Joint Colloquium of the IACA, PBSS and IAAHS Sections of the International Actuarial Association
Westin Copley Place Hotel, Boston, U.S.A. – 4-7 May 2008

Actuarial and Investment Management Issues for the CPP

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

• 1997 CPP Amendments
• 23rd CPP Actuarial Report
  • Setting the asset mix assumption
  • Volatility of results / sensitivity analysis
  • Evolution of liabilities
  • Actuarial balances
• CPP Peer Review Process

Bridge over Mountain Creek, British Columbia, 1880
Source: Library and Archives Canada
Principles to Guide Federal-Provincial Decisions on the CPP

• 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.

• CPP must be invested in the best interest of plan members, and maintain a proper balance between returns and investment risk.

• Available on website at http://www.cpp-rpc.ca/principals/principe.html
CPP Steady-State Funding

Effect of the 1998 Amendments

- Increase the contribution rate by 65% over 6 years (1997-2003) and keep the same rate thereafter

- Moderate the future growth of benefits by 10% on a long-term basis (in 2050).

- Creation of the CPP Investment Board (www.cppib.ca)
CPP Financing

- **Steady-state funding**: replaces the original pay-as-you-go financing to build a reserve of assets equivalent over time to about five and a half years of benefit expenditures or about 25% of Plan liabilities.

- **Incremental full funding**: requires that changes to the CPP that increase benefits or add new benefits be fully funded (e.g., increase in eligibility for disability benefits for long-term contributors).
CPP Financing

- The current legislated contribution rate is 9.9%.
- The minimum contribution rate is 9.82%.
- If the legislated contribution rate is higher than the minimum contribution rate, the funding status of the plan will increase over time.
- The higher this rate is set above the minimum rate, the faster the plan will become more funded.
Evolution of Asset/Expenditure Ratio

- 9.9% Legislated rate
- 9.82% minimum contribution rate
- A/E ratios: 5.4 in 2019 and 2069

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CPP Default Provisions

- If the minimum contribution rate is higher than the legislated contribution rate AND if finance ministers cannot reach an agreement on a solution, then:
  - Contribution rate increased by \( \frac{1}{2} \) of excess over three years, subject to maximum increase of 0.2% per year
  - Benefits frozen
  - At end of three years, next review performed to determine financial status of Plan.
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Cisco, Colombie-Britannique, 1956
Source: Canada Science and Technology Museum
Setting the Asset Mix Assumption

- CPPIB does not target specific asset allocations
  - risk allocated to investment strategies subject to risk limit
- CPPIB Reference Portfolio: relevant benchmark to compare performance of CPPIB (not a target)
- Must determine an appropriate asset mix over the 75-year projection period
  - Short-term mix similar to CPPIB Reference Portfolio
  - Long-term mix assumes a reduction of risk in the portfolio
Ultimate Asset Mix Assumption

• Investments in “riskier” assets, such as equities, are projected to decline over time
• As the ratio of active to retired members decreases, the asset mix of the portfolio must be adjusted to reflect a lower tolerance for risk
• Portfolio should be adjusted to minimize the CPP Fund’s potential for loss
### Evolution of CPP Asset Mix

<table>
<thead>
<tr>
<th>Year</th>
<th>Fixed Income</th>
<th>Equities</th>
<th>Inflation-Sensitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>28%</td>
<td>65%</td>
<td>7%</td>
</tr>
<tr>
<td>2010</td>
<td>30%</td>
<td>60%</td>
<td>10%</td>
</tr>
<tr>
<td>2015</td>
<td>30%</td>
<td>60%</td>
<td>10%</td>
</tr>
<tr>
<td>2020</td>
<td>35%</td>
<td>55%</td>
<td>10%</td>
</tr>
<tr>
<td>2025</td>
<td>40%</td>
<td>50%</td>
<td>10%</td>
</tr>
</tbody>
</table>
Stochastic Modeling in CPP #23

- Recommendation from CPP #21 review panel
- Incorporate stochastic modeling in determination of alternative assumptions for sensitivity analysis
  - Project probability distribution of potential outcomes
  - High cost and low cost assumptions
- Objective is to measure the impact of alternative assumptions on the financial status of the Plan
Sensitivity Test – Life Expectancy
Asset/Expenditure Ratio

- Low-Cost: LE in 2050 at 65 M:17.8 F:18.6 (MC rate of 9.16%)
- High-Cost: LE in 2050 at 65 M:25.1 F:27.9 (MC rate of 10.20%)

9.9% Contribution Rate
### Sensitivity Test – Real Rate of Return

#### Asset/Expenditure Ratio

<table>
<thead>
<tr>
<th>Year</th>
<th>Low-Cost: 5.66% (MC rate of 9.02%)</th>
<th>CPP Best-Estimate: 4.22%</th>
<th>High-Cost: 2.67% (MC rate of 10.72%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>2017</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>2027</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
</tr>
<tr>
<td>2037</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>2047</td>
<td>20.0</td>
<td>20.0</td>
<td>20.0</td>
</tr>
<tr>
<td>2057</td>
<td>25.0</td>
<td>25.0</td>
<td>25.0</td>
</tr>
<tr>
<td>2067</td>
<td>30.0</td>
<td>30.0</td>
<td>30.0</td>
</tr>
</tbody>
</table>

**9.9% Contribution Rate**
Sensitivity Test – Retirement Rates
Asset/Expenditure Ratio

- Low-Cost: +20% for retirements at 65, 2009+ (MC rate of 9.66%)
- CPP Best-Estimate: Retirements between ages 60 to 70
- High-Cost: +20% for retirements at 60, 2009+ (MC rate of 10.02%)

9.9% Contribution Rate
## Balance Sheet Under Various Rates of Return

As at 31 December 2006

<table>
<thead>
<tr>
<th></th>
<th>100% Risk-Free Bond Portfolio</th>
<th>Best-Estimate 55/45 Equity/Bond Portfolio</th>
<th>100% Equity Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Real Return (%)</td>
<td>2.8</td>
<td>4.2</td>
<td>4.9</td>
</tr>
<tr>
<td>Assets ($B)</td>
<td>113.6</td>
<td>113.6</td>
<td>113.6</td>
</tr>
<tr>
<td>Liability ($B)</td>
<td>919.8</td>
<td>733.5</td>
<td>675.9</td>
</tr>
<tr>
<td>Unfunded Liability ($B)</td>
<td>806.2</td>
<td>619.9</td>
<td>562.3</td>
</tr>
<tr>
<td>Funded Ratio (%)</td>
<td>12.3</td>
<td>15.5</td>
<td>16.8</td>
</tr>
<tr>
<td>Current Service Cost (%)</td>
<td>8.6</td>
<td>5.9</td>
<td>5.0</td>
</tr>
<tr>
<td>Minimum Contribution Rate (%)</td>
<td>10.64</td>
<td>9.82</td>
<td>9.42</td>
</tr>
</tbody>
</table>
Actuarial Balance

• A positive actuarial balance indicates that estimated income (assets and contributions) is more than sufficient to meet estimated CPP expenditures for the period as a whole; negative actuarial balance indicates the opposite.

• Comparative measure with OASDI

• Expressed as a dollar value or percentage of contributory earnings
### Actuarial Balances Over Various Periods

<table>
<thead>
<tr>
<th>Period</th>
<th>Assets (A)</th>
<th>Income (I)</th>
<th>Expenditures (E)</th>
<th>Actuarial Balance (A)+(I)-(E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPP:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007-2031</td>
<td>114</td>
<td>584</td>
<td>593</td>
<td>105</td>
</tr>
<tr>
<td>2007-2056</td>
<td>114</td>
<td>917</td>
<td>960</td>
<td>70</td>
</tr>
<tr>
<td>2007-2081</td>
<td>114</td>
<td>1,100</td>
<td>1,167</td>
<td>47*</td>
</tr>
<tr>
<td>OASDI:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007-2031</td>
<td>2,048</td>
<td>15,354</td>
<td>16,727</td>
<td>675</td>
</tr>
<tr>
<td>2007-2056</td>
<td>2,048</td>
<td>26,543</td>
<td>31,085</td>
<td>(2,494)</td>
</tr>
<tr>
<td>2007-2081</td>
<td>2,048</td>
<td>34,113</td>
<td>41,237</td>
<td>(5,076)**</td>
</tr>
</tbody>
</table>

* Equal to 0.42% of the present value of contributory earnings in the period
** Equal to 1.95% of the present value of contributory earnings in the period
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Canadian troops, Canal-du-Nord, 1918
Source: Library and Archives Canada
Strengthening the Accountability in 1997

- Federal and provincial governments took meaningful steps to strengthen the transparency and accountability of actuarial reporting. They endorsed plans:
  
  - to review the CPP every three years, instead of every five years as before. Therefore, frequency of actuarial reporting was increased to once every three years with a further requirement to produce the report within one year of the valuation date;
  - to consult regularly with experts on assumptions to be used in actuarial reports;
  - to establish regular peer reviews of future actuarial reports on the CPP;
  - to supply actuarial information to Canadians in a timely manner.
CPP has been peer reviewed four times since 1998

- Role of the Auditor General and Selection Process
- Overseeing of the Peer Review by GAD
- Terms of Reference
  - Is the professional **experience** of the Chief Actuary and his staff adequate for carrying out the work required?
  - Does the work comply with professional **standards of practice** and statutory requirements?
  - Did the Chief Actuary have access to the **information** required?
  - Were the actuarial **methods and assumptions** used reasonable?
  - Does the actuarial report fairly **communicate** the results?
Peer Review of CPP#23

• The independent Review Panel confirmed that:
  • the staff is competent and qualified to carry out the work required;
  • the work complies with all relevant professional standards of practice and statutory requirements;
  • the Chief Actuary had access to the data and he completed relevant tests on the data as might be expected;
  • actuarial methods and assumptions are reasonable;
  • assumptions are, in the aggregate, reasonable, but towards the high-cost side of the reasonable range;
  • the report fairly communicates the results;

• and made twelve recommendations on data, methodology, assumptions, communications of results and other actuarial issues.

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Thank you