The future sustainability of the Canada Pension Plan and Old Age Security Program
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Good afternoon. Thank you for inviting me here today to talk about the future sustainability of the Canada Pension Plan and Old Age Security Program.

The presentation (*Slide* 2)
Most industrialized countries around the world are wrestling with the challenge of supporting older people as their population age. Although Canada will age as many other countries, I will compare its aging with the aging of other countries. In May 2005, our office released a Canadian population projection study and a comparison with other G8 countries. After discussing the Canadian retirement income system, I will talk to you about the funding of Canada's public pension plans. I will also discuss the peer review process that the CPP actuarial reports undergo, as well as the stochastic analysis performed for the last CPP report and the improved analysis for the next report.

Funding of the Canadian retirement income security system *(Slide 3)*
At retirement, most Canadians will receive an income from one or both of the following pension schemes. The Old Age Security (OAS) Program is financed on a pay-as-you-go basis. The Canada Pension Plan is partially funded and is financed through contributions paid in equal parts by the employer and employees. The contribution rate of 9.9% in 2005 and thereafter will provide Plan's assets equal to approximately 25% of the Plan's liability within about 15 years. Lastly, private pension plans and RRSPs are fully funded. Given these three main sources of retirement income, it is reasonable to say that the Canadian system is funded at 40% to 45% of future liabilities. A diversified funding approach allows Canada's retirement income system to adapt rapidly to changing demographic and economic conditions, including the aging of its population. In addition, the Canadian approach, based on a mix of public and private pensions, is an effective way to provide for retirement income needs, according to international organizations.

Income Replacement Rates *(Slide 4)*
The following graph compares the public pensions provided by Canada and United States. At 50% of average earnings, the Canadian public pension plans are more generous than the social security of the United States. The replacement rates for both countries are about the same for workers with an income equal to average earnings. However, for high-income earners, the social security system of the United States is more generous than the Canadian public pension plans.

The purpose of the Actuarial Report *(Slide 6)* The Office of the Chief Actuary is required by law to produce an actuarial report on the Canada Pension Plan every three years. The report is one of the key items considered by federal and provincial finance ministers when reviewing and making recommendations on the CPP. The projections included in this report cover a long period of time- 75 years- and require assumptions on demographic factors such as fertility, migration and mortality.

Canadian Aging *(Slide 7)* The aging of the Canadian population is most evident with persons over the age of 65. A significant increase of 150% in the size of this group is expected until 2050. This means that the number of people over age 65 will increase from 4 to 10 million by 2050. During the same period, the population aged 80 and above is expected to increase by 250% to reach more than 3.5 million people.

Global aging *(Slide 8)* When analysing global aging, it is important to identify the indicators of aging. We need to look at three elements: the extent of aging, the speed of aging, and the change in the active population. As an indicator of the speed of aging, the next chart shows the number of years it is expected to take for the population aged 65 and over to increase from 12% of the total population to 24%. Japan will experience this shift very quickly, in just 25 years. The absence of the United States should be mentioned since, according to their projections, it will never achieve the 24% threshold, at least not between now and 2050. We can say with relative certainty that the United States is the industrialized nation that will be least affected by the aging of its population.

Future Labour Shortage? *(Slide 9)* This chart presents a demographic indicator of the expected labour shortage. It shows the ratio between people aged 60 to 64 years to those aged 20-24. That is, a ratio of those who reduce their hours of work or who are leaving the workforce to those who are entering the workforce. Historically, this ratio was consistently below 50% up until the end of the 80s. It then began to rise and reached 70% by the year 2006. This means that for every 7 people who leave, 10 people enter the workforce. Supply exceeds demand, expressed in economic terms. It is expected that this ratio will equal 1 around 2015. Moreover, as early as 2025, it is predicted that for every 13 people who leave, only 10 people will enter the workforce. Note as well the rapid growth in this ratio. The trend is similar for the United States, although less pronounced.

(Slide 10) This chart shows the evolution of the working age population of some industrialized countries. Canada and U.S. are the only countries that could experience an increase in the working age population, albeit a small increase. Based on the belief that a shrinking and aging population may bring economic decline, GDP growth could slow significantly in Japan and Continental Europe. If the rates of labour force participation among older populations do not rise over time, every developed country could face

shrinking labour markets that could significantly constrain their potential for economic growth.

Canada Pension Plan Funding *(Slide 12)* When it was introduced in 1966, the CPP was designed as a pay-as-you-go plan, with a small reserve. Continuing to finance the Plan on a pay-as-you-go basis would have meant imposing a heavy financial burden on Canadians in the workforce after 2020, which was deemed unacceptable by governments. Therefore, following extensive consultations in 1997, the provincial and federal governments agreed to change the funding approach to one of "steady-state" funding or partial funding. The contributions were increased, the future growth of benefits was reduced and the CPP Investment Board was created to invest the funds not required by the CPP to pay current benefits. These measures have acted to ensure the long-term sustainability of the Canada Pension Plan.

 CPP Steady-State Funding *(Slide 13)* The steady-state funding requires that the contribution rate be set no lower than the lowest rate expected to ensure the long-term financial stability of the Plan without recourse to further rate increases. At the time of the amendments and according to the actuarial report produced in September 1997, the steady-state contribution rate was deemed to be 9.9% in 2003 and to remain at that level for the years thereafter. As a result, the legislated contribution rate is 9.9%. Under the last actuarial report, the steady-state rate now stands at 9.8%. As the legislated rate is higher than the steady-state rate, the funding status of the Plan will improve over time, and the greater this difference, the greater the improvement.

CPP Steady-State Funding *(Slide 14)* Steady-state funding has a built-in hedge that is used when the calculated steady-state contribution rate is higher than the current 9.9%. The default provisions in the Canada Pension Plan Act may result in adjustments being made to the contribution rate and benefits in payment if the federal and provincial governments reach no agreement in response to the actuarial determination of the steady-state contribution rate. If the new steady-state rate is 10.1%, one half of the excess of the new steady-state rate over the 9.9%, that is 0.1%, will be applied to an increase in the contribution rate and the other half will be applied to non-indexation of benefits in pay in order to keep the steady-state rate at 10.0%. In other words, the contributors and the beneficiaries would equally support the additional cost shown in the actuarial report.

Old Age Security Financing *(Slide 15)* How do we position ourselves for the future aging of the Canadian population knowing that the cost of the Public Pension Plans (OAS/CPP/QPP) is expected to increase from the current 5% of the GDP to 7% in 2030? The cost of OAS benefits is expected to increase from 2% of the GDP to 3% by 2030, driven largely by the retirement of the baby boomers. However, Canada has shown the largest budgetary improvements of any of the G-7 countries over the past decade.

Balancing the budget and taking steps to put debt as a proportion of gross domestic product on a downward track are effective ways to ensure sustainable financing of Old Age Security, which is funded from the government's Consolidated Revenue Fund.

Independent Peer Review Process *(Slide 17)* Since 1999, the federal and provincial governments, as co-stewards of the CPP, have endorsed regular peer reviews of actuarial reports and consultations by the Chief Actuary with experts on the assumptions to be used in such reports. To further enhance the credibility of the review process, the Chief Actuary agreed with a suggestion by the Auditor General to seek input from a foreign actuarial organization outside the federal government. The United Kingdom Government Actuary's Department (GAD) was asked to select the independent Canadian actuaries who performed the peer review and to provide an opinion on the work done by the reviewers once the peer review was completed.

The independent panel of actuaries released a report in March 2005 confirming that the work of the Chief Actuary meets professional standards of actuarial practice. The Review Panel found that the assumptions used by the Chief Actuary were reasonable and within acceptable ranges. The Review Panel also supported the conclusions reached by the Chief Actuary about the actuarial soundness of the Canada Pension Plan.

In a time of rising doubts about the sustainability of pension plans, I want to leave you with one of the key findings of the most recent actuarial report. "Despite the projected substantial increase in expenditures as a result of the aging of the population, the Canada Pension Plan is expected to be able to meet its obligations and remain fully sustainable over the projection period."

(Slide 18) Having said that, the future is great for Canadians. This is a happy ending. Is this really the case? How uncertain is the certainty? How certain is the uncertainty? Well, over the past three years, our Office has embarked on a long and complex trip to measure the uncertainty with stochastic analysis. We have published some results in the most recent CPP Actuarial Report. We intend to go further in the next actuarial report as at 31 December 2006 in measuring the risk, volatility and uncertainty surrounding the actuarial projections through stochastic analysis.

CPP Actuarial Report as at 31 December 2003 *(Slide 19*) The sensitivity tests for the Actuarial Report on the Canada Pension Plan as at 31 December 2003 were performed by varying each of nine key assumptions individually with the remaining assumptions being maintained at their best-estimate levels. Each sensitivity test was categorized as either a low-cost or a high-cost scenario. In the low-cost scenarios, the alternative assumptions have the effect of reducing the steady-state contribution rate. Conversely, in the high-cost scenarios, the assumptions would increase the steady-state contribution rate.

These sensitivity tests do not provide an indication of the probability that the actual level of the assumptions will be inside or outside the assumed range of values for each assumption. Based on historical data and using stochastic modelling techniques, the probability that the actual value of the assumption will fall outside the specified range of potential outcomes was estimated for some of the assumptions. The following charts illustrate the results of the stochastic analysis performed on four key assumptions.

Historical Fertility Rates *(Slide 20)* The first assumption analyzed was fertility, which had a geometric mean of 2.5 births per female for the period 1941 to 2002. The geometric mean decreased to only 1.6 births per female for the more recent period of 1977 to 2002. This smaller time period was used to randomly generate the geometric mean of fertility rates over a 20-year period.

Stochastic Results – Fertility *(Slide 21)* The results of this analysis show that the probability of the fertility rate over the next twenty years being between 1.58 and 1.67 is 100%. The range used in the sensitivity tests for CPP21 was 1.3 births per female and 1.9, which may be too wide a range. Fertility is a rather simple variable to analyse as its variations from year-to-year are quite small. Fertility has very low volatility and its short-term trends are highly predictable. Fertility rates are always positive, so if it were to be modelled using a time-series approach, constraints would have to be put in the model to ensure the rate remains positive. This issue was faced by the SSA in United States, which published an actuarial study on a stochastic model of the long-range financial status of the OASDI program.

Historical Real Wage Differential *(Slide 22)* During the historical period between 1924 and 2003, the geometric mean of the real wage differential was 1.4%. Based on the experience of this 80-year period, a stochastic approach was used to randomly generate the geometric mean of the real wage differential over a 20-year period.

Stochastic Results – Real Wage Differential *(Slide 23)* The ultimate real wage differential assumed in CPP21 is 1.2% and sensitivity tests were performed using rates of 0.5% and 2%. The results show that the probability of the real wage differential over the next twenty years exceeding 2.0% is 12%, while the probability of it being below 0.5% is 4%. Thus, with 84% probability, the real wage differential over the next twenty years will be within the range specified by the low-and high-cost scenarios. The low- and high-cost scenarios result in corresponding steady-state contribution rates of 9.2% and 10.3%, respectively.

Historical Canadian Equity Returns *(Slide 24)* During the historical period between 1938 and 2005, the geometric mean of real Canadian equity returns was 6.4% with a

standard deviation of 16.1%, which indicates high volatility. Using Canadian equity returns, foreign equity returns and long-term Government of Canada bonds, an annual historical real rate of return for a CPP Reference Portfolio was calculated. Using the experience of this period, a stochastic approach was used to randomly generate the geometric mean of the portfolio returns over a 20-year period.

Real Rates of Return *(Slide 25)* The ultimate real investment return assumed in CPP21 is 4.1% and sensitivity tests were performed using returns of 3.1% and 5.1%. The results show that the probability of real investment returns over the next twenty years exceeding 5.1% is 61%, while the probability of being below 3.1% is 16%. The mean of this CPP Reference Portfolio investment return is 5.8% with a standard deviation is 2.7%, which is considerably lower than the standard deviation of a pure Canadian equity portfolio (16.1%, as shown in the previous slide) and indicates much lower volatility.

Real Rates of Return – remove high inflation period *(Slide 26)* However, if we are to remove the period from 1973 to 1982, which was a time of very high inflation, the results of this Reference Portfolio improve greatly. The mean of investment returns increases from 5.8% to 7.1%, while the standard deviation actually decreases from 2.7% to 2.5%. In fact, when performing a stochastic analysis on this reduced historical period, the probability that real investment returns over the next twenty years will exceed 5.1% is 78% (as opposed to 61%) and the probability of being below 3.1% is only 5%.

 (Slide 27) As per the peer reviewers' recommendation, we have been developing a more sophisticated stochastic analysis for the next actuarial report as at December 31, 2006. Instead of selecting deterministically a range of outcome and then stochastically analyzing the probability of the outcome being within that range, we will use stochastic analysis to determine the appropriate range of outcomes for a wide range of assumptions. That is, the low- and high-cost scenarios will be determined stochastically with an accompanying level of confidence, such as 95%, that the actual outcome will be within that range. This will result in more plausible and consistent sensitivity tests. As well, a new section will be included in the report that will explain the uncertainty involved in estimating future contribution rates.

I hope that I've been able to provide you with a greater understanding of the future sustainability of our public pension system and would be pleased to answer any questions.

Thank you.