.34	1,022.14	615.31	1,299.65	1,549.21
2030	755.57	1,128.52	679.35	1,434.92	1,710.45
2035	834.21	1,245.98	750.06	1,584.27	1,888.48
2040	921.03	1,375.66	828.12	1,749.16	2,085.03
2045	1,016.90	1,518.85	914.31	1,931.21	2,302.04
2050	1,122.74	1,676.93	1,009.48	2,132.21	2,541.64
2055	1,239.59	1,851.46	1,114.54	2,354.14	2,806.18
2060	1,368.61	2,044.17	1,230.55	2,599.16	3,098.25

(1)   The maximum benefits shown for the OAS basic pension are for age 65.
(2)   The GIS and Allowance maximum benefits shown account for the top-ups.

Table 44   Average Benefits as Percentage of Maximum Rates

	Males					
	2016			2060		
	Level of Benefit:			Level of Benefit:		
	Partial	Full[1]	All	Partial	Full[1]	All
OAS	44.6	100.0	95.4	54.8	100.7	95.1
GIS-Single	54.7	126.8	64.5	51.9	127.2	61.5
GIS-Spouse a pensioner	41.9	164.1	66.1	39.8	159.8	64.9
GIS-Spouse not a pensioner	46.4	112.0	61.1	45.7	114.1	60.1
GIS-Spouse with Allowance	59.1	131.0	89.2	60.0	129.1	92.5
Allowance-Regular	43.2	100.0	45.8	43.7	100.0	46.6
Allowance-Survivor	51.2	100.0	58.4	37.8	100.0	45.6
	Females					
	2016			2060		
	Level of Benefit:			Level of Benefit:		
	Partial	Full[1]	All	Partial	Full[1]	All
OAS	42.1	100.0	95.3	54.2	100.4	95.0
GIS-Single	54.0	133.4	68.2	49.8	132.8	64.1
GIS-Spouse a pensioner	42.7	157.0	64.9	39.9	161.9	65.5
GIS-Spouse not a pensioner	69.0	114.4	78.5	65.3	110.6	74.2
GIS-Spouse with Allowance	58.3	122.5	83.2	57.0	119.8	82.3
Allowance-Regular	44.5	100.0	46.8	47.0	100.0	49.2
Allowance-Survivor	53.0	100.0	59.4	36.0	100.0	42.8

(1)   The percentages of maximum rates are calculated using the maximum rates at age 65 for the OAS basic pension and GIS and age 60 for the Allowance, and for the OAS basic pension can exceed 100% due to individuals delaying their benefit to receive an actuarially-adjusted higher pension. The proportion exceeds 100% for GIS benefits, because the GIS maximum is raised for individuals receiving a partial OAS pension to the extent that such pension falls short of a full OAS pension.
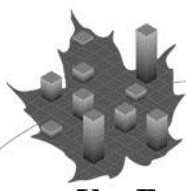
V. Expenditures

A. Benefits

The expenditure for each year for a given type of benefit was computed as the sum, over all relevant population cells, of the product of:

- the population as at 1 July (by age and sex);

- the recipient rates (that vary by type of benefit, level of benefit, age, sex, and calendar year);

- the average benefit of those in the level-of-benefit cell as a percentage of the maximum benefit (varies by type of benefit, age, sex, and calendar year); and

- 12 times the maximum benefit as at 1 July.

As part of the methodology validation process, the number of beneficiaries and amounts of total annual benefits computed as above were compared to the actual results for 1983 through 2015 by type of benefit. Based on these comparisons, adjustments were made to the projected results, as described below.

The numbers of beneficiaries projected as described above were multiplied by experience adjustment factors. Furthermore, after adjusting the projected numbers of beneficiaries, the calculated total annual benefits tended to be lower than the actual benefits. Therefore, the projected amounts of benefits were also multiplied by experience adjustment factors.

The resulting experience adjustment factors by type of benefit are presented in Table 45 and correspond to the ratio required to reflect as closely as possible actual results for 2016. Detailed tables for the projected number of beneficiaries and total expenditures by sex, type and level of benefit are presented in Appendix E.

Table 45   Experience Adjustment Factors

		GIS				Allowance	
	OAS	Single	Spouse a Pensioner	Spouse not a Pensioner	Spouse has Allowance	Regular	Survivor
Beneficiaries	0.987	0.986	0.992	0.986	0.996	0.996	0.960
Benefits	1.013	1.036	1.062	0.939	1.103	1.133	1.149

B. Administrative Expenses

Based on experience over the last five years, annual administrative expenses have averaged about 0.33% of total annual benefit payments. This has been assumed to continue throughout the projection period.

Appendix E – Detailed Projections of Beneficiaries and Expenditures

The following tables present detailed projections of the number of beneficiaries and amounts of expenditures for the OAS basic pension, GIS, and Allowance benefits. All figures shown include benefits paid outside of Canada.

The tables providing OAS basic pension projections account for voluntary deferrals, effective 1 July 2013. The tables providing GIS projections account for the increase in the supplement paid to individuals receiving partial OAS pensions. For these individuals, the GIS is increased by the difference between the full and partial OAS pension.
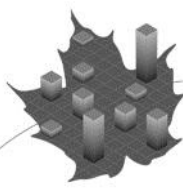
Table 46   OAS Basic Pension Beneficiaries (thousands)[1]

Year	Males Partial	Males Full	Males Total[2]	Females Partial	Females Full	Females Total[2]	Both Sexes Partial	Both Sexes Full	Both Sexes Total[2]
2016	273	2,345	2,618	321	2,822	3,143	594	5,167	5,761
2017	293	2,429	2,722	342	2,907	3,249	635	5,336	5,971
2018	313	2,518	2,832	365	2,998	3,363	678	5,516	6,194
2019	335	2,614	2,949	389	3,094	3,483	724	5,708	6,432
2020	359	2,715	3,074	413	3,197	3,610	772	5,912	6,683
2021	382	2,816	3,198	438	3,300	3,738	820	6,116	6,936
2022	406	2,921	3,327	463	3,407	3,870	869	6,328	7,197
2025	478	3,245	3,723	538	3,739	4,278	1,017	6,984	8,001
2030	593	3,758	4,350	657	4,276	4,933	1,250	8,033	9,283
2035	674	4,054	4,729	743	4,607	5,350	1,417	8,662	10,079
2040	728	4,234	4,962	803	4,837	5,640	1,531	9,071	10,602
2045	762	4,385	5,147	846	5,039	5,885	1,608	9,424	11,032
2050	793	4,574	5,367	882	5,273	6,155	1,674	9,848	11,522
2055	826	4,795	5,622	918	5,521	6,439	1,745	10,316	12,061
2060	873	5,079	5,952	965	5,807	6,773	1,838	10,886	12,724

(1)   The projected number of OAS basic pension beneficiaries is on a gross basis; that is, the numbers shown include those beneficiaries with pensions subject to full repayment by the OAS Recovery Tax.

(2)   Components may not sum to totals due to rounding.

Table 47   OAS Basic Pension Expenditures ($ million)[1]

Year	Males Partial	Males Full	Males Total[2]	Females Partial	Females Full	Females Total[2]	Both Sexes Partial	Both Sexes Full	Both Sexes Total[2]
2016	836	16,347	17,183	929	19,668	20,596	1,765	36,015	37,779
2017	944	17,253	18,197	1,063	20,642	21,705	2,007	37,895	39,902
2018	1,062	18,250	19,312	1,191	21,723	22,914	2,253	39,973	42,226
2019	1,189	19,335	20,524	1,330	22,884	24,214	2,518	42,219	44,738
2020	1,325	20,504	21,829	1,477	24,128	25,605	2,802	44,631	47,433
2021	1,467	21,717	23,184	1,629	25,418	27,047	3,097	47,135	50,232
2022	1,615	22,997	24,612	1,788	26,783	28,571	3,403	49,780	53,183
2025	2,088	27,174	29,263	2,290	31,238	33,528	4,378	58,413	62,791
2030	2,932	34,766	37,698	3,183	39,452	42,636	6,115	74,219	80,334
2035	3,700	41,437	45,137	4,014	46,944	50,958	7,715	88,381	96,095
2040	4,407	47,800	52,207	4,807	54,423	59,230	9,214	102,223	111,437
2045	5,092	54,620	59,712	5,593	62,590	68,184	10,686	117,210	127,896
2050	5,844	62,878	68,721	6,436	72,292	78,728	12,280	135,169	147,449
2055	6,731	72,763	79,494	7,405	83,554	90,959	14,135	156,317	170,452
2060	7,858	85,083	92,941	8,594	97,031	105,625	16,452	182,114	198,566

(1)   The projected amounts of OAS basic pension expenditures are on a gross basis, that is, before application of the OAS Recovery Tax.

(2)   Components may not sum to totals due to rounding.
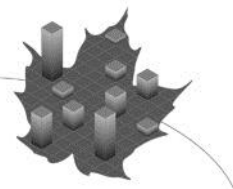
Table 48   GIS Beneficiaries (Total, thousands)

| | Males | | | Females | | | Both Sexes | | |
| | Level of Benefit: | | | Level of Benefit: | | | Level of Benefit: | | |
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	586	135	721	929	210	1,139	1,515	345	1,860
2017	605	137	741	960	217	1,177	1,565	354	1,918
2018	629	142	771	991	225	1,215	1,620	367	1,987
2019	650	148	798	1,021	232	1,253	1,672	380	2,052
2020	677	154	831	1,055	240	1,296	1,732	394	2,127
2021	706	160	866	1,093	248	1,341	1,799	408	2,207
2022	735	166	900	1,135	256	1,391	1,870	422	2,292
2025	826	183	1,009	1,263	282	1,544	2,088	465	2,553
2030	972	208	1,180	1,488	323	1,811	2,460	531	2,991
2035	1,037	217	1,255	1,621	348	1,969	2,658	566	3,224
2040	1,058	218	1,277	1,697	362	2,059	2,756	580	3,336
2045	1,050	217	1,267	1,717	366	2,083	2,767	583	3,350
2050	1,043	218	1,261	1,716	367	2,084	2,759	585	3,344
2055	1,033	220	1,253	1,692	369	2,061	2,725	589	3,314
2060	1,035	225	1,260	1,678	374	2,052	2,713	599	3,312

(1)   Components may not sum to totals due to rounding.

Table 49   GIS Expenditures (Total, $ million)

| | Males | | | Females | | | Both Sexes | | |
| | Level of Benefit: | | | Level of Benefit: | | | Level of Benefit: | | |
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	2,379	1,443	3,821	4,293	2,525	6,818	6,672	3,968	10,640
2017	2,639	1,502	4,141	4,690	2,751	7,441	7,329	4,253	11,582
2018	2,817	1,598	4,415	4,922	2,905	7,827	7,739	4,503	12,243
2019	2,964	1,698	4,662	5,147	3,058	8,205	8,111	4,756	12,867
2020	3,155	1,802	4,957	5,403	3,230	8,633	8,558	5,031	13,590
2021	3,377	1,906	5,283	5,692	3,400	9,092	9,069	5,306	14,375
2022	3,586	2,017	5,603	6,029	3,579	9,607	9,614	5,596	15,210
2025	4,280	2,369	6,650	7,052	4,177	11,228	11,332	6,546	17,878
2030	5,554	2,987	8,541	9,057	5,302	14,359	14,611	8,288	22,899
2035	6,512	3,471	9,983	10,800	6,371	17,172	17,312	9,843	27,155
2040	7,293	3,884	11,177	12,408	7,357	19,765	19,700	11,241	30,941
2045	7,947	4,270	12,217	13,819	8,241	22,061	21,766	12,512	34,278
2050	8,685	4,718	13,403	15,248	9,114	24,361	23,932	13,832	37,764
2055	9,488	5,247	14,734	16,674	10,079	26,753	26,162	15,326	41,488
2060	10,483	5,892	16,375	18,312	11,266	29,578	28,795	17,158	45,953

(1)   Components may not sum to totals due to rounding.
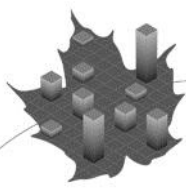
Table 50   GIS Beneficiaries (Single, thousands)

	Males			Females			Both Sexes		
	Level of Benefit:			Level of Benefit:			Level of Benefit:		
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	264	41	305	662	144	805	925	185	1,110
2017	274	43	317	690	150	840	964	193	1,157
2018	290	45	335	710	154	864	1,000	199	1,199
2019	301	47	348	729	158	887	1,030	205	1,235
2020	316	49	365	752	163	915	1,068	212	1,280
2021	334	51	385	778	168	945	1,111	219	1,330
2022	349	53	402	808	173	981	1,157	226	1,383
2025	397	59	457	899	190	1,089	1,296	249	1,545
2030	479	69	548	1,066	218	1,284	1,545	286	1,831
2035	526	74	599	1,177	238	1,415	1,703	312	2,015
2040	551	77	628	1,255	252	1,507	1,806	329	2,135
2045	561	79	640	1,291	259	1,550	1,853	338	2,190
2050	568	80	649	1,306	262	1,568	1,874	342	2,217
2055	569	81	650	1,293	264	1,557	1,861	345	2,207
2060	574	83	657	1,282	268	1,550	1,856	351	2,206

(1)   Components may not sum to totals due to rounding.

Table 51   GIS Expenditures (Single, $ million)

	Males			Females			Both Sexes		
	Level of Benefit:			Level of Benefit:			Level of Benefit:		
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	1,414	515	1,929	3,504	1,878	5,382	4,918	2,393	7,311
2017	1,616	568	2,184	3,879	2,066	5,944	5,494	2,634	8,128
2018	1,748	606	2,354	4,063	2,168	6,231	5,811	2,774	8,585
2019	1,842	645	2,488	4,238	2,267	6,505	6,080	2,913	8,993
2020	1,976	686	2,662	4,441	2,387	6,827	6,417	3,073	9,490
2021	2,135	727	2,862	4,675	2,506	7,180	6,810	3,233	10,043
2022	2,273	773	3,046	4,954	2,635	7,588	7,227	3,407	10,634
2025	2,740	916	3,656	5,788	3,071	8,858	8,527	3,987	12,514
2030	3,608	1,174	4,782	7,450	3,906	11,356	11,058	5,080	16,138
2035	4,312	1,406	5,718	8,955	4,741	13,696	13,267	6,148	19,414
2040	4,912	1,625	6,537	10,392	5,553	15,945	15,304	7,178	22,482
2045	5,432	1,842	7,274	11,693	6,306	17,999	17,125	8,148	25,273
2050	6,000	2,071	8,071	12,996	7,033	20,029	18,996	9,104	28,100
2055	6,590	2,310	8,901	14,252	7,800	22,052	20,843	10,110	30,953
2060	7,310	2,591	9,901	15,656	8,718	24,374	22,966	11,309	34,275

(1)   Components may not sum to totals due to rounding.
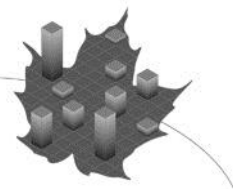
Table 52   GIS Beneficiaries (Spouse a Pensioner, thousands)

| | Males | | | Females | | | Both Sexes | | |
| | Level of Benefit: | | | Level of Benefit: | | | Level of Benefit: | | |
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	244	60	304	245	59	304	489	119	609
2017	246	59	305	246	59	305	491	119	610
2018	256	63	319	256	63	319	512	126	638
2019	267	66	333	267	66	333	533	133	666
2020	278	70	347	278	70	347	555	139	695
2021	288	73	361	288	73	361	577	145	722
2022	299	75	375	299	75	375	599	150	749
2025	334	83	417	334	83	417	668	166	834
2030	389	95	484	389	95	484	778	190	969
2035	409	100	510	409	100	510	819	200	1,019
2040	408	100	508	408	100	508	816	200	1,016
2045	391	97	488	391	97	488	781	194	976
2050	376	95	470	376	95	470	751	190	941
2055	365	94	459	365	94	459	730	189	918
2060	361	96	457	361	96	457	722	191	913

(1)   Components may not sum to totals due to rounding.

Table 53   GIS Expenditures (Spouse a Pensioner, $ million)

| | Males | | | Females | | | Both Sexes | | |
| | Level of Benefit: | | | Level of Benefit: | | | Level of Benefit: | | |
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	633	612	1,245	647	573	1,220	1,281	1,185	2,466
2017	666	607	1,272	668	607	1,276	1,334	1,214	2,548
2018	707	657	1,364	710	658	1,368	1,418	1,314	2,732
2019	751	706	1,458	754	708	1,462	1,505	1,415	2,920
2020	796	756	1,552	800	757	1,557	1,596	1,513	3,109
2021	843	803	1,645	846	805	1,651	1,689	1,607	3,297
2022	891	848	1,739	895	850	1,745	1,785	1,698	3,484
2025	1,048	995	2,043	1,052	998	2,050	2,100	1,993	4,093
2030	1,331	1,256	2,586	1,337	1,263	2,599	2,667	2,518	5,186
2035	1,523	1,461	2,984	1,530	1,481	3,011	3,053	2,942	5,995
2040	1,651	1,614	3,265	1,659	1,640	3,299	3,311	3,254	6,565
2045	1,725	1,720	3,446	1,733	1,753	3,486	3,459	3,473	6,932
2050	1,816	1,842	3,658	1,823	1,877	3,700	3,638	3,720	7,358
2055	1,945	2,022	3,967	1,953	2,052	4,005	3,898	4,074	7,971
2060	2,121	2,257	4,378	2,129	2,288	4,417	4,250	4,545	8,795

(1)   Components may not sum to totals due to rounding.

Table 54   GIS Beneficiaries (Spouse Not a Pensioner, thousands)

| | Males | | | Females | | | Both Sexes | | |
| | Level of Benefit: | | | Level of Benefit: | | | Level of Benefit: | | |
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	52	15	67	19	5	24	71	20	91
2017	56	14	70	20	5	25	76	19	96
2018	56	15	71	21	5	26	77	20	97
2019	57	15	72	21	5	26	78	20	98
2020	58	15	73	22	5	27	80	20	100
2021	59	16	75	22	5	28	82	21	103
2022	61	16	77	23	6	29	84	22	106
2025	66	17	84	25	6	31	91	23	115
2030	73	19	92	28	7	35	101	26	127
2035	72	18	90	29	7	36	101	25	127
2040	70	18	88	30	7	37	100	25	125
2045	69	18	87	30	7	37	99	25	124
2050	69	18	87	30	7	37	99	25	124
2055	69	18	87	30	7	37	99	25	124
2060	69	18	88	30	7	38	99	26	125

(1)   Components may not sum to totals due to rounding.

Table 55   GIS Expenditures (Spouse Not a Pensioner, $ million)

| | Males | | | Females | | | Both Sexes | | |
| | Level of Benefit: | | | Level of Benefit: | | | Level of Benefit: | | |
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	237	165	402	129	57	186	365	222	587
2017	245	166	411	127	59	186	372	224	597
2018	254	173	427	133	60	193	387	233	620
2019	265	180	445	139	62	201	404	243	647
2020	278	189	467	146	65	211	423	254	677
2021	292	198	490	153	68	221	445	266	711
2022	308	208	516	162	71	233	470	279	749
2025	361	239	600	190	83	273	552	322	873
2030	453	289	742	245	102	347	698	391	1,089
2035	503	314	816	289	117	406	792	431	1,223
2040	547	337	884	329	131	460	876	468	1,344
2045	595	370	965	364	144	509	959	514	1,474
2050	651	414	1,065	395	159	554	1,047	573	1,620
2055	708	461	1,169	431	176	608	1,139	638	1,777
2060	775	515	1,290	485	201	686	1,260	716	1,976

(1)   Components may not sum to totals due to rounding.

Table 56   GIS Beneficiaries (Spouse with Allowance, thousands)

	Males			Females			Both Sexes		
	Level of Benefit:			**Level of Benefit:**			**Level of Benefit:**		
Year	**Partial**	**Full**	**Total[1]**	**Partial**	**Full**	**Total[1]**	**Partial**	**Full**	**Total[1]**
2016	26	19	44	4	2	6	29	21	50
2017	29	20	49	4	2	7	33	22	55
2018	27	20	47	4	2	7	31	22	53
2019	26	20	45	4	3	7	30	22	52
2020	25	20	45	4	3	7	29	22	52
2021	25	20	45	4	3	7	29	23	52
2022	26	21	47	4	3	7	30	24	54
2025	28	23	51	5	3	8	33	26	59
2030	31	25	56	5	3	8	36	28	64
2035	31	25	55	5	3	8	35	28	63
2040	29	24	53	5	3	7	34	27	61
2045	29	24	53	5	3	7	33	27	60
2050	30	25	55	5	3	8	35	28	63
2055	31	26	57	5	3	8	35	29	65
2060	31	28	59	5	3	8	36	31	67

(1)   Components may not sum to totals due to rounding.

Table 57   GIS Expenditures (Spouse with Allowance, $ million)

	Males			Females			Both Sexes		
	Level of Benefit:			**Level of Benefit:**			**Level of Benefit:**		
Year	**Partial**	**Full**	**Total[1]**	**Partial**	**Full**	**Total[1]**	**Partial**	**Full**	**Total[1]**
2016	94	151	245	13	17	30	107	168	276
2017	112	162	274	16	19	35	129	181	309
2018	108	163	271	16	19	36	124	182	306
2019	105	166	271	17	20	36	122	186	308
2020	105	171	276	17	21	38	122	192	314
2021	108	179	286	18	22	39	125	200	325
2022	113	188	302	19	23	41	132	211	343
2025	132	219	351	21	26	47	153	245	398
2030	162	268	430	25	31	56	187	299	486
2035	174	290	465	26	32	58	200	322	522
2040	182	308	490	27	34	61	209	342	551
2045	195	338	533	29	38	67	224	376	600
2050	218	391	608	33	44	78	251	435	686
2055	245	453	698	37	51	89	282	505	787
2060	277	528	805	42	59	101	319	587	906

(1)   Components may not sum to totals due to rounding.
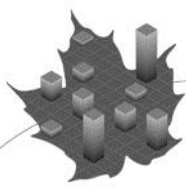
Table 58 Allowance Beneficiaries (Total, thousands)

| | Males | | | Females | | | Both Sexes | | |
| | Level of Benefit: | | | Level of Benefit: | | | Level of Benefit: | | |
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	8	1	9	61	4	64	69	4	73
2017	9	1	10	64	4	67	73	4	77
2018	9	1	10	61	3	64	70	4	74
2019	9	1	10	58	3	61	67	4	71
2020	9	1	10	57	3	60	66	4	70
2021	9	1	10	57	3	60	66	4	70
2022	9	1	10	58	3	61	68	4	71
2025	10	1	10	62	3	65	71	4	75
2030	10	1	11	64	3	67	74	3	77
2035	9	0	10	62	3	64	71	3	74
2040	9	0	9	59	2	61	67	3	70
2045	9	0	9	58	2	60	67	3	69
2050	9	0	10	59	2	62	68	3	71
2055	9	0	10	60	2	63	70	3	73
2060	9	1	10	62	2	64	71	3	74

(1) Components may not sum to totals due to rounding.

Table 59 Allowance Expenditures (Total, $ million)

| | Males | | | Females | | | Both Sexes | | |
| | Level of Benefit: | | | Level of Benefit: | | | Level of Benefit: | | |
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	55	10	65	407	61	468	462	71	532
2017	63	10	73	436	62	497	498	72	570
2018	63	10	74	425	59	484	488	69	558
2019	64	10	75	420	57	476	484	67	551
2020	65	10	76	420	55	475	485	66	551
2021	67	11	78	428	55	483	495	66	561
2022	70	11	80	444	57	501	514	67	581
2025	76	11	88	493	60	553	569	71	640
2030	83	11	94	556	60	616	638	72	710
2035	83	11	94	578	61	638	660	72	733
2040	85	12	98	596	62	659	682	75	756
2045	95	13	108	646	67	713	741	80	821
2050	109	15	124	729	73	802	838	89	926
2055	120	17	138	815	82	897	936	99	1,035
2060	130	19	150	916	89	1,005	1,046	108	1,155

(1) Components may not sum to totals due to rounding.

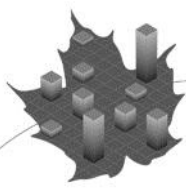**Table 60   Allowance Beneficiaries (Regular, thousands)**

	Males			Females			Both Sexes		
	Level of Benefit:			Level of Benefit:			Level of Benefit:		
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	6	0	6	43	2	44	49	2	50
2017	7	0	7	47	2	49	54	2	55
2018	6	0	7	45	2	47	51	2	53
2019	6	0	7	44	2	45	50	2	52
2020	7	0	7	43	2	45	50	2	52
2021	7	0	7	44	2	45	50	2	52
2022	7	0	7	45	2	47	52	2	54
2025	7	0	8	49	2	51	57	2	59
2030	8	0	8	54	2	56	62	2	64
2035	7	0	8	54	2	55	61	2	63
2040	7	0	7	51	2	53	59	2	61
2045	7	0	7	51	2	53	58	2	60
2050	8	0	8	53	2	55	61	2	63
2055	8	0	8	55	2	57	63	2	65
2060	8	0	8	57	2	59	65	2	67

(1)   Components may not sum to totals due to rounding.

Table 61   Allowance Expenditures (Regular, $ million)

	Males			Females			Both Sexes		
	Level of Benefit:			Level of Benefit:			Level of Benefit:		
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	33	3	37	259	23	282	292	26	318
2017	39	4	43	295	25	320	334	29	364
2018	40	4	44	292	25	317	332	29	361
2019	41	4	45	293	25	318	334	29	363
2020	42	4	46	299	25	323	341	29	370
2021	44	4	48	309	25	334	353	30	383
2022	46	5	51	326	27	352	372	31	403
2025	52	5	58	377	30	408	429	36	465
2030	62	6	68	460	36	496	522	42	564
2035	64	6	70	493	39	532	557	45	602
2040	66	7	73	516	41	558	583	48	631
2045	74	8	82	563	45	608	637	53	690
2050	87	9	96	647	52	699	733	61	795
2055	98	11	109	738	60	798	836	71	907
2060	111	12	123	852	70	921	963	82	1,045

(1)   Components may not sum to totals due to rounding.

Table 62   Allowance Beneficiaries (Survivor, thousands)

| | Males | | | Females | | | Both Sexes | | |
| | Level of Benefit: | | | Level of Benefit: | | | Level of Benefit: | | |
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	3	0	3	18	2	20	21	2	23
2017	3	0	3	17	2	19	19	2	22
2018	3	0	3	16	2	17	18	2	20
2019	3	0	3	15	2	16	17	2	19
2020	3	0	3	14	2	15	16	2	18
2021	3	0	3	13	1	15	16	2	18
2022	3	0	3	13	1	15	16	2	17
2025	3	0	3	12	1	14	15	2	17
2030	2	0	2	10	1	11	12	1	13
2035	2	0	2	8	1	9	10	1	11
2040	2	0	2	7	1	8	9	1	10
2045	2	0	2	7	1	7	9	1	9
2050	2	0	2	6	1	7	8	1	9
2055	2	0	2	6	1	6	7	1	8
2060	1	0	1	5	0	5	6	1	7

(1)   Components may not sum to totals due to rounding.

Table 63   Allowance Expenditures (Survivor, $ million)

| | Males | | | Females | | | Both Sexes | | |
| | Level of Benefit: | | | Level of Benefit: | | | Level of Benefit: | | |
Year	Partial	Full	Total[1]	Partial	Full	Total[1]	Partial	Full	Total[1]
2016	22	6	28	148	38	186	170	44	214
2017	23	6	30	141	36	177	164	43	207
2018	23	6	30	133	34	167	156	40	197
2019	23	6	30	127	32	159	150	38	188
2020	23	6	29	121	31	152	144	37	181
2021	23	6	30	119	30	149	142	36	178
2022	24	6	30	119	30	149	142	36	179
2025	24	6	30	116	29	145	140	35	175
2030	21	5	26	96	24	120	116	29	146
2035	19	5	24	85	22	106	104	27	131
2040	19	5	24	80	21	101	99	26	125
2045	21	6	27	83	22	104	104	27	131
2050	22	6	28	82	21	104	104	27	132
2055	22	7	29	77	21	99	99	28	128
2060	20	7	26	64	19	84	84	26	110

(1)   Components may not sum to totals due to rounding.

ACTUARIAL REPORT
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as at 31 December 2015
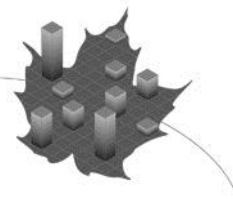
Appendix F – Acknowledgements

Service Canada provided statistics on the Old Age Security program and the Canada Pension Plan.

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The following people assisted in the preparation of this report:

Shayne Barrow
Yu Cheng, A.S.A.
Patrick Dontigny, A.S.A.
Sari Harrel, F.S.A., F.C.I.A.
Kelly Moore
Louis-Marie Pommainville, F.S.A., F.C.I.A.