VLIL Ch. 5, Lesson 1: Common Reserve Methodologies

Valuation of Life Insurance Liabilities, 4th ed.

Chapter 5, Lesson 1: Common Reserve Methodologies

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Key Exam Topics in This Lesson

Overview of Statutory Reserve Methodologies

In all cases:

$$ {}_tV_x = {}_tV_x^{NLP} - {}_tVE_x $$

1. **Net level premium (NLP) method** (${}_tV_x^{NLP}$)
   - NP is a level % of GPs
   - No expense allowance (EA)
2. **Modified reserve methods** (${}_tVE_x \neq 0$)
   - Any NLP method that also includes an EA
   - EA lowers reserves $\Rightarrow$ unamortized EA = ${}_tVE_x$
   - Examples of modified methods: FPT and CRVM

CRVM is the lowest stat reserve allowed under SVL

- A FPT method with additional rules for EA

Net Level Premium Method

Net premiums are a constant % of gross premiums

$$ {}_tV_x^{NLP} = \text{PVFB}_t - \underbrace{NP_0 \cdot \ddot{a}_{x+t}}_{\text{PVNP}_t} $$

$$ NP_0 = PB_0 = \left(\frac{\text{PVFB}_0}{\ddot{a}_x} \right) = \text{NP for first policy year} $$

$$ r_t^{GP} = \text{gross premium ratio} = \frac{GP_t}{GP_0} $$

$$ \ddot{a}_x = 1 + v \cdot {}_1p_x \cdot r_1^{GP} + v^2 \cdot {}_2p_x \cdot r_2^{GP} + \cdots $$

$$ \ddot{a}_{x+t} = r_t^{GP} + v \cdot {}_1p_{x+t} \cdot r_{t+1}^{GP} + v^2 \cdot {}_2p_{x+t} \cdot r_{t+2}^{GP} + \cdots $$

$$ NP_t = PB_t = PB_0 \cdot r_t^{GP} $$

FPT Method

FPT = Modified NLP Method with a formulaic expense allowance

$$ {}_tV_x^{FPT} = {}_tV_x^{NLP} - {}_tVE_x = \text{PVFB}_t - \underbrace{(\text{PVPB}_t + \text{PVPE}_t)}_{\text{PVNP}_t} $$

$$ {}_tVE_x = \text{PVPE}_t = PE_0 \times \ddot{a}_{x+t} $$

$$ PE_0 = \frac{EA_x}{\ddot{a}_x} $$

$$ EA_x = NP_1 - c_x = \left(\frac{\text{PVFB}_1}{\ddot{a}_{x+1}}\right) - c_x $$

$$ c_x = v \cdot q_x \cdot \text{DB} = \text{first-year cost of insurance} $$

$$ NP_t = \begin{cases} c_x & \text{for } t = 0 \quad (\alpha) \\ PB_t + PE_t = \dfrac{\text{PVFB}_1}{\ddot{a}_{x+1}} \cdot r_t^{GP} & \text{for } t \geq 1 \quad (\beta) \end{cases} $$

EA $\neq$ actual expenses

$${}_0V_x^{FPT} = {}_1V_x^{FPT} = 0$$

$${}_tV_x^{FPT} \leq {}_tV_x^{NLP}$$

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Remaining handout pages for this lesson included in online seminar