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Technical Aspects of the Financing of the Canada Pension Plan

Actuarial Study No. 8

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I. Executive Summary

A. Purpose

This is the eighth actuarial study to be published by the Office of the Chief Actuary (OCA), undertaken in response to Recommendation #6 and suggestions made in respect of a report by the independent peer review panel that reviewed the 23rd Actuarial Report on the Canada Pension Plan¹. All the findings in this study are based on the 23rd CPP Actuarial Report and do not reflect the more recent findings of the 24th CPP Actuarial Report, which was tabled before Parliament on 19 October 2009. The 24th CPP Actuarial Report was prepared to reflect proposed amendments to the Plan as put forth in Part 2 of Bill C-51.

The review panel expressed concern that most readers would be unduly distressed that the Canada Pension Plan (CPP or the “Plan”) is not expected to ever be even one-third funded. As such, the panel recommended minimizing or removing “point-in-time” funded status indicators from the actuarial report and to focus instead on the fact that the adequacy and stability of the steady-state contribution rate is the critical tool for judging the sustainability of the CPP, and that the funded ratio (ratio of assets to liabilities), if kept in the report, is at most an indicator of the projected improvement in the funded level. This paper was thus written with the purpose of analyzing and comparing the financing of the CPP using different measures, in particular, the unfunded obligations (liabilities less assets) and funded ratios of the Plan under various closed and open group methodologies, including a methodology more consistent with that used for occupational defined benefit pension plans.

A comparison of the internal rate of return for CPP retirement beneficiaries with the return one could expect to receive if purchasing a similar annuity in the private market is also given in the study to examine the differences in risk allocation between the Plan and private insurers.

It is the objective of the OCA for the analyses and findings in this paper to generate fruitful discussion between the Plan’s various stakeholders and the OCA regarding different financing measures for the Plan. This valuable feedback will in turn assist the OCA in deciding which information regarding the financing of the Plan should be included in future actuarial valuation reports on the CPP.

B. Main Findings

Closed Group Without Future Accruals

The current methodology, which was used in the 23rd CPP Actuarial Report, is based on a closed group without future accruals. Specifically, the methodology assumes that no new entrants to the workforce are included, and current Plan participants who are not receiving benefits at the valuation date are assumed to have no contributory earnings beyond that date. As such, there are no contributions flowing into the Plan beyond the valuation date.

Using this methodology and under the best-estimate scenario of the 23rd CPP Actuarial Report, the Plan’s unfunded obligation is \$620 billion, and its funded ratio is 15% as at 31 December 2006.

The largest unfunded obligation, and thus the lowest funded ratio, for the closed group without future accruals are produced by the current methodology compared to two alternatives that modify

¹ “The Review of the Twenty-Third Actuarial Report on the Canada Pension Plan” report by the CPP actuarial review panel and associated reports may be accessed at the following web site:
http://www.osfi-bsif.gc.ca/osfi/index_e.aspx?DetailID=377

the way drop-out provisions of the CPP are valued and how future salary increases are projected. Under the methodology based on the observation of the independent review panel, the unfunded obligation reduces to \$560 billion and the funded ratio increases to 17% as at 31 December 2006.

Closed Group With Future Accruals

The closed group with future accruals allows current contributors to continue contributing to the Plan and accrue future benefits. The inflow of contributions is more than sufficient to cover the associated future benefits, which reduces the unfunded obligation compared to the closed groups without future accruals.

As at 31 December 2006, the unfunded obligation for this group is \$361 billion and the funded ratio is 66%.

Open Group

The calculation of the open group unfunded obligation includes future contributions and benefits for both current and future Plan members. Once again, the inflow of contributions is more than sufficient to cover the associated future benefits, which reduces the unfunded obligation compared to the closed groups.

The result is that the Plan is fully funded with a funded ratio of 100.2% on an open group basis as at 31 December 2006.

Decomposition of CPP into Pay-As-You-Go and Funded Components on an Open Group Basis

Under an open group, the obligations of the Plan result from and are met to a large extent by the pay-as-you-go component. The pay-as-you-go component of the Plan accounts for 91% of the Plan's total obligations, whereas the funded component of the Plan only accounts for 9% of the total obligations as at 31 December 2006. These relative proportions change over time; however, the Plan still remains mostly financed on a pay-as-you-go basis.

Both the pay-as-you-go and funded components are subject to demographic and economic risks. The pay-as-you-go component, however, is not exposed to financial market risk since the associated cash flows are not invested, while the funded component is subject to financial market risk since its assets are invested.

While the share of the Plan's obligations financed by the pay-as-you-go component varies depending on the particular sensitivity analysis scenario considered, the pay-as-you-go component remains the dominant financing component of the Plan.

Internal Rate of Return

For the CPP retirement pension, cohorts born after 1980 are expected to earn an annual real rate of return of 2.2% on their investment (contributions paid). In comparison, for a similar benefit purchased from a private insurer, an annuitant's initial investment will yield a smaller rate of return, usually less than 1% real. The answer to the question why are private insurers not able to offer an annuity that is competitive with the CPP includes several factors, in particular, the difference in how risks are allocated amongst parties of an insurance contract versus the allocation of risks within the CPP. Moreover, fully indexed annuities are not widely available in Canada which adds to the value of the CPP pension.

C. Conclusion

Major amendments in 1997 (the “1997 reform”) led to the change in financing of the Canada Pension Plan from a pay-as-you-go (PayGo) basis to a form of partial funding called steady-state funding. The 1997 reform, and particularly steady-state funding, restored the Plan’s sustainability for current and future generations. The purpose of the steady-state methodology is to produce an asset/expenditure ratio that is relatively stable over time.

With the legislated contribution rate of 9.9%, the assets are expected to increase significantly, with the asset/expenditure ratio growing from 4.1 in 2006 to about 5.6 by 2025, as projected under the 23rd CPP Actuarial Report. In addition, the funded ratio of the Plan is expected to increase from a level of 15% in 2006 to about 25% by 2025, thus reducing the relative size of the Plan’s unfunded obligation, as projected under a closed group methodology of that same report. Although the funded ratio may be used as a measure of the Plan’s financial status, the key financial measure for evaluating the Plan is the steady-state contribution rate, specifically, its adequacy and stability over time.

If the Plan’s sustainability is to be measured based on its funded ratio or unfunded obligation, it should be done so on an open group basis. Given the long-term nature of the Plan, the fact that its stewards are the federal, provincial and territorial governments, and the strong governance and accountability framework of the Plan, it is unlikely that the Plan would become insolvent. Thus, an open group valuation could be deemed to be the most appropriate. The inclusion of future contributions and benefits from both current and future contributors in the assessment of the Plan’s funded status shows that the Plan is fully funded in the long term, able to meet its financial obligations, and sustainable over the 75-year projection period.

Future demographic, economic and financial market environments may differ from those assumed under the best-estimate scenario of the 23rd CPP Actuarial Report, and as such may impact the Plan’s finances differently. It follows that, regardless of the measure used to assess the Plan’s financial status, the unique characteristics of the Plan’s long-term obligations and the assets needed to meet those obligations, as well as the relation between them should all be considered to ensure the long-term financial sustainability of the CPP.

II. Introduction

A. Purpose

This is the eighth actuarial study to be published by the Office of the Chief Actuary (OCA), undertaken in response to Recommendation #6 and suggestions made in respect of a report by the independent peer review panel that reviewed the 23rd Actuarial Report on the Canada Pension Plan². All the findings in this study are based on the 23rd CPP Actuarial Report and do not reflect the more recent findings of the 24th CPP Actuarial Report, which was tabled before Parliament on 19 October 2009. The 24th CPP Actuarial Report was prepared to reflect proposed amendments to the Plan as put forth in Part 2 of Bill C-51.

Independent peer reviews of actuarial reports on the Canada Pension Plan are conducted to ensure that the credibility of the information presented in such reports is indisputable. The review panel expressed concern that most readers would be unduly distressed that the Canada Pension Plan is not expected to ever be even one-third funded. As such, the panel recommended minimizing or removing “point-in-time” funded status indicators from the actuarial report and to focus instead on the fact that the adequacy and stability of the steady-state contribution rate is the critical tool for judging the sustainability of the CPP, and that the funded ratio, if kept in the report, is at most an indicator of the projected improvement in the funded level.

The inclusion of “actuarial balance” results in the report as a means to compare the CPP with the Old-Age, Survivors, and Disability Insurance (OASDI) program in the United States was also questioned by the panel as the purpose of this indicator is not consistent with the determination of the steady-state rate. The panel suggested that if the information was still deemed useful by the Chief Actuary, then it could be published separately. Lastly, it was observed by the panel that the methodology used to evaluate the actuarial liability of the Plan produces a higher liability than that determined by the methodology used to evaluate liabilities of occupational defined benefit pension plans.

Based on the review panel’s recommendation, the discussion regarding the financing of the CPP will be revised for future actuarial reports, with the possibility of it being substantially reduced or removed entirely. However, the OCA still feels that there is a need to discuss the implications of partially financing the Plan. Thus, this paper was written with the purpose of analyzing and comparing the unfunded obligations and the funded ratios of the Plan under various closed and open group methodologies, including a methodology more consistent with that used for occupational defined benefit pension plans. A more detailed analysis of the balance sheet under the open group methodology including sensitivity analyses based on different demographic, economic, and financial market environments than those assumed under the best-estimate scenario was also performed. Further, an analysis of the actuarial balance is provided as another financial measure. In addition, a comparison of the internal rate of return for CPP retirement beneficiaries with the monthly payment one could expect to receive if purchasing a similar annuity in the private market is provided in the study.

It is the objective of the OCA for the analyses and findings in this paper to generate fruitful discussion between the Plan’s various stakeholders and the OCA regarding different financing measures for the Plan. This valuable feedback will in turn assist the OCA in deciding which

² “The Review of the Twenty-Third Actuarial Report on the Canada Pension Plan” report by the CPP actuarial review panel and associated reports may be accessed at the following web site:
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information regarding financing of the Plan should be included in future actuarial valuation reports on the CPP.

B. Scope

The results contained in this study are based on the “best-estimate” scenario of the 23rd CPP Actuarial Report which was tabled before Parliament on 29 October 2007. The best-estimate scenario consists of long-term projections and is based on “best-estimate assumptions”. These assumptions reflect the best judgement of the Chief Actuary of the CPP as to future demographic, economic, and financial market conditions that will affect the long-term financial sustainability of the Plan. The projections in this study cover periods of 75 years and longer and place more emphasis on historical trends than on short-term trends.

Section III discusses the history of the Plan and how its financing has evolved from pay-as-you-go to steady-state financing. Section IV presents an analysis of the unfunded obligation and funded ratio of the CPP under the best-estimate assumptions of the 23rd CPP Actuarial Report, using different methodologies. Section V next presents a more in-depth analysis of the balance sheet under the open group methodology, including sensitivity analyses based on different demographic, economic and financial market scenarios. A comparison of the actuarial balances between the CPP and the U.S. OASDI program is next given in Section VI. This is followed in Section VII by the determination of the internal rate of return for CPP cohorts and a comparison of the CPP with the Canadian annuity market in terms of the rate of return that an investment in each could earn. The conclusion follows in Section VIII. Lastly, three appendices are included in section IX: Appendix A provides the principles upon which changes made in 1997 to the Plan (the 1997 reform) were based, Appendix B lists the references used, and Appendix C lists the contributors to this study.

III. Historical Background on Financing of the CPP

A. Inception to Pre-1997 CPP Reform

The Canada Pension Plan came into effect on 1 January 1966 as an earnings-related plan to provide working Canadians with retirement, disability, death, survivor and children benefits. The Plan was established primarily to assist with income replacement upon retirement. Retirement benefits under the Plan are meant to replace approximately 25% of a beneficiary's pre-retirement earnings up to \$43,620 in 2009 (the five-year average of the Year's Maximum Pensionable Earnings (YMPE)).

The Plan covers employees and self-employed persons between the ages of 18 and 70, but excludes those with earnings less than the Year's Basic Exemption (YBE), members of certain religious groups, persons who qualify under excepted employment and those covered by the Québec Pension Plan (QPP). The QPP came into effect on the same date as the CPP, and the two plans are deemed equivalent.

Contributions to the Plan are based on contributory earnings between the YBE and the YMPE. In 2009, the YBE and YMPE are \$3,500 and \$46,300, respectively, giving a maximum contributory earnings base of \$42,800. The legislated contribution rate is shared equally between employer and employee, or applied fully to self-employed persons. In 2009, the combined employer-employee contribution rate is 9.9% (4.95% each), giving a maximum contribution of \$4,237.20 (\$2,118.60 each). The YBE has been fixed at \$3,500 since 1997, whereas the YMPE increases each year in line with the percentage increase, as at 30 June of the preceding year, in the 12-month average of the Industrial Aggregate (the measure of average weekly earnings by Statistics Canada). The CPP is progressive in that contributions are based on earnings above the YBE so that lower-income earners pay a lower level of contributions for the same effective benefit protection.

The CPP was initially established as a pay-as-you-go plan with a small reserve and an initial combined employer-employee contribution rate of 3.6%. The CPP (and QPP) became the second tier of Canada's retirement income system, with the first tier being the Old Age Security Program (including the Guaranteed Income Supplement and Allowance) financed from general tax revenues and the third tier comprising fully funded employer-sponsored registered retirement plans and personal savings, including individual registered retirement savings plans. A registered retirement plan is registered with the federal Canada Revenue Agency and thus qualifies for tax sheltering.

At the time of the Plan's inception, demographic and economic conditions were characterized by a younger population owing to higher fertility rates and lower life expectancies, rapid growth in wages and labour force participation and low rates of return on investments. These conditions made prefunding of the scheme unattractive and a pay-as-you-go scheme more appropriate. Growth in total earnings of the workforce and thus contributions were sufficient to cover growing expenditures without requiring large increases to the contribution rate. Assets of the Plan were invested primarily in long-term non-marketable securities issued by the provincial governments at lower than market rates, thus providing the provinces with a relatively inexpensive source of capital to develop needed infrastructure. However, changing conditions over time, including lower birth rates, increased life expectancies and higher market returns led to increasing Plan costs and made fuller funding more attractive and appropriate. By the mid-1980s, the net cash flows (contributions less expenditures) had turned negative and part of the Plan's investment earnings were required to meet the shortfall. The shortfall continued to grow and eventually caused the assets to start decreasing by the mid-1990s. The fall in the level of assets led to a portion of the reserve being required to cover expenditures.

In the December 1993 (15th) Actuarial Report on the CPP, the Chief Actuary projected that the pay-as-you-go contribution rate (expenditures as a percentage of contributory earnings) would increase to 14.2% by 2030. It was further projected that if changes were not made to the Plan, the reserve fund would be exhausted by 2015. The Chief Actuary identified four factors responsible for the increasing Plan costs, namely: lower birth rates and higher life expectancies than expected, lower productivity, benefit enrichments and increased numbers of Canadians claiming disability benefits for longer periods.

The projected increasing financial burden on workers to financially maintain the Plan led to the federal, provincial, and territorial governments' decision to consult with Canadians in a review of the Plan and to restore its long-term financial sustainability. Following cross-country consultations held in 1996, the federal, provincial, and territorial governments agreed to amend the Plan based on nine guiding principles (see Appendix A).

The historical financial status of the CPP from its inception to year 2006 is shown in Table 1. The decrease in assets in the mid-1990s is observed in the table. The subsequent increase in the assets starting in the year 1998 resulted from major changes made to the Plan in 1997. These Plan amendments are discussed in the following subsection.

Table 1 Historical Financial Status
 (\$ million)*

Year	PayGo Rate** (%)	Contribution Rate (%)	Contributions**	Expenditures	Net Cash Flow	Investment Earnings	Assets at 31 Dec.***	Yield/Return*** (%)	Asset/Expenditure Ratio
1966	0.05	3.6	531	8	523	2	525	0.7	52.50
1967	0.06	3.6	623	10	613	37	1,175	4.3	48.96
1968	0.13	3.6	686	24	662	79	1,916	5.1	35.48
1969	0.26	3.6	737	54	683	128	2,727	5.6	28.11
1970	0.45	3.6	773	97	676	193	3,596	6.2	24.13
1971	0.66	3.6	816	149	667	260	4,523	6.5	21.33
1972	0.88	3.6	869	212	657	333	5,513	6.8	19.83
1973	1.07	3.6	939	278	661	404	6,578	6.8	16.78
1974	1.17	3.6	1,203	392	811	498	7,887	7.0	14.06
1975	1.42	3.6	1,426	561	865	607	9,359	7.2	11.47
1976	1.80	3.6	1,630	816	814	747	10,920	7.6	10.48
1977	2.05	3.6	1,828	1,042	786	890	12,596	7.8	9.72
1978	2.31	3.6	2,022	1,296	726	1,043	14,365	7.9	9.03
1979	2.47	3.6	2,317	1,590	727	1,236	16,328	8.3	8.31
1980	2.72	3.6	2,604	1,965	639	1,466	18,433	8.7	7.64
1981	2.89	3.6	3,008	2,413	595	1,784	20,812	9.4	7.04
1982	2.91	3.6	3,665	2,958	707	2,160	23,679	10.0	6.58
1983	3.73	3.6	3,474	3,598	(124)	2,494	26,049	10.4	6.22
1984	3.66	3.6	4,118	4,185	(67)	2,829	28,811	10.7	5.97
1985	4.31	3.6	4,032	4,826	(794)	3,113	31,130	10.8	5.66
1986	4.20	3.6	4,721	5,503	(782)	3,395	33,743	10.9	4.73
1987	5.02	3.8	5,393	7,130	(1,737)	3,654	35,660	10.9	4.31
1988	5.41	4.0	6,113	8,272	(2,159)	3,886	37,387	11.0	3.98
1989	5.89	4.2	6,694	9,391	(2,697)	4,162	38,852	11.3	3.72
1990	5.82	4.4	7,889	10,438	(2,549)	4,386	40,689	11.4	3.53
1991	6.31	4.6	8,396	11,518	(3,122)	4,476	42,043	11.2	3.22
1992	7.07	4.8	8,883	13,076	(4,193)	4,497	42,347	11.0	2.97
1993	7.79	5.0	9,166	14,273	(5,107)	4,480	41,720	10.9	2.72
1994	8.33	5.2	9,585	15,362	(5,777)	4,403	40,346	11.0	2.52
1995	7.91	5.4	10,911	15,986	(5,075)	4,412	39,683	11.3	2.37
1996	8.71	5.6	10,757	16,723	(5,966)	4,177	37,894	11.0	2.16
1997	8.67	6.0	12,165	17,570	(5,405)	3,971	36,460	10.8	1.99
1998	8.11	6.4	14,473	18,338	(3,865)	3,938	36,535	10.9	1.94
1999	8.23	7.0	16,052	18,877	(2,825)	764	42,783	1.7	2.17
2000	7.69	7.8	19,977	19,683	294	4,446	47,523	9.9	2.32
2001	7.85	8.6	22,469	20,515	1,954	3,154	52,631	6.2	2.43
2002	8.16	9.4	24,955	21,666	3,289	187	56,107	0.3	2.47
2003	8.19	9.9	27,454	22,716	4,738	6,769	67,614	11.1	2.84
2004	8.29	9.9	28,459	23,833	4,626	6,475	78,715	8.9	3.15
2005	8.37	9.9	29,539	24,976	4,563	11,083	94,361	13.2	3.60
2006	8.37	9.9	31,000	26,213	4,787	14,433	113,581	14.5	4.11

* Table 1 corresponds to Table 10 in the 23rd CPP Actuarial Report.

** The pay-as-you-go rates have been calculated using the historical contributory earnings, while the contributions are based on an estimate made by the Department of Finance.

*** Results for years 1966 to 1998 are on a cost basis, while results for years 1999 to 2006 are presented on a market value basis. If assets were shown at market value at the end of 1998, total assets would be \$44,864 million instead of \$36,535 million.

B. 1997 CPP Reform

Overview – Restoring the Financial Sustainability of the Plan

The changes to restore the financial sustainability of the CPP were legislated in 1997 and became effective on 1 January 1998. The changes involved a balanced approach to sustain the Plan while ensuring fairness for future generations and between males and females. The 1997 changes were based on the principles of increasing the level of funding in order to stabilize the contribution rate, improving intergenerational equity and securing the financial status of the Plan over the long term. Key changes included steep increases in the contribution rate combined with a freeze on the YBE, a slowing of the future growth of benefits, full funding of any new or improved benefits in the future, and the modification of the investment policy through the creation of the Canada Pension Plan Investment Board (CPPIB). A major change was modifying the financing approach from a pay-as-you-go basis to a hybrid of pay-as-you-go financing and full funding, called “steady-state funding”.

Fuller Funding and Changes to Benefits

The schedule of contribution rates since the changes were implemented is shown in Table 2. The results of the 23rd CPP Actuarial Report confirm that the contribution rate of 9.9% for years 2010 and thereafter is sufficient to maintain the long-term financial sustainability of the Plan. The combination of a freeze on the YBE at \$3,500 and the continued increase in the YMPE has led to the contributory earnings base increasing each year which results in higher Plan contributions and revenues.

Table 2 Schedule of CPP Contribution Rates

<u>Year</u>	<u>Contribution Rate</u>
	(%)
1997	6.00
1998	6.40
1999	7.00
2000	7.80
2001	8.60
2002	9.40
2003+	9.90

Prior to the changes, retirement, survivor and disability benefits were based on a formula which indexed wages earned over a working lifetime using a final three-year average of the YMPE. This formula was changed to a five-year average which is the most common way of calculating pension benefits in occupational defined benefit pension plans. There were also other changes that resulted in reducing the future growth of benefits by about 10%.

Changes to the Plan’s Financing Provisions

Steady-state funding was introduced to replace pay-as-you-go financing with the purpose of building an asset reserve equivalent over time to about five and a half years of expenditures or about 25 per cent of Plan liabilities. Investment earnings of this pool of assets would help to pay benefits when the large cohort of baby boomers retires. Steady-state funding is described in more detail in the next subsection.

Incremental full funding was introduced in order to require that changes to the CPP that improve or add new benefits be fully funded. That is, the costs of these benefits must be paid as the benefit is earned and any costs associated with benefits that have already been earned must be amortized and paid for over a defined period of time consistent with common actuarial practice. These additional

costs may take the form of temporary and/or permanent contribution rate increases. The steady-state rate is determined independently of the incremental rate. As such, the Plan is financed on a dual basis – the steady-state rate applies only to the basic Plan, whereas the incremental rate applies to new or improved benefits. The resulting sum of the steady-state and incremental rates is the minimum contribution rate of the Plan.

Both of these funding objectives were introduced to improve fairness and equity across generations, as well as to improve the long-term financial sustainability of the Plan. The move to steady-state funding eases some of the contribution burden on future generations. Under full funding, each generation that will receive benefit enrichments is more likely to pay for it in full so that its costs are not passed onto future generations.

New Investment Policy

It was determined by the review of the CPP in 1996 that to ensure the sustainability of the Plan, higher rates of return would be required than had been previously thought. Continuing to invest solely in short-term and low risk fixed income instruments was not considered to be an option since it would ultimately require a higher contribution rate. Hence, the CPP Investment Board was created to invest the assets of the Plan in a diversified portfolio with the aim of achieving higher returns without undue risk of loss. All CPP assets were transferred to the CPPIB by April 2007. The role of the CPPIB will become increasingly important as assets are expected to grow rapidly over the next 10 years with contributions to the Plan projected to exceed expenditures over this period. After 2019, a portion of investment earnings will be required to meet expenditures.

Strengthened Stewardship and Accountability

The 1997 reform also strengthened stewardship and accountability to Canadians. Specifically, the statutory periodic reviews of the Plan by the federal and provincial finance ministers were increased from once every five years to every three years. Moreover, if a triennial review reveals that major changes are required to be made to the Plan, Canadians are to be informed in advance of any such changes being made. Self-sustaining provisions were also put in place to safeguard the Plan in the event that the minimum contribution rate exceeds the legislated contribution rate and no recommendation is made by the Minister of Finance either to increase the legislated rate or maintain it.

Further to the changes of 1997, the federal, provincial and territorial finance ministers took additional steps in 1999 to strengthen the transparency and accountability of actuarial reporting on the CPP. They endorsed regular independent peer reviews of such reports and consultations by the Chief Actuary with experts on the assumptions to be used in actuarial reports. The most recent independent review of the statutory actuarial report on the CPP confirmed that the work of the Chief Actuary meets professional standards of actuarial practice and is of sound quality. To ensure the quality of future actuarial reports, the Chief Actuary continues to consult with experts in the fields of long-term demographic and economic projections.

In summary, the 1997 reform resulted in the financial sustainability of the Plan being restored and maintained as confirmed in subsequent actuarial reports. The measures implemented ensure strengthened stewardship, accountability and transparency regarding the Plan and its finances.³

³ For further historical background on the 1997 reform, the reader may refer to “Fixing the Future: How Canada’s Usually Fractious Governments Worked Together to Rescue the Canada Pension Plan” by Bruce Little.

C. Steady-State Funding of the CPP

Steady-state funding is a partial funding approach that is a hybrid of pay-as-you-go financing and full funding, where the level of prefunding depends on the best-estimate assumptions. Steady-state funding was introduced as part of the 1997 CPP reform in order to build a greater reserve of assets over time, eventually equal to about five and a half years of expenditures (i.e., an asset/expenditure or A/E ratio of 5.5) or 25 percent of Plan liabilities. As such, steady-state funding results in a funded ratio over the long term that is relatively stable. Maintaining a pay-as-you-go approach would have resulted in significant increases in the contribution rate over time to provide the same benefits. On the other hand, moving to a full-funding approach would have also created unfairness across generations, as some generations would have been required to pay higher contributions than others to cover both their own benefits and the past unfunded liability of current retirees. A partially funded approach provides a balance between pay-as-you-go and full funding and also contributes to diversifying the funding of Canada's retirement income system. This diversification in funding strengthens the system against possible fluctuations in demographic, economic, and financial market conditions.

Steady-state funding involves a steady-state contribution rate that is the lowest rate sufficient to ensure the long-term financial sustainability of the Plan without recourse to further rate increases. This rate is calculated by the Chief Actuary based on regulations set out in legislation and is part of each triennial actuarial valuation of the Plan that is made public. The steady-state contribution rate ensures the stabilization of the A/E ratio over time. Specifically, Regulations of the *Canada Pension Plan* require that the steady-state contribution rate be the lowest rate such that the A/E ratios in the tenth and sixtieth year following the third year of the most recent review period are the same.

At the time of the 1997 reform, the steady-state contribution rate was determined to be 9.9% for the years 2003 and thereafter as shown in the September 1997 (16th) Actuarial Report on the CPP. The contribution rate was thus scheduled to increase incrementally from 5.6% in 1996 to 9.9% in 2003 and to remain at that level thereafter. The legislated rate has remained at 9.9% in accordance with the schedule. In subsequent actuarial reports on the Plan, the steady-state contribution rate and more recent minimum contribution rate have been determined to be 9.8%. As these rates have been 0.1 percentage points lower than the legislated rate of 9.9%, the funded status of the Plan has increased more quickly than originally anticipated. Under the 23rd CPP Actuarial Report with the legislated rate of 9.9%, the A/E ratio is expected to grow to 5.5 by 2019 and 6.0 by 2050, and the funded level of the Plan is expected to reach about 25% by 2025.

Table 3 shows the projected financial status of the CPP using the legislated contribution rate of 9.9%.

Table 3 Projected Financial Status*
 (\$ million)

Year	PayGo Rate (%)	Contribution Rate (%)	Contributory Earnings	Contributions	Expenditures	Net Cash Flow	Investment Earnings	Assets at 31 Dec.	Yield (%)	Asset/Expenditure Ratio
2007	8.35	9.90	331,200	32,789	27,665	5,124	6,785	125,490	5.82	4.31
2008	8.48	9.90	343,669	34,023	29,149	4,874	7,344	137,707	5.72	4.47
2009	8.63	9.90	356,699	35,313	30,773	4,540	7,856	150,104	5.60	4.62
2010	8.78	9.90	370,305	36,660	32,504	4,156	8,351	162,611	5.47	4.74
2011	8.90	9.90	385,232	38,138	34,299	3,839	8,838	175,288	5.36	4.84
2012	9.04	9.90	400,338	39,633	36,195	3,438	9,953	188,680	5.61	4.93
2013	9.18	9.90	416,806	41,264	38,249	3,015	11,269	202,963	5.92	5.02
2014	9.29	9.90	434,853	43,050	40,414	2,636	12,746	218,345	6.23	5.11
2015	9.41	9.90	454,172	44,963	42,729	2,234	14,386	234,965	6.55	5.20
2016	9.52	9.90	474,661	46,991	45,202	1,789	16,360	253,115	6.93	5.29
2017	9.63	9.90	496,827	49,186	47,843	1,343	17,552	272,010	6.91	5.37
2018	9.75	9.90	519,263	51,407	50,643	764	18,774	291,549	6.89	5.44
2019	9.88	9.90	542,573	53,715	53,601	114	20,027	311,689	6.87	5.49
2020	10.01	9.90	566,677	56,101	56,731	(630)	21,300	332,360	6.84	5.54
2021	10.15	9.90	591,647	58,573	60,026	(1,453)	22,607	353,514	6.82	5.57
2022	10.28	9.90	617,378	61,120	63,468	(2,348)	23,928	375,095	6.80	5.59
2023	10.42	9.90	643,966	63,753	67,080	(3,327)	25,281	397,048	6.78	5.60
2024	10.55	9.90	671,707	66,499	70,852	(4,353)	26,651	419,346	6.76	5.61
2025	10.67	9.90	700,665	69,366	74,756	(5,390)	28,031	441,987	6.74	5.61
2026	10.77	9.90	731,095	72,378	78,763	(6,385)	29,447	465,049	6.72	5.61
2027	10.85	9.90	763,246	75,561	82,848	(7,287)	30,968	488,731	6.72	5.62
2028	10.92	9.90	796,795	78,883	87,029	(8,146)	32,524	513,108	6.72	5.62
2029	10.97	9.90	832,253	82,393	91,339	(8,946)	34,128	538,290	6.72	5.62
2030	11.02	9.90	869,269	86,058	95,767	(9,709)	35,789	564,370	6.72	5.63
2031	11.06	9.90	906,667	89,760	100,308	(10,548)	37,507	591,328	6.72	5.63
2032	11.08	9.90	946,759	93,729	104,942	(11,213)	39,292	619,407	6.72	5.65
2033	11.09	9.90	988,698	97,881	109,682	(11,801)	41,138	648,744	6.72	5.66
2034	11.10	9.90	1,032,270	102,195	114,562	(12,367)	43,092	679,469	6.72	5.68
2035	11.10	9.90	1,077,823	106,704	119,607	(12,903)	45,143	711,709	6.72	5.70
2040	11.06	9.90	1,336,186	132,282	147,807	(15,525)	57,071	899,772	6.72	5.83
2045	11.13	9.90	1,645,065	162,861	183,065	(20,204)	72,251	1,138,870	6.72	5.96
2050	11.29	9.90	2,014,667	199,452	227,357	(27,905)	90,885	1,431,573	6.72	6.03
2055	11.43	9.90	2,463,571	243,894	281,686	(37,792)	113,256	1,782,723	6.72	6.07
2060	11.49	9.90	3,021,575	299,136	347,272	(48,136)	140,276	2,207,491	6.72	6.10
2065	11.43	9.90	3,723,098	368,587	425,502	(56,915)	174,003	2,739,396	6.72	6.18
2070	11.36	9.90	4,588,166	454,228	521,373	(67,145)	217,219	3,421,353	6.72	6.30
2075	11.40	9.90	5,633,966	557,763	642,185	(84,422)	271,914	4,282,683	6.72	6.39
2080	11.50	9.90	6,896,361	682,740	793,321	(110,581)	339,313	5,342,094	6.72	6.45

* Table 3 corresponds to Table 11 in the 23rd CPP Actuarial Report.

IV. Analysis of Unfunded Obligations of the CPP

This section presents an analysis and comparison of the unfunded obligations and associated funded ratios of the Plan under different closed and open group methodologies. The unfunded obligation, that is, the unfunded liability, is determined by subtracting the Plan's assets from its actuarial liabilities. The resulting difference, if any, is the amount of the obligation that is not covered by assets, and hence is termed "unfunded". The funded ratio is determined by dividing the Plan's assets by its liabilities (obligations), which similarly provides an indication of the extent to which the Plan's obligations are covered by its assets.

A closed group includes only past and current members of a plan, with no new entrants permitted. In comparison, an open group is one which includes all past, current and future members of a plan. Two types of closed groups will be discussed in this section: a closed group without future benefit accruals for the group's members, and a closed group with future accruals for members. The methodology used in the 23rd CPP Actuarial Report to value the Plan's liabilities is based on a closed group without future benefit accruals. This methodology along with others is discussed in this section.

For all of the methodologies discussed below, it is assumed that future contributions are determined using the legislated contribution rate of 9.9%. It is also assumed that the assets of the Plan are invested in the best-estimate portfolio of the 23rd Actuarial Report on the CPP and consist ultimately of 50% equity, 40% fixed income securities and 10% inflation-sensitive assets, such as real estate and infrastructure. The ultimate annual real return on this portfolio is assumed to be 4.2%.

A. Closed Group Without Future Accruals

For this group, no new entrants to the Plan are permitted and current plan participants who are not receiving benefits at the valuation date are assumed to make no further contributions beyond that date. Contributors' projected benefits are calculated by assuming that they have no pensionable earnings from the valuation date up to the year of benefit uptake. Further, for the purposes of this study, pensionable earnings prior to the valuation date are assumed to be eligible for increases in line with inflation or wages, depending on the methodology used, for the purpose of calculating the benefit. For beneficiaries, benefits received are increased annually in line with inflation only as provided under the current Plan.

Three methodologies are discussed below with respect to a closed group without future accruals. It should be noted that all three consider only the accrued benefits as at the valuation date. The Plan's assets and liabilities are valued on a termination basis, somewhat consistent with how occupational defined benefit pension plans are valued. However, whereas a solvency valuation assumes that a plan is terminated on the valuation date and that all accrued benefits are settled by way of lump-sum payments and annuity purchases, there is no such settlement market for CPP benefits. Therefore, while occupational pension plans use market rates for solvency valuations, it is appropriate for the CPP to use a long-term discount rate to determine the Plan's liabilities.

1. Current Methodology

Under the current methodology used to evaluate the financial status of the CPP, the actuarial liability of the Plan is estimated on a termination basis using the projected unit credit actuarial cost method. This method is widely used for the actuarial valuations of occupational defined benefit pension plans. Under this method, the benefits that will be paid in respect of CPP participation up to and including the valuation date must first be projected. This projection is based on the best-estimate assumptions of the Plan with the following exceptions:

- No new entrants to the workforce are included; and
- Current Plan participants who are not receiving benefits at the valuation date are assumed to make no further contributions beyond that date. Their projected benefits are calculated by assuming they will have no pensionable earnings from the valuation date up to the year of benefit uptake. The YMPE is still projected in line with wage increases because pre-valuation date pensionable earnings are still indexed to the year of benefit uptake.

The maximum contributory period for each Plan participant is 47 years; that is, from age 18 to 65. Some periods of low pensionable earnings may be excluded from the benefit calculation by reason of pensions commencing after age 65, disability, child-rearing for a child less than seven years of age and the 15% dropout provisions. By dropping 15% of the years with the lowest pensionable earnings, the maximum contributory period decreases from 47 to 40 years. A participant's retirement pension is equal to 25% of the average of the YMPE for the year of his or her retirement and the four previous years, referred to as the Maximum Pensionable Earnings Average (MPEA), adjusted to take into account the contributor's pensionable earnings. For this purpose, the contributor's pensionable earnings for any given month are indexed by the ratio of the MPEA for the year of retirement to the YMPE for the year to which the given month belongs. It follows that if a contributor paid contributions on earnings equal to the YMPE for thirty years, his average adjusted earnings would be determined by multiplying his MPEA by the ratio of 30/40 since he did not contribute for ten years.

The resulting projected expenditures are next discounted using the projected rate of return on the overall CPP assets to determine their present value. This is the actuarial liability of the Plan. The actuarial position (balance sheet) of the Plan on a termination basis as at 31 December 2006 is presented in Table 4 together with those of two other closed group methodologies, discussed below for comparison. As at 31 December 2006, the Plan's unfunded obligation and funded ratio were \$620 billion and 15.5%, respectively.

The unfunded obligation and corresponding low funded ratio of the Plan may be viewed as worrisome to stakeholders who are not familiar with the funding objectives of the CPP. With the Plan amendments introduced in 1998, the Plan has been moving away from pure pay-as-you-go financing (with a small contingency reserve) towards fuller funding. Therefore, the funding of the Plan is expected to increase from its current level of over 15% in 2006 to a level of about 25% by 2025, thus reducing the relative size of the Plan's unfunded obligation. However, it should be noted that fully funding the Plan was not an objective of the amendments.

If the Plan were fully funded, the asset/expenditure ratio would be about 26.5 instead of 4.1 as at 31 December 2006. This ratio will vary in future years in accordance with demographic and economic experience and any assumption changes.

The following Chart 1 shows the evolution of the funded ratio, while Chart 2 shows the projected growth rates of the assets and liabilities.

Chart 1 Evolution of CPP Funded Ratio
 (9.9% contribution rate for 2010+)

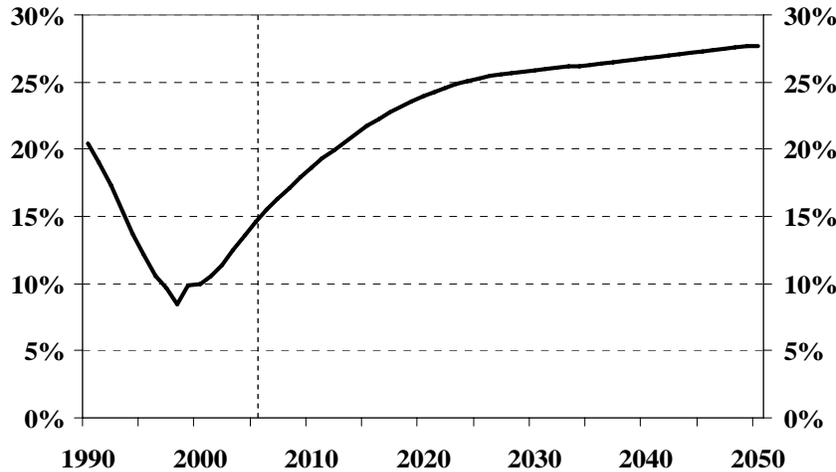
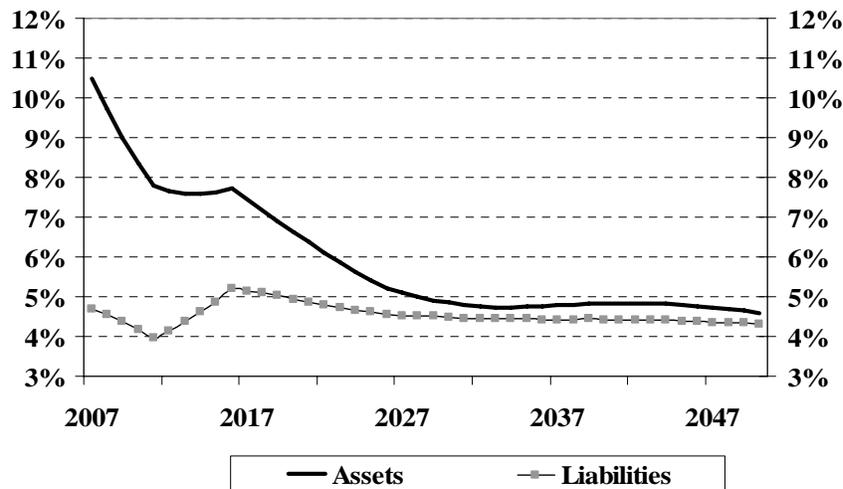


Chart 2 Annual Growth Rates of CPP Assets and Liabilities



Until 1985, the Plan was accumulating assets more rapidly than its liabilities were growing, resulting in assets worth about six times annual expenditures by the end of 1985 (see Table 1 in subsection III.A.). In 1990, the Plan’s funded ratio was slightly above 20%. However, from 1985 until the later part of the 1990s, asset growth slowed compared to liability growth in response to changing demographic and economic conditions. The Plan’s funded ratio reached a low of 8.5% in 1998. During the period from 1993 to 1998, the asset growth rate was negative because a portion of assets, in addition to all contributions and investment earnings, were needed to pay benefits. This trend was reversed by the CPP amendments which became effective on 1 January 1998.

Chart 2 shows that assets are projected to grow more quickly than liabilities in the short to medium term, and thereafter grow at a slightly higher rate. This will result in the assets growing to a stable level of between five and six years of expenditures from its current level of about four over the next few decades. This is a clear indication that the 1998 amendments have been successful in

improving the Plan's financial status over the foreseeable future since asset growth significantly outpaces liability growth over the next twenty years. During that period the baby boom generation will have retired and, as a result of the baby bust, fewer young Canadians will replace them in the workforce. Once the Plan has reached the funded level of about 25%, the long-term asset growth rate must be at least equal to the liability growth rate to ensure long-term financial sustainability. As shown in Chart 2, the asset and liability growth rates will stabilize at about 5% over the long term, making the Plan financially sustainable.

2. Alternative Methodology #1: Drop-Outs Limited to Years Prior to Valuation Date

In occupational defined benefit pension plans, drop-out provisions do not exist, so the actuarial liability is determined based on the maximum contributory period. That is, rather than reducing the contributory period from 47 to 40 years, the maximum contributory period remains 47 years and a participant's average adjusted earnings are determined by multiplying the participant's MPEA by, for example, 30/47. Thus, a participant's stream of benefits is lower, as is the plan's actuarial liability compared to the current methodology employed for the CPP.

However, it is not appropriate to ignore the drop-out provision when calculating the actuarial liability of the CPP. Instead, an alternative methodology has been developed. Specifically, instead of allowing each member to drop 15% of the maximum contributory period of 47 years, members will be allowed to drop 15% of the period up to the valuation date. Thus, if a member has been eligible to contribute for a period of 30 years prior to the valuation date, only 15% of those years (4, in this example) will be dropped and the member's average adjusted earnings will be determined by multiplying his MPEA by 30/43 rather than 30/40. The result is a lower actuarial liability for the Plan and thus a lower unfunded obligation. As at 31 December 2006 the unfunded obligation and funded ratio under this methodology are \$598 billion and 16%, respectively. The balance sheet for the CPP using this alternative methodology is presented in Table 4.

3. Alternative Methodology #2: Drop-Outs Limited to Years Prior to Valuation Date, and Future Salaries Indexed to Inflation (Observation of Independent Peer Review Panel)

Following the Independent Peer Review of the 23rd CPP Actuarial Report, the panel discussed alternative methods for calculating the actuarial liability in order to be more consistent with occupational defined benefit pension plan practice. The independent reviewers noted that, unlike the actuarial valuation methodology used for the CPP, actuarial valuations of occupational pension plans include future benefit accruals for the purpose of projecting benefits, and that the accrued benefits are then determined by prorating the present value of the projected benefits by the ratio of accrued service as at the valuation date to the total projected service. As such, the valuation methodology used for the CPP results in a higher actuarial liability compared to occupational plan valuations, as noted in the 23rd CPP Peer Review Report.

As mentioned in the previous subsection, occupational defined benefit pension plans do not have a drop-out provision and therefore, all years in the contributory period are counted in the valuation. In addition, such plans normally do not assume an annual wage increase for projected salaries. Instead, when these plans are valued on a termination basis, future salaries are indexed to inflation only (as measured by increases in the CPI).

Thus, the second alternative methodology for determining the actuarial liability assumes that the 15% general drop-out period is limited to the contributory period prior to the valuation date and that future salary increases are limited to increases in the CPI. Consistent with that, the YMPE is indexed only to increases in the CPI rather than to wages (CPI plus a real wage increase). As at 31 December 2006, the unfunded obligation and funded ratio under this methodology are

\$560 billion and 17%, respectively. The balance sheet for the CPP using this second alternative methodology is shown in Table 4.

Table 4 Balance Sheet as at 31 December 2006 for the Closed CPP Group Without Future Benefit Accruals – Comparison of Methodologies (9.9% contribution rate)

Present Value as at 31 December (in \$ billion)*	Current CPP	Alternative #1: Drop-Outs Limited to Years Prior to Valuation Date	Alternative #2: Drop-Outs Limited to Years Prior to Valuation Date, and Future Salaries Indexed to Inflation
Assets and Contributions			
Current Assets	114	114	114
Future Contributions	0	0	0
Total Assets (a)	114	114	114
Liabilities			
Current Benefits	250	250	250
Future Benefits	484	462	424
Total Liabilities (b)	734	712	674
Unfunded Obligation (b) – (a)	620	598	560
Funded Ratio (a)/(b)	15.5%	16.0%	16.9%

* Benefit values shown include associated administrative expenses.

B. Closed Group With Future Accruals

For this group, no new entrants to the Plan are permitted, and current Plan participants who are not receiving benefits at the valuation date are assumed to continue contributing to the Plan beyond that date. Thus, current Plan members also continue to accrue benefits with future salary increases in line with wage increases. As a result, the obligations side of the balance sheet includes the present value of future benefits for current Plan participants, while the assets side includes the present value of their future contributions, as shown in Table 5. The unfunded obligation and funded ratio under this methodology as at 31 December 2006 are \$361 billion and 66%, respectively. The balance sheet for the CPP using this alternative methodology is presented in Table 5 together, for comparison, with those for the current CPP methodology and open group methodology, discussed next.

C. Open Group

An open group is defined as one which includes all past, current and future members of a plan, where the plan is considered to be ongoing into the future, that is, over an extended time horizon. This means that future contributions of current and new members and their associated benefits are included in order to determine whether current assets and future contributions will be sufficient to pay for all future benefits.

As at 31 December 2006 under the open group methodology, there is no unfunded obligation, and excess funds result giving a funded ratio greater than 100%, as shown in Table 5 below. This indicates that the Plan is fully funded with assets sufficient to cover liabilities over the long term. As mentioned earlier, the assets are assumed to be invested in the best-estimate portfolio of the 23rd CPP Actuarial Report. In addition, future contributions are calculated using the current legislated contribution rate of 9.9%.

The inclusion of the present value of future contributions and expenditures in the calculation of the Plan's net cash flows shows that the Plan is fully funded in the long-term, able to meet its financial obligations and sustainable over the 75-year projection period.

Table 5 Balance Sheet as at 31 December 2006 for the CPP: Groups With and Without Future Benefit Accruals – Comparison of Methodologies (9.9% contribution rate)

Present Value as at 31 December (in \$ billion)*	Methodology		
	Excluding Future Benefit Accruals	Including Future Benefit Accruals	
		Current CPP (closed group)	Closed Group
Assets and Contributions			
Current Assets	114	114	114
Future Contributions	0	590	1,418
Total Assets (a)	114	704	1,532
Liabilities			
Current Benefits	250	250	250
Future Benefits	484	815	1,279
Total Liabilities (b)	734	1,065	1,529
Unfunded Obligation (b) – (a)	620	361	-3
Funded Ratio (%) (a)/(b)	15.5%	66.1%	100.2%

* Benefit values shown include associated administrative expenses.

Compared to the closed CPP group with accruals and the open CPP group, the unfunded obligation for the closed CPP group without accruals (current CPP methodology) is larger and the funded ratio is smaller, as shown in Table 5. This is because there are no future accruals in the Plan as well as no future contributions. The value of future contributions more than offsets the value of the associated future benefit accruals, and as a result the unfunded obligation decreases for the groups with accruals compared to the current methodology. The impact is greater for the open group compared to the closed group with accruals due to the additional value of contributions from new entrants compared to their benefits earned.

The current service cost, expressed as a percentage of contributory earnings, is the value of future benefits earned in respect of the current year. Under the best-estimate scenario, the current service cost for the open group for 2007 was 5.9% of projected contributory earnings. The excess contribution rate (the difference between the legislated contribution rate of 9.9% and the current service cost) is used to fund benefits that have already accrued and improve the Plan's financial position.

D. Summary of Unfunded Obligations

The following Table 6 summarizes the unfunded obligations of past, current and future Plan participants for 2006 and 2019 for the three types of groups, assuming the best-estimate assumptions of the 23rd CPP Actuarial Report, with a legislated contribution rate of 9.9% and an expected real rate of return of 4.2%. The year 2019 corresponds to the last year that contributions are projected to meet all expenditures, after which a proportion of investment earnings will be required to cover the difference, as projected under the current CPP valuation methodology (closed group without future accruals) and shown in the 23rd CPP Actuarial Report.

Table 6 Balance Sheet Summary as at 31 December 2006 and 2019 for the CPP: Groups With and Without Future Benefit Accruals
(9.9% contribution rate)

Present Value as at 31 December (in \$ billion)*	2006	2019
<i>Closed Group Without Future Accruals (current methodology)</i>		
Liabilities		
Current Benefits	250	529
Future Benefits	484	793
Total Liabilities (a)	734	1,322
Less Assets		
Current Assets	114	312
Future Contributions	0	0
Total Assets (b)	114	312
Equals Unfunded Obligation (c) = (a) – (b)	620	1,010
Funded Ratio (b)/(a)	15.5%	23.6%
<i>Closed Group With Future Accruals</i>		
Liabilities		
Current Benefits	250	529
Future Benefits	815	1,366
Total Liabilities (d)	1,065	1,895
Less Assets		
Current Assets	114	312
Future Contributions	590	971
Total Assets (e)	704	1,283
Equals Unfunded Obligation (f) = (d) - (e)	361	612
Change in Unfunded Obligation (f) – (c)	-259	-398
Funded Ratio (e)/(d)	66.1%	67.7%
<i>Open Group</i>		
Liabilities		
Current Benefits	250	529
Future Benefits	1,279	2,041
Total Liabilities (g)	1,529	2,570
Less Assets		
Current Assets	114	312
Future Contributions	1,418	2,266
Total Assets (h)	1,532	2,578
Equals Unfunded Obligation (i) = (g) – (h)	-3	-8
Change in Unfunded Obligation (i) – (f)	-364	-620
Funded Ratio (h)/(g)	100.2%	100.3%

* Benefit values shown include associated administrative expenses.

Table 6 shows that for the closed group without future accruals (current methodology), the unfunded obligation increases from \$620 billion to \$1,010 billion between 2006 and 2019. Despite the growth in the unfunded obligation, the funded ratio improves from 15% to 24% over the same period. Net cash flows to the Plan are expected to continue to be positive until 2019. In addition, expected investment returns are 4.2 percentage points above inflation. Thus, positive net cash flows and strong investment returns result in Plan assets growing at a faster rate than liabilities, which improves the funded ratio of the Plan.

The closed group with future accruals includes future contributions and benefits for current contributors in the calculation of the unfunded obligation. As the future contributions more than cover the associated future benefits earned, the unfunded obligation decreases compared to the closed group without future accruals. Between 2006 and 2019, the unfunded obligation for the closed group with future accruals increases from \$361 billion to \$612 billion. The funded ratio is stable at around 67% in both years.

The open group includes future contributions and benefits for both current and future contributors in the calculation of the unfunded obligation. Thus, the unfunded obligation decreases compared to both of the closed groups. In fact, the unfunded obligation is eliminated in this case and the Plan is fully funded. Between 2006 and 2019, the excess amount of the Plan's total assets over total obligations increases slightly from \$3 billion to \$8 billion, and the funded ratio remains stable at slightly over 100%. The inclusion of the future contributions and benefits of future Plan members demonstrates that the Plan is fully funded in the long term. The fully funded status results from the fact that the future contributions paid at 9.9% of contributory earnings are more than sufficient to pay the associated benefits. The accumulated excess contributions in combination with investment earnings thereon both pay accrued benefits and build a greater fund. This greater fund in turn provides additional capacity toward mitigating the impact on the Plan's finances from future adverse environments.

V. Open Group Modified Balance Sheet

A. Best-Estimate Scenario

In this subsection an open group balance sheet is presented in a modified form, such that the pay-as-you-go and funded components of the Plan are shown separately in order to analyze the assets and liabilities under each component. This modified balance sheet is first discussed for the best-estimate scenario of the 23rd CPP Actuarial Report. Sensitivity analysis of the components of the modified balance sheet under different demographic, economic and financial market environments than those projected under the best-estimate scenario is then provided in subsection B. The purpose of this analysis is to illustrate the sensitivity of the long-term financial position of the Plan under the best-estimate assumptions to possible changes in the future demographic, economic and financial market environments. The scenarios presented provide just a few examples of what could happen in the future, and are not evaluated for their respective probabilities of occurrence.

As discussed in section III, the CPP is financed using a steady-state contribution rate methodology that stabilizes the asset/expenditure ratio over time. This approach to financing the Plan is a form of partial funding, that is, a hybrid of pay-as-you-go financing and full funding. This hybrid nature of partial funding allows for part of a current year's expenditures to be financed from the same year's contributions, stemming from the pay-as-you-go component of the Plan. The remaining expenditures, if any, are covered using the underlying pension fund from the funded component of the Plan. Although there is a funded component to steady-state funding, its goal is not to fully fund the Plan. Rather, by stabilizing the assets at a level of about five and a half times the amount of expenditures, steady-state funding ensures that the Plan's contributions remain the primary source for covering the Plan's expenditures.

Table 7 presents the separation of the projected contributions and expenditures into the pay-as-you-go and the funded components of the CPP under the best-estimate scenario and the legislated 9.9% contribution rate. By definition, under the pay-as-you-go component, the contributions and expenditures are exactly equal every year. Contributions for the funded component exist as long as the current year's contributions exceed the same year's expenditures. These excess contributions are added to the Plan's assets, which are invested by the CPPIB. The 23rd CPP Actuarial Report projects that contributions will exceed expenditures up to and including 2019. Starting in 2020, the expenditures are then projected to be higher than contributions. These excess expenditures are allocated to the funded component of the Plan and are financed by the invested assets.

Table 7 Separation of CPP Contributions and Expenditures into Pay-As-You-Go and Funded Components
 (9.9% contribution rate, \$ billion)

	Pay-As-You-Go Component		Funded Component		TOTAL*	
	Contributions (a)	Expenditures (b)	Contributions (c)	Expenditures (d)	Contributions (a) + (c)	Expenditures (b) + (d)
2007	27.7	27.7	5.1	0.0	32.8	27.7
2008	29.1	29.1	4.9	0.0	34.0	29.1
2009	30.8	30.8	4.5	0.0	35.3	30.8
2010	32.5	32.5	4.2	0.0	36.7	32.5
2011	34.3	34.3	3.8	0.0	38.1	34.3
2012	36.2	36.2	3.4	0.0	39.6	36.2
2013	38.2	38.2	3.0	0.0	41.3	38.2
2014	40.4	40.4	2.6	0.0	43.1	40.4
2015	42.7	42.7	2.2	0.0	45.0	42.7
2016	45.2	45.2	1.8	0.0	47.0	45.2
2017	47.8	47.8	1.3	0.0	49.2	47.8
2018	50.6	50.6	0.8	0.0	51.4	50.6
2019	53.6	53.6	0.1	0.0	53.7	53.6
2020	56.1	56.1	0.0	0.6	56.1	56.7
2021	58.6	58.6	0.0	1.5	58.6	60.0
2022	61.1	61.1	0.0	2.3	61.1	63.5
2023	63.8	63.8	0.0	3.3	63.8	67.1
2024	66.5	66.5	0.0	4.4	66.5	70.9
2025	69.4	69.4	0.0	5.4	69.4	74.8
2026	72.4	72.4	0.0	6.4	72.4	78.8
2027	75.6	75.6	0.0	7.3	75.6	82.8
2028	78.9	78.9	0.0	8.1	78.9	87.0
2029	82.4	82.4	0.0	8.9	82.4	91.3
2030	86.1	86.1	0.0	9.7	86.1	95.8
2031	89.8	89.8	0.0	10.5	89.8	100.3
2032	93.7	93.7	0.0	11.2	93.7	104.9
2033	97.9	97.9	0.0	11.8	97.9	109.7
2034	102.2	102.2	0.0	12.4	102.2	114.6
2035	106.7	106.7	0.0	12.9	106.7	119.6
2040	132.3	132.3	0.0	15.5	132.3	147.8
2045	162.9	162.9	0.0	20.2	162.9	183.1
2050	199.5	199.5	0.0	27.9	199.5	227.4
2055	243.9	243.9	0.0	37.8	243.9	281.7
2060	299.1	299.1	0.0	48.1	299.1	347.3
2065	368.6	368.6	0.0	56.9	368.6	425.5
2070	454.2	454.2	0.0	67.1	454.2	521.4
2075	557.8	557.8	0.0	84.4	557.8	642.2
2080	682.7	682.7	0.0	110.6	682.7	793.3

* As shown in Table 3 of subsection III.C.

The open group balance sheet shown in Table 5 of section IV can be regrouped in a way that emphasizes the hybrid nature of partial funding and allows for a better understanding of how future expenditures are financed. As a first step, the assets and liabilities sides of the balance sheet are modified as follows:

- On the assets side, the present value of future contributions is separated into the present value of future contributions that cover future expenditures (pay-as-you-go component future contributions shown in column (a) of Table 7) and the present value of future contributions in excess of future expenditures (funded component future contributions shown in column (c) of Table 7).
- On the liabilities or obligations side of the balance sheet, the present value of future expenditures is similarly separated into the present value of future expenditures covered by future contributions (pay-as-you-go component future expenditures shown in column (b) of Table 7) and the present value of future expenditures not covered by future contributions (funded component future expenditures shown in column (d) of Table 7);

Then, as the second step, the open group balance sheet is regrouped by separating it into its two components: pay-as-you-go and funded. Charts 3 and 4 illustrate the two steps to construct the open group modified balance sheet.

Chart 3 Open Group Modified Balance Sheet Approach – Step 1
 (as at 31 December 2006, 9.9% contribution rate, \$ billion)

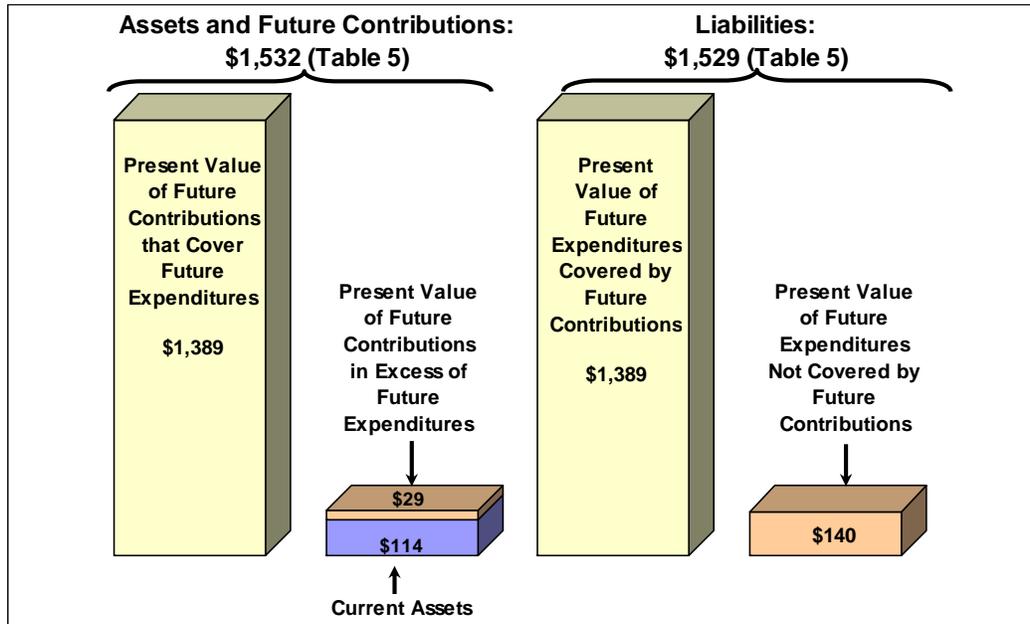


Chart 4 Open Group Modified Balance Sheet Approach – Step 2
 (as at 31 December 2006, 9.9% contribution rate, \$ billion)

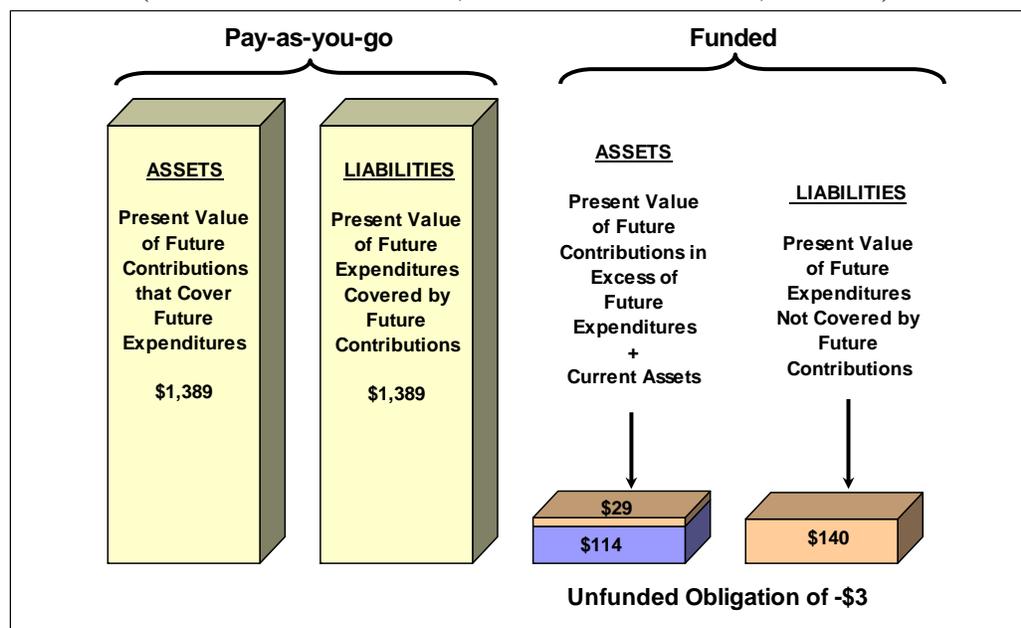


Chart 4 clearly shows that no unfunded obligation exists with respect to the pay-as-you-go component. Under pay-as-you-go financing, while both the present values of the assets and liabilities could vary depending on past experience and future actuarial assumptions, they will always remain equal. Under the funded component, an unfunded obligation results when the total assets, consisting of the invested assets and the future contributions in excess of future expenditures, are not sufficient to pay the future expenditures not covered by future contributions. In the case of the open group under the best-estimate scenario, the unfunded obligation is eliminated and excess assets result in the amount of \$3 billion.

The financial status of the funded component and its evolution over time provide meaningful measures of the financial status of the CPP. In addition, the relative sizes of the pay-as-you-go and funded obligations may be regarded as measures of the degree to which the Plan is funded. The open group modified balance sheet for years 2006 and 2019 is next shown in Table 8.

The funded component's total assets exceed its obligations by \$3 billion as at 31 December 2006, thereby eliminating the unfunded obligation. By 2019, the present value of future contributions in excess of future expenditures under the funded component disappears, since thereafter expenditures are projected to exceed contributions. However, the value of the Plan's assets increases to \$312 billion, the amount of excess assets rises further to \$8 billion, and the Plan remains fully funded in 2019 and thereafter. This confirms that under the open group methodology, the Plan is sustainable over the long term.

The decomposition of the Plan into the pay-as-you-go and funded components provides additional insight into the nature of the risks to which the CPP is exposed. Both the pay-as-you-go and funded components are subject to demographic and economic risks. The pay-as-you-go component, however, is not exposed to financial market risk since the associated cash flows are not invested. This is in contrast to the funded component, which is subject to market risk since its assets are invested. As such, it is important for this additional risk to the funded component of the Plan, and hence the Plan as a whole, to be taken into account in considering both the short-term

and long-term financial sustainability of the Plan. Moreover, this consideration will become increasingly important since the share of the funded component's obligations as a percentage of the total CPP obligations is expected to increase over time. The funded component's share of the obligations was 9% as at the end of 2006, and is projected to increase to 12% by 2019 and to 17% by 2080.

Table 8 Open Group Modified Balance Sheet – Best-Estimate Scenario
 (9.9% contribution rate)

Present Value (PV) as at 31 December (in \$ billion)	2006	2019
Pay-As-You-Go Component		
<i>Assets, Liabilities</i>		
PV of Future Contributions that Cover Future Expenditures = PV of Future Expenditures Covered by Future Contributions (a)	1,389	2,266
<i>No unfunded obligation exists for pay-as-you-go component.</i>		
Funded Component		
<i>Assets</i>		
PV of Future Contributions in Excess of Future Expenditures	29	0
<u>Current Assets</u>	114	312
Total Assets for funded component (b)	143	312
<i>Liabilities</i>		
PV of Future Expenditures Not Covered by Future Contributions (c)	140	304
Unfunded obligation with respect to funded component (d) = (c) – (b)	-3	-8
Total Plan		
Total Assets (e) = (a) + (b)	1,532	2,578
Total Liabilities (f) = (a) + (c)	1,529	2,570
Total Unfunded Obligation (g) = (f) – (e)	-3	-8
Total Funded Ratio (h) = (e)/(f)	100.2%	100.3%
Component obligations as a percentage of total obligations:		
Pay-As-You-Go (a)/(f)	91%	88%
Funded (c)/(f)	9%	12%

B. Sensitivity Analysis

This subsection shows how the open group modified balance sheet may be used to analyze the impacts of different demographic, economic and financial market environments other than those assumed under the best-estimate scenario on both the pay-as-you-go and the funded components of the Plan.

1. Younger and Older Populations

The impacts of different demographic environments on the open group modified balance sheet are illustrated in this subsection by looking at the demographic characteristics (fertility, mortality and net migration rates) of younger and older populations, as considered in the 23rd CPP Actuarial Report. All other assumptions remain unchanged relative to the best-estimate scenario. Table 9 below summarizes the demographic assumptions used as well as the minimum contribution rate for each scenario.

Table 9 Younger and Older Populations Sensitivity Tests Assumptions

Canada	Younger Population		Best-Estimate		Older Population	
Total fertility rate	1.80		1.60		1.40	
Mortality:						
Canadian life expectancy at age 65 in 2050	Males	19.6	Males	21.9	Males	23.9
	Females	21.4	Females	24.2	Females	26.6
Net migration rate	0.64%		0.54%		0.44%	
Minimum Contribution Rate	9.07%		9.82%		10.52%	

The open group modified balance sheets for the younger and older population scenarios under the 9.90% legislated contribution rate are presented in Table 10. As at 31 December 2006, the total CPP obligations are higher under the younger population (\$1,578 billion) compared to the best-estimate scenario (\$1,529 billion). This occurs since a younger population leads to an increase in the number of contributors and thus eventually to an increase in the amount of future benefits to be paid. Moreover, the obligations of the pay-as-you-go component of the Plan are higher relative to the best-estimate, while the funded component obligations are lower. Under this scenario, the high volume of contributions from the greater labour force in combination with the contribution rate of 9.9% being higher than the minimum contribution rate of 9.07% cause a substantial increase in the present value of contributions in excess of future expenditures (\$52 billion as at 31 December 2006) and a significant decrease in the obligations of the funded component (\$14 billion as at 31 December 2006). As a result, the unfunded obligation is eliminated and excess assets of \$152 billion are created as at 31 December 2006. Under the younger population scenario, the Plan is close to be fully financed on a pay-as-you-go basis since the obligations of the funded component of the Plan represent only 1% of the total.

In comparison, under the older population scenario, the total CPP obligations are lower compared to the best-estimate scenario (\$1,484 billion compared to \$1,529 billion as at 31 December 2006). This occurs since an older population implies fewer contributors and thus eventually less benefits being paid. The pay-as-you-go component obligations also decrease, and the funded component obligations increase significantly. The result is an unfunded obligation of \$99 billion as at 31 December 2006, increasing to \$217 billion by 2019. The share of the funded component obligations increases from 16% in 2006 to 21% by 2019.

Table 10 illustrates how the proportion of the obligations relating to the funded component can vary considerably in response to the given demographic environment. Further, the exposure of the Plan to financial market risk is driven by the size of the obligation of the funded component. As such, this table demonstrates the degree to which the Plan could be exposed to financial market risk depending on the demographic environment.

Table 10 Open Group Modified Balance Sheet – Younger and Older Populations
 (9.9% contribution rate)

	Younger Population		Older Population	
	2006	2019	2006	2019
Present Value (PV) as at 31 December (in \$ billion)				
Pay-As-You-Go Component				
<i>Assets, Liabilities</i>				
PV of Future Contributions that Cover Future Expenditures = PV of Future Expenditures Covered by Future Contributions (a)	1,564	2,647	1,243	1,950
<i>No unfunded obligation exists for pay-as-you-go component.</i>				
Funded Component				
<i>Assets</i>				
PV of Future Contributions in Excess of Future Expenditures	52	38	28	0
<u>Current Assets</u>	114	322	114	306
Total Assets for funded component (b)	166	360	142	306
<i>Liabilities</i>				
PV of Future Expenditures Not Covered by Future Contributions (c)	14	30	241	523
<i>Unfunded obligation with respect to funded component (d) = (c) – (b)</i>	-152	-330	99	217
Total Plan				
Total Assets (e) = (a) + (b)	1,730	3,007	1,385	2,256
Total Liabilities (f) = (a) + (c)	1,578	2,677	1,484	2,473
Total Unfunded Obligation (g) = (f) – (e)	-152	-330	99	217
Total Funded Ratio (h) = (e)/(f)	109.6%	112.3%	93.3%	91.2%
Component obligations as a percentage of total obligations:				
Pay-As-You-Go (a)/(f)	99%	99%	84%	79%
Funded (c)/(f)	1%	1%	16%	21%

2. Economic Half Cycle

The economic scenario presented in this subsection assumes an economic slowdown followed by a partial economic recovery. Under this scenario, total contributory earnings are reduced by 6% in 2009 and are followed by a partial recovery thereafter. The unemployment rate is increased in 2009 and gradually reverts to its best-estimate value over the following ten years. The real increases in average weekly earnings and average annual earnings are reduced for 2009 and then return to their best-estimate values for 2010 and thereafter. This scenario is referred to as an “Economic Half Cycle” in the 23rd CPP Actuarial Report, and its minimum contribution rate is determined to be 9.92%.

Table 11 presents the open group modified balance sheet for the economic half cycle scenario under the 9.90% legislated contribution rate. As shown, the total CPP obligations as at 31 December 2006 are lower under the economic half cycle scenario compared to the best-estimate scenario (\$1,492 billion versus \$1,529 billion). This occurs since lower total contributory earnings during the economic slowdown due to a smaller labour force and lower earnings lead to a corresponding decrease in the amount of benefits eventually paid. However, the lower contributions under this scenario result in the creation of an unfunded obligation of the funded component of \$9 billion as at 31 December 2006, which increases to \$21 billion by 2019. The funded ratio remains stable at 99% over the period 2006 to 2019.

Table 11 Open Group Modified Balance Sheet – Economic Half Cycle
 (9.9% contribution rate)

Present Value (PV) as at 31 December (in \$ billion)	2006	2019
Pay-As-You-Go Component		
<i>Assets, Liabilities</i>		
PV of Future Contributions that Cover Future Expenditures = PV of Future Expenditures Covered by Future Contributions (a)	1,353	2,195
<i>No unfunded obligation exists for pay-as-you-go component.</i>		
Funded Component		
<i>Assets</i>		
PV of Future Contributions in Excess of Future Expenditures	16	0
<u>Current Assets</u>	114	279
Total Assets for funded component (b)	130	279
<i>Liabilities</i>		
PV of Future Expenditures Not Covered by Future Contributions (c)	139	300
<i>Unfunded obligation with respect to funded component (d) = (c) – (b)</i>	9	21
Total Plan		
Total Assets (e) = (a) + (b)	1,483	2,474
Total Liabilities (f) = (a) + (c)	1,492	2,495
Total Unfunded Obligation (g) = (f) – (e)	9	21
Total Funded Ratio (h) = (e)/(f)	99.4%	99.2%
Component obligations as a percentage of total obligations:		
Pay-As-You-Go (a)/(f)	91%	88%
Funded (c)/(f)	9%	12%

3. Financial Market Volatility

In this subsection the possible impact of the volatility of equity returns is considered. Different rates of returns for Canadian and foreign equities are assumed for years 2009 and 2010 than under the best-estimate investment portfolio of the CPP. It is further assumed that the returns revert back to their best estimate values from 2011 onward. Table 12 summarizes the assumed returns on equities as well as the corresponding minimum contribution rates for the two scenarios considered.

Table 12 Financial Market Volatility Scenarios

Scenario	Annual Nominal Equity Returns	
	in 2009 and 2010	Minimum Contribution Rate
Positive Returns	+20%	9.66%
Negative Returns	-10%	9.98%

Two points in particular should be noted with respect to financial market volatility:

- Since the volatility in equity returns occurs after 31 December 2006, the assets remain the same under the positive returns, negative returns and best-estimate scenarios as at 31 December 2006 with the legislated contribution rate of 9.9%.
- Financial market volatility does not affect total CPP liabilities. As such, under both market volatility scenarios, the liabilities of the pay-as-you-go and funded components remain the same as under the best-estimate scenario with the legislated contribution rate of 9.9%.

As a result of both the assets and liabilities remaining unchanged as at 31 December 2006, the open group modified balance sheet as at that date with a 9.9% contribution rate is the same under the positive returns, negative returns, and best-estimate scenarios.

Table 13 presents the open group modified balance sheets for the two market volatility scenarios under the legislated contribution rate of 9.9%.

Table 13 Open Group Modified Balance Sheet – Financial Market Volatility
(9.9% contribution rate)

Present Value as at 31 December (in \$ billion)	Positive Returns		Negative Returns	
	2006	2019	2006	2019
Pay-As-You-Go Component				
<i>Assets, Liabilities</i>				
PV of Future Contributions that Cover Future Expenditures = PV of Future Expenditures Covered by Future Contributions (a)	1,389	2,266	1,389	2,266
<i>No unfunded obligation exists for pay-as-you-go component.</i>				
Funded Component				
<i>Assets</i>				
PV of Future Contributions in Excess of Future Expenditures	29	0	29	0
<u>Current Assets</u>	114	362	114	262
Total Assets for funded component (b)	143	362	143	262
<i>Liabilities</i>				
PV of Future Expenditures Not Covered by Future Contributions (c)	140	304	140	304
Unfunded obligation with respect to funded component (d) = (c) – (b)	-3	-58	-3	42
Total Plan				
Total Assets (e) = (a) + (b)	1,532	2,628	1,532	2,528
Total Liabilities (f) = (a) + (c)	1,529	2,570	1,529	2,570
Total Unfunded Obligation (g) = (f) – (e)	-3	-58	-3	42
Total Funded Ratio (h) = (e)/(f)	100.2%	102.3%	100.2%	98.4%
Component obligations as a percentage of total obligations:				
Pay-As-You-Go (a)/(f)	91%	88%	91%	88%
Funded (c)/(f)	9%	12%	9%	12%

Under the positive returns scenario, the funded ratio increases slightly to 102% by 2019 after two years of strong returns and continues to improve slightly thereafter. This increase in the funded status provides additional room to absorb the impact of future adverse financial markets or other environments.

Under the negative returns scenario, the funded ratio drops slightly to 98% after the market shock, and the unfunded obligation reaches \$42 billion by 2019. In this case, there is less room to absorb any future negative impacts on the Plan's finances.

The provisions of the *Canada Pension Plan* including its strong regular review process ensure the continual monitoring and management of the financing of the Plan. The sensitivity analyses presented in this subsection in particular underscore the importance of managing the risks that the Plan could face from varying demographic, economic or financial market environments. The CPP is unique in terms of the structure and long-term nature of its obligations, the associated contributions and assets that must cover those obligations, and the dynamics between them. Further, although the main source of financing the Plan's future expenditures comes from future contributions, the importance of the funded portion of the Plan increases over time. As such, ensuring the Plan's long-term financial sustainability requires regularly assessing the characteristics of and relationship between its assets and obligations.

VI. Actuarial Balance

Another method for analyzing the sustainability of the Plan on an open group basis is to calculate a financial measure known as the actuarial balance. The actuarial balance is basically the difference between annual income and expenditures expressed as a percentage of contributory earnings and is summarized over a selected projection period. An actuarial balance of zero for any period indicates that the estimated cost for the period is met, on average, with assets remaining at the end of the period equal to the following year's expenditures. A negative actuarial balance indicates that, over the period, the present value of income to the program plus existing assets is less than the present value of program expenditures plus the cost of accumulating assets equivalent to one year's expenditures by the end of the period.

A. Actuarial Balance over a 75-Year Horizon

The actuarial balance is a measure used by the Old-Age, Survivors, and Disability Insurance (OASDI) program in the United States (also known as U.S. Social Security), so calculating it for Canada allows a comparison between the financial statuses of the social security programs available in both countries. The following table summarizes the actuarial balances over a 75-year horizon for the CPP and the OASDI as at 31 December 2006.

Table 14 Components of 75-Year Actuarial Balance Using Best-Estimate Assumptions (2007-2081)^(1,2)

Item:	CPP	OASDI ⁽³⁾
Present Value as at 31 December 2006 (in \$ billions)		
a. Contribution Revenue (income)	1,100	34,113
b. Plan Expenditures	1,161	40,876
c. Plan Expenditures minus income (b-a)	60	6,763
d. Fund assets at start of period	114	2,048
e. Open group funded obligation (d-c)	53	-4,715
f. Ending fund target	6	361
g. Income minus cost, plus assets at start of period, minus ending fund target (a-b+d-f)	47	-5,076
h. Contributory Earnings	11,113	259,783
Percent of Contributory Earnings		
Actuarial Balance (100 x g ÷ h)	0.42	-1.95

(1) Benefit values shown include associated administrative expenses.

(2) Totals may not equal the sums of rounded components

(3) From 2007 SSA Trustees Report page 58, Table IV.B5

The figures in the above table for the OASDI program have been updated according to the 2009 SSA Trustees Report. According to that report, the 75-year actuarial balance for the period 2009-2083 under the intermediate assumptions is -2.00.

The positive actuarial balance of the CPP confirms its sustainability under its current legislation and assumptions, while the negative actuarial balance of the OASDI is an indicator that the program in its current form is not sustainable over the long term.

B. Actuarial Balance of the CPP Pre-Reform

In 1993, the CPP faced a situation similar to that of the OASDI today. At that time, a contribution rate schedule was set for a twenty-five year period. At the conclusion of each quinquennial federal-provincial review, the rates for the last twenty years in the twenty-five year schedule were confirmed or revised and the schedule was extended for an additional five years. In addition to the twenty-five year schedule, a fifteen-year formula prescribed by regulation would come into

operation in the absence of agreement or recommendation at subsequent quinquennial federal-provincial reviews.

The 15th Actuarial Report on the Canada Pension Plan (15th CPP Actuarial Report) as at 31 December 1993 showed from the projected Plan cash flows that the assets were exhausted by the end of 2015, but then gradually built back up due to significant increases to the contribution rate. This revised contribution rate schedule showed the Plan to be in balance over a 75-year period; however, the contribution rate rose to a level of 15.55% in 2031 before decreasing to 13.92% at the end of the projection period.

These projected contribution rates were deemed unacceptable since future generations would be paying much higher rates than previous generations for essentially the same benefits. Instead, Plan stakeholders chose to improve the Plan such that fairness and sustainability were restored by implementing the amendments described in section III of this study. The actuarial balance remained positive, but, more importantly, a stable contribution rate of 9.9% was achieved such that intergenerational equity improved.

The Plan's financial situation in 1993 can also be compared to its situation today. The contribution rate schedule in the 15th CPP Actuarial Report showed a rate of 9.9% in 2015. If, instead of further increases, the rate were held constant at 9.9% after 2015 with no other changes to the Plan, the actuarial balance of the Plan would have been -2.69% of contributory earnings. As discussed in section III, Plan stakeholders implemented a series of amendments to put the Plan on secure financial footing. The result is a positive actuarial balance of 0.42% of contributory earnings as at 31 December 2006.

VII. Internal Rate of Return

A. CPP Internal Rate of Return

With the contribution rate at 9.9%, current and future contributors are contributing more to the Plan compared to past contributors. However, all cohorts are still expected to realize a positive internal rate of return on their contributions, as discussed below.

The internal rate of return, calculated for a group of CPP participants born in a given year (i.e. a cohort) is the unique interest rate resulting from the equality of:

- The present value of past and future contributions paid or expected to be paid by and in respect of that cohort, and
- The present value of past and future benefits earned or expected to be earned by that cohort.

Accordingly, actual internal rates of return cannot be determined until the last member of the cohort has died. However, they can be estimated based on historical and projected experience of the cohort. Internal rates of return have been calculated on the basis of the best-estimate assumptions of the 23rd CPP Actuarial Report, using the legislated contribution rate of 9.9%.

The results presented in Table 15 below do not include the administrative expenses associated with the benefits for a given cohort. Also, the results are presented as both nominal and real internal rates of return. Real internal rates of return were determined by adjusting both contributions and benefits in order to remove the impact of inflation.

Table 15 Internal Rates of Return by Cohort
 (annual percentages)

Birth Year	Nominal	Real
1940	10.4	6.2
1950	7.2	4.1
1960	5.6	3.0
1970	4.9	2.4
1980	4.8	2.2
1990	4.7	2.2
2000	4.7	2.2

The higher internal rates of return for earlier cohorts indicate that they are expected to receive better value from the CPP than those who follow. The differences provide an indication of the degree of intergenerational transfer present in the Plan. However, the fact that all of the rates in the table are greater than zero shows that each cohort is expected to realize a positive return from its investment in the CPP. In fact, as the next subsection discusses, it would be almost impossible to purchase an annuity product in the current private market that is similar to the CPP retirement pension that also provides a rate of return as generous as the CPP.

B. CPP Comparison with the Private Annuity Market

The purpose of this subsection is to compare the internal rate of return for CPP retirement beneficiaries with the return that one could expect to receive if purchasing a similar annuity in the private market. To do so, a private Canadian insurer was contacted for quotations on a fully indexed life annuity with no guarantee period and a lump sum payment of \$10,000. It should be noted that the market for purchasing private annuities in Canada is quite small.

For the contacted insurer, the annuity's underlying assumptions were not known, including the mortality rates and the rate of return. However, by assuming that the annuity mortality rates are equal to those of the CPP, the rate of return can then be solved for. That is, the solved-for rate of return is the return that the private insurer is able to offer for a benefit equivalent to that offered by the CPP, assuming the same mortality rates. It should be noted that the CPP rates of mortality apply to the general population and may be higher than the rates assumed by the insurer. In general, older individuals who purchase annuities are in better health than the general population and expect to receive annuity payments well into the future. As a result, for the given premium and initial benefit provided by the insurer, the rate of return estimated for this study could be slightly lower than the actual rate used by the insurance company.

As discussed in the previous subsection, CPP cohorts born on and after 1980 are expected to earn an annual real rate of return of 2.2%. For a similar benefit purchased from a private insurer, an annuitant's initial investment will yield a smaller rate of return, usually less than 1% real. In particular, this means that the insurer charges a higher premium than the CPP for the same benefit. The answer to the question why are private insurers not able to offer an annuity that is competitive with the CPP includes several factors, in particular, the difference in how risks are allocated amongst parties of an insurance contract versus the allocation of risks within the CPP.

The CPP is a fully indexed plan, largely financed from wage-linked contributions (pay-as-you-go component of the Plan) and is thus affected by inflation. As the rate of inflation increases, benefits paid rise; however, there is also a corresponding rise in contributions due to the increase in nominal wages (from the combination of inflation and real wage increase). The increase in revenues to the CPP fund from contributions mitigates the increase in benefits paid. In comparison, for private annuities indexed to inflation, insurers are subject to the risk of being able to make the annuity payments regardless of the level of inflation. The insurer is thus subject to the risk of mispricing their annuity product due to assuming too low a level of inflation, although this risk could be mitigated by linking the product's supporting assets to inflation. To further hedge the risk posed by inflation, private insurers may charge a significant premium.

The insurer is subject to another type of risk, namely investment risk if the periodic annuity payments are guaranteed to the annuitant. This will generally increase the cost. In comparison, only part of the CPP's assets, from the funded component of Plan, is exposed to investment risk.

Another risk facing insurers that offer annuities is longevity risk, since those who purchase annuities tend to be in good health and so expect and are likely to receive annuity payments well into the future. In comparison, unhealthy individuals are unlikely to purchase an annuity from private insurers, since they do not think they will get value on their investment. This type of anti-selection is not present in the CPP, since it covers the general population. Thus, the life expectancy assumptions used by insurers to calculate annuity costs will tend to be higher than those used for the CPP, and so will result in a higher cost to individuals.

It should also be emphasized that one of the main goals of an insurance company, as with any private sector company, is to earn profits. An element of profit is priced into an insurer's products, which in turn results in an increased cost to the policyholder. Such an element does not exist in the CPP as its main goal is to provide promised benefits to those Canadians who have contributed to the Plan. Finally, the higher administrative costs for private annuities contribute to increased costs for policyholders.

The result of the factors discussed above, that is, inflation exposure, investment risk, longevity risk, necessity of a profit margin and higher administrative costs, is that the estimated real rate of

return implied in the pricing of the private sector annuity is quite low. The fact that the use of the CPP general population mortality assumption underestimates the real rate of return compared to the actual rate used in the pricing of a private sector annuity does not alter the above conclusion.

In a recent paper titled “The Fair Value of the Canada Pension Plan: The Role of Risk and Cost Structure”, by S. James, J. Pesando, J. Arnold and J. Ilkiw (2008), a comparison of current service cost rates of the CPP and of private insurers was performed. These rates were calculated under the assumption that the underlying assets were invested in inflation-indexed bonds. The authors concluded, in particular, that private insurer cost rates exceed the CPP rates because of high administrative costs and adverse selection due to longevity costs. This conclusion is consistent with the above discussion.

Although the internal rate of return that CPP cohorts are expected to earn may seem low at 2.2%, it is higher than what is being offered for an equivalent benefit in the private annuity market. In addition, fully indexed annuities are not widely available in Canada which adds to the value of the CPP benefit.

VIII. Conclusion

Major amendments in 1997 led to the change in financing of the Canada Pension Plan from a pay-as-you-go basis to a form of partial funding called steady-state funding. The 1997 reform, and particularly steady-state funding, restored the Plan's sustainability for current and future generations. The purpose of the steady-state methodology is to produce an asset/expenditure ratio that is relatively stable over time.

From its inception, the CPP was never intended to be a fully funded plan. Instead, under steady-state funding, the goal is to build a reserve of assets equivalent to about five and a half years of benefit expenditures or about 25 percent of Plan liabilities by 2025. Investment earnings on this pool of assets will be required to help pay benefits when the large cohort of baby boomers retires. From 2000 to 2019, the net cash flows of the Plan, that is, contributions less expenditures, are expected to be positive, resulting in an increase in the Plan's assets, asset/expenditure ratio and funded ratio.

Although the funded ratio may be used as a measure of the Plan's financial status, the key financial measure for evaluating the Plan is the steady-state contribution rate, in particular its adequacy and stability over time. The funded ratio and corresponding unfunded obligation are at most measures of the fact that the funded level is projected to improve and stabilize over time.

If the Plan's sustainability is to be judged based on its funded ratio or unfunded obligation, it should be done on an open group basis. Given the long-term nature of the Plan, the fact that its stewards are the federal, provincial and territorial governments, and the strong governance and accountability framework of the Plan, it is unlikely that the Plan would become insolvent. Thus, an open group valuation which includes future contributions and benefits could be deemed to be the most appropriate. The inclusion of future contributions and benefits from both current and future contributors in the assessment of the Plan's funded status shows that the Plan is fully funded in the long term, able to meet its financial obligations, and sustainable over the 75-year projection period.

Future demographic, economic and financial market environments may differ from those assumed under the best-estimate scenario of the 23rd CPP Actuarial Report, and as such may impact the Plan's finances differently. Different environments affect the Plan's obligations and assets and the relation between them to varying degrees. As different environments unfold over time, the Plan's stakeholders, as part of their regular reviews of the Plan, will need to consider the benefit and contribution structure of the Plan in light of how each side of the balance sheet is impacted by experience. In any case, regardless of which measure is used to assess the Plan's financial status, the unique characteristics of the Plan's long-term obligations and the assets needed to meet those obligations, as well as the dynamics between them should all be considered in ensuring the long-term financial sustainability of the CPP.

IX. Appendices

A. Principles to Guide Federal-Provincial Decisions on the Canada Pension Plan

This appendix presents the nine guiding principles that were formally put forth by the Plan's stakeholders as part of the CPP reform of the late 1990s. At the time, the legislated contribution rate was set to increase to 10.1% (as mentioned in Principle 4) in accordance with a schedule of contribution rates, which was also shown in the 13th Actuarial Report on the CPP as at February 1992 and shown or discussed in several subsequent actuarial reports. This schedule was later replaced by a revised schedule as part of the reform (see Table 2 in section III.B). In addition, a Seniors Benefit (mentioned in Principle 2) had been proposed in the 1996 Federal Budget to replace the basic Old Age Security benefit and Guaranteed Income Supplement in 2001, but which in fact was subsequently revoked before it came into effect.

The nine guiding principles and the context surrounding them at the time of the reform were given as follows:

Following extensive consultations across Canada on the Canada Pension Plan, governments agreed that they must put to rest the worries that Canadians have that their CPP pensions will not be there for them when they retire in the future. They therefore agreed that they must solve the problems facing the CPP quickly, and that they will be guided by the following principles in doing so:

1. The CPP is a key pillar of Canada's retirement income system that is worth saving.
2. The CPP is an earnings-related program. Its fundamental role is to help replace earnings upon retirement or disability, or the death of a spouse – not to redistribute income. The income redistribution role is the responsibility of the income tax system, the Old Age Security/Guaranteed Income Supplement/Seniors Benefit, and other income-tested programs paid from general tax revenues.
3. The solutions to the CPP's problems must be fair across generations and between men and women.
4. The CPP must be affordable and sustainable for future generations. This requires fuller funding and a contribution rate no higher than the already legislated future rate of 10.1 per cent. In deciding how quickly to move to this rate, governments must take economic and fiscal impacts into account.
5. Governments must tighten administration as the first step towards controlling costs.
6. Disability and survivor benefits are important features of the CPP. However, they must be designed and administered in a way that does not jeopardize the security of retirement pensions.
7. Any further benefit improvements must be fully funded.
8. CPP funds must be invested in the best interests of plan members, and maintain a proper balance between returns and investment risk. Governance structures must be created to ensure sound fund management.
9. Governments must monitor changing economic, demographic, and other circumstances which can affect the CPP, and act to respond to these changing conditions. Annually, Ministers of Finance should provide Canadians with the appropriate information so they can judge for themselves that the integrity and security of the CPP is being protected.

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