Mortality perspective - Canada
IAA Mortality Committee,
Den Haag 2013
Agenda

• Life insurance
• Annuities
Life Insurance
Life Insurance Industry

• No new Canadian Individual Life Insurance Industry study since Nassau
• New database tables available on experience between 2004-10 and covering:
  – Periods 2004-05, 2005-06 to 2009-10,
  – Gender: M/F
  – Underwriting: Medical, non-medical, paramedical and unknown
  – Smoker: NS/SM/Unknown
  – Policy type: Whole Life, UL, Term to 100, Other Permanent, Renewable Term, Term Rider, Other Term, and Other
  – Face size: <$10,000, $10K-$50K, $50K-$100K, $100K-$250K, $250K-$500K, $500k-$1,000K and >$1,000K
  – Preferred underwriting class if available.
Annuities and Pension Plans
Annuities and Pensions mortality

- In 2008, Canadian Institute of Actuaries ("CIA") commissioned 2 studies on C/QPP pensioners and Canadian registered pensioners
- First was split into current experience and improvement projections
- Current experience report released May 2012
- Mortality improvement table for C/QPP pensioners released March 2013
- Study of Canadian registered pensioners now expected in June 2013
Annuities and Pensions mortality (cont’d)

• CIA study of C/QPP pensioners
  – http://www.cia-ica.ca/publications/publication-details/213003
  – Covers C/QPP annuitants (note all workers participating in a private pension plan are working and thus contribute to the C/QPP)
  – Based on data 2005-07 using $7.9 million lives
  – Distinguishes by gender, age and income paid level,
  – Strictly on Canadian workers; estimated to cover about 82% of M and 69% of F aged 60 or more in study period
  – Resulted in mortality tables
  – Under this table, Male life expectancy at 65 is 17.9 while that of his spouse is 21.5
  – Results for 3 separate income levels and 2 groupings of these levels
  – 30 tables produced (2 genders x 5 income levels x 2 data sources)
  – Sample of results in following slides
Male Probabilities of Dying by Income Level

Chart 11 – CAN-Male: Exact Age Graduated Probabilities of Death for Classes 1 to 5, 2005–2007
Female Probabilities of Dying by Income Level

Chart 12 – CAN-Female: Exact Age Graduated Probabilities of Death for Classes 1 to 5, 2005–2007
Evolution of Probabilities of Dying over Time

Suggested Mortality Improvements over 3 Projected Periods for Males

Chart 24 – Canada, Male, Over 35% Max. Pension, Rate of Mortality Decrease per Year, Short Term (2007)
Suggested Mortality Improvements over 3 Projected Periods for Females

Chart 25 – Canada, Female, Over 35% Max. Pension, Rate of Mortality Decrease per Year, Short Term (2007)
# Impact of Different Mortality Improvements on Male Annuity Prices

Table 71 – Impact on Actuarial Liabilities of a Change of Mortality Table: Male
All CPM-CAN figures for the “Income Class 4 (Over 35% of Maximum Pension)” Mortality Table

With Static Projection to 2010, 2015 or 2020
Present Value of a $1,000/Year Life Annuity-Due, Interest Rate=6%

<table>
<thead>
<tr>
<th>Age</th>
<th>UP-94 @ 2010 NB</th>
<th>UP-94 @ 2015 NB</th>
<th>UP-94 @ 2020 NB</th>
<th>CPM-CAN-4 @ 2010</th>
<th>CPM-CAN-4 @ 2015</th>
<th>CPM-CAN-4 @ 2020</th>
<th>% Increase compared to UP94 NB</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>12,328.15</td>
<td>12,464.14</td>
<td>12,595.05</td>
<td>12,406.80</td>
<td>12,648.73</td>
<td>12,873.21</td>
<td>0.64%</td>
</tr>
<tr>
<td>65</td>
<td>11,083.64</td>
<td>11,231.96</td>
<td>11,375.21</td>
<td>11,102.40</td>
<td>11,373.74</td>
<td>11,626.76</td>
<td>0.17%</td>
</tr>
<tr>
<td>70</td>
<td>9,750.65</td>
<td>9,902.33</td>
<td>10,049.14</td>
<td>9,701.14</td>
<td>9,976.91</td>
<td>10,235.92</td>
<td>-0.51%</td>
</tr>
<tr>
<td>75</td>
<td>8,269.19</td>
<td>8,402.96</td>
<td>8,533.52</td>
<td>8,179.74</td>
<td>8,432.34</td>
<td>8,671.81</td>
<td>-1.08%</td>
</tr>
<tr>
<td>80</td>
<td>6,725.29</td>
<td>6,826.50</td>
<td>6,926.43</td>
<td>6,612.76</td>
<td>6,807.40</td>
<td>6,993.98</td>
<td>-1.67%</td>
</tr>
<tr>
<td>85</td>
<td>5,350.90</td>
<td>5,421.40</td>
<td>5,491.38</td>
<td>5,095.05</td>
<td>5,202.79</td>
<td>5,307.89</td>
<td>-4.78%</td>
</tr>
</tbody>
</table>

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Mortality Improvement Report on Canadian Pensioners (C/QPP)

- Used C/QPP admin data from 1967-2007
- Observed improvements much higher than previously used (i.e. AA Table from American data)
- Varies by age (even negative or zero around age 90)
- Not constant over time (for a given age, higher in recent short term than prior)
- Varies by gender (M>F)
- Varies by income level (higher for group with higher income)
- Doesn’t appear to be slowing down since 2007
- Proposed approach uses 3 scales:
  - Higher rates for short term (to 2021)
  - Lower rates for mid-term (2021-30)
  - Lowest rates for long term (2031+)