VM-20 Mortality Assumption Requirements

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Two approaches to valuation mortality within VM-20

• Prescribed commissioners standard ordinary (CSO) tables for net premium reserve
  – Currently 2001 CSO but expected to be 2014 CSO by time of implementation

• Prudent estimate mortality assumption for use in deterministic and stochastic reserves
  – Based on anticipated experience assumption
  – Sufficient data period
  – Credibility blending with industry experience table
  – Mortality improvement
  – Margin
Anticipated experience assumptions

• Combination of own company and 2014 VBT, without margin
• Specific VBT table not prescribed, but subject to certain requirements
• Ability to use own company experience and assumptions subject to credibility and amount of claims in underlying experience study
• Neither company experience mortality rates nor resulting anticipated experience assumption may be less than the mortality company actually expects to occur and can justify
Procedure to determine prudent estimate mortality assumption

1. Determine mortality segments
2. For each mortality segment, determine:
   a. Company experience mortality rates
      • Can default to industry table if experience is limited
   b. Applicable industry mortality table
   c. Margin(s)
   d. Prudent estimate mortality rates
      • Sufficient data period
      • Credibility of experience data
      • Smoothing and other adjustments
   e. Anticipated experience assumption
Mortality segments

• Level at which separate prudent estimate mortality assumptions determined
• Group of policies expected to have similar mortality experience
• VM-20 currently provides flexibility in how to set the mortality segments
  – Likely to have a mortality segment for each mortality class but can be otherwise
  – E.g., male vs. female, smoker vs. non-smoker, preferred vs. super-preferred vs. residual, etc.
Mortality segments

Examples of mortality segments

Example 1
• Mortality segment 1 = Male, Non-smoker, Preferred Classes
• Mortality segment 2 = Male, Non-smoker, Residual Standard Class
• Mortality segment 3 = Female, Non-smoker, Preferred Classes
• Mortality segment 4 = Female, Non-smoker, Residual Standard Class
• Mortality segment 5 = Male, Smoker
• Mortality segment 6 = Female Smoker

Example 2
• Mortality segment 1 = Male, Non-smokers
• Mortality segment 2 = Female, Non-smokers
• Mortality segment 3 = Male, Smoker
• Mortality segment 4 = Female, Smoker

Example 3
• Mortality segment 1 = Male, Non-smoker, Super Preferred Class
• Mortality segment 2 = Male, Non-smoker, Preferred Class
• Mortality segment 3 = Male, Non-smoker, Residual Standard Class
• Mortality segment 4 = Female, Non-smoker, Super Preferred Class
• Mortality segment 5 = Female, Non-smoker, Preferred Classes
• Mortality segment 6 = Female, Non-smoker, Residual Standard Class
• Mortality segment 7 = Male, Preferred smoker
• Mortality segment 8 = Male, Standard smoker
• Mortality segment 9 = Female, Preferred smoker
• Mortality segment 10 = Female, Standard smoker
Company experience mortality rates

• Only determined if actuary does not elect to use industry mortality table
• Essentially the “best estimate” mortality assumptions
• Can include mortality improvement from mid-point of exposure period to valuation date
• Sources for experience:
  • Actual company experience for book of business within the mortality segment
  • Experience from other books of business within the company with similar underwriting
  • Experience data from other sources, if available and appropriate
    – If the source has underwriting and expected mortality experience characteristics that are similar to policies in the mortality segment
Company experience mortality rates, cont’d

• Company can base the mortality rates on more aggregate experience and use other techniques to further sub-divide the aggregate class into various sub-classes or mortality segment

• Requirements exist regarding frequency of experience studies, justification for assumptions and documentation
Applicable industry mortality table

• Determine appropriate industry table to blend with own experience
  – Using SOA Underwriting Criteria Scoring Tool or other methods, if more appropriate
• Currently table is specified as 2008 VBT Tables, all forms
  – New tables being worked on
• Can include mortality improvement (industry published) from 2008 (or 2014) to valuation date
Applicable industry mortality table, cont’d

- A modified industry basic table is permitted in a limited number of situations where an industry basic table does not appropriately reflect the expected mortality experience
  - joint life mortality
  - simplified underwriting
  - substandard or rated lives
Determining the margin

Two Components

1. Company experience mortality rates
   - Blended margin based on attained age and level of credibility of underlying company experience
   - Margin considers company variation risk as well as Margin for Random Fluctuation risk
     • Fluctuation from the expected results of credible component of a company’s mortality

2. Applicable industry basic tables
   - Blended margin based on attained age
   - Margin considers company variation risk only

Margin levels as well as approach to margins being revisited with development of new tables; margin levels set based on underlying experience from 2008 VBT
Margin for company experience mortality rates

Percentage margin that varies by:
- Attained age
- Credibility level of underlying company experience

Margin percentage for 0-19% credibility same as for applicable industry mortality table

Prescribed margin percentage should be increased to reflect situations involving greater uncertainty

<table>
<thead>
<tr>
<th>Attained Age</th>
<th>Credibility Level</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>0-19%</td>
</tr>
<tr>
<td>&lt;45</td>
<td>21.0%</td>
</tr>
<tr>
<td>46-47</td>
<td>20.0%</td>
</tr>
<tr>
<td>48-49</td>
<td>19.0%</td>
</tr>
<tr>
<td>50-51</td>
<td>18.0%</td>
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<tr>
<td>52-53</td>
<td>17.0%</td>
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<tr>
<td>54-55</td>
<td>16.0%</td>
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<tr>
<td>56-57</td>
<td>15.0%</td>
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<tr>
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<td>14.0%</td>
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<tr>
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<td>13.0%</td>
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<tr>
<td>62-63</td>
<td>12.0%</td>
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<tr>
<td>64-68</td>
<td>11.0%</td>
</tr>
<tr>
<td>69-76</td>
<td>10.0%</td>
</tr>
<tr>
<td>77+</td>
<td>9.0%</td>
</tr>
</tbody>
</table>
### Margin for applicable industry basic tables

#### Percentage margin table for company variation risk

<table>
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<th>Load</th>
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<tr>
<td>77+</td>
<td>9%</td>
</tr>
</tbody>
</table>

Prescribed margin percentage should be increased to reflect situations involving greater levels of uncertainty.
Prudent estimate mortality assumption

• Determine period for which sufficient data exists (based on policy duration and credibility)
• Determine aggregate credibility of experience data
• Grade own company experience mortality rates with margin to applicable industry table rates with margin following method specified
• Make any adjustments for reasonableness of relationships between classes
Prudent estimate mortality assumption, cont’d

• Determining sufficient data period
  – Last policy duration at which sufficient company experience data exists
  – Period ends at the last policy duration that has a minimum of 50 claims over entire exposure period
    • e.g., the last policy duration at which total # claims is greater than or equal to 50
  – May be determined at a more aggregate level than the mortality segment if the company based its mortality on aggregate experience and then used a methodology to sub-divide the aggregate class into various sub-classes or mortality segments
Prudent estimate mortality assumption, cont’d

• Determining credibility of experience data over entire exposure period
  – No method specified other than must follow common actuarial practice as published in actuarial literature
  – Much flexibility in how to determine
• May be determined at mortality segment level or more aggregate level
• Used to determine grading schedule for blending into industry mortality
Prudent estimate mortality assumption, cont’d

- Grade company experience rates with margin into applicable industry table rates with margin using following schedule

<table>
<thead>
<tr>
<th></th>
<th>(1) Credibility of company data*</th>
<th>(2) Maximum # of years for data to be considered sufficient</th>
<th>(3) Maximum # of years in which to begin grading after sufficient data no longer exists</th>
<th>(4) Maximum # of years in which the assumption must grade to 100% of an applicable industry table (from the duration where sufficient data no longer exists)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-19%</td>
<td>10</td>
<td>2</td>
<td>10</td>
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</tr>
<tr>
<td>20-39%</td>
<td>20</td>
<td>4</td>
<td>15</td>
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<tr>
<td>40-59%</td>
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<td>18</td>
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<tr>
<td>60-79%</td>
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<td>8</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>80-100%</td>
<td>50</td>
<td>10</td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

- Must grade into 100% of the applicable industry table mortality by the later of attained age [100] or 15 years after policy underwriting

* Current VM-20 states credibility over sufficient data period but this is inconsistent with text
Anticipated experience assumption

• The anticipated experience mortality assumption is determined by removing the prescribed margins from prudent estimate mortality assumption