



## *Valuation of Life Insurance Liabilities, 4th ed.*

Chapter 5, Lesson 1: Common Reserve Methodologies

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## Key Exam Topics in This Lesson



### Common Statutory Reserve Methodologies

- Overview

- Net Level Premium Method

- FPT Method

### Examples With Level Gross Premiums

- Example Contract

- Task 1: Determine NLP Reserve

- Task 2: Determine FPT Reserve

### Example With Non-Level Gross Premiums

- Task 3: Determine FPT Reserve Assuming Non-Level Premiums

### Commissioners Reserve Valuation Method (CRVM)

- Task 4: Determine the CRVM Reserve for a 10-Pay WL Policy

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**

$${}_tV_x^{NLP} = PVFB_t - \underbrace{NP_0 \cdot \ddot{a}_{x+t}}_{PVNP_t}$$

$$NP_0 = PB_0 = \left( \frac{PVFB_0}{\ddot{a}_x} \right) = \text{NP for first policy year}$$

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

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

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

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

# FPT Method



**FPT = Modified NLP Method with a formulaic expense allowance**

$${}_tV_x^{FPT} = {}_tV_x^{NLP} - {}_tVE_x = PVFB_t - \underbrace{(PVPB_t + PVPE_t)}_{PVNP_t}$$

$${}_tVE_x = PVPE_t = PE_0 \times \ddot{a}_{x+t}$$

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

$$EA_x = NP_1 - c_x = \left( \frac{PVFB_1}{\ddot{a}_{x+1}} \right) - c_x$$

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

$$NP_t = \begin{cases} c_x & \text{for } t = 0 \quad (\alpha) \\ PB_t + PE_t = \frac{PVFB_1}{\ddot{a}_{x+1}} \cdot r_t^{GP} & \text{for } t \geq 1 \quad (\beta) \end{cases}$$

**EA  $\neq$  actual expenses**

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

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

## VLIL Ch. 5, Lesson 1: Common Reserve Methodologies



### Common Statutory Reserve Methodologies

#### Examples With Level Gross Premiums

##### Example Contract

Task 1: Determine NLP Reserve

Task 2: Determine FPT Reserve

### Example With Non-Level Gross Premiums

### Commissioners Reserve Valuation Method (CRVM)

**Remaining handout pages for this lesson included in online seminar**