

Long-Term Care (LTC) Principle Based Reserve (PBR) Report Webinar Presentation

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Agenda

- Introduction
- Overview
- Model Description
 - Basic input items
 - Basic output items
 - Active policy logic
 - Claim logic
 - Recovery logic
- Enhancements

Overview

- Risk assessment in PBR context
 - Stochastic model of LTC liabilities
- A demonstration only
 - Excel-based model
 - Major risk factors
 - Process risk
 - Simulation techniques
 - Hazard Rate Methodology
- Limitations and Future Enhancements

Table of Contents

- Basic Input Items
- Basic Output Items
- Active Policy Logic
- Claim Logic
- Recovery Logic



Basic Input Items

Stochastic Valuation



Requirements

Seriatim Policy Data

- Policy ID
- Birth Date
- Issue Date
- Volume (i.e., daily benefit)
- Premium Mode (i.e., a = annual, s = semi-annual, q = quarterly, m = monthly)
- Gender (i.e., m = male, f = female)
- Elimination Period (days)
- Benefit Period (i.e., number of years, 99 = lifetime)
- Benefit Limit (i.e., amount or n = no limit)
- Elimination Period Type (i.e., n = no EP accumulation)
- Cause 2 Adjustment (i.e., percentage of reduction of volume for cause 2 claim)
- Minimum Index (i.e., pre and post claim)
- Maximum Index (i.e., pre and post claim)
- Index Type (i.e., s = simple, c = compound)
- Modal Premium

Requirements

Basis Rates

- Incidence Rates (cause 1 independent of Cause 2)
- Selection Factors (since issue and since recovery)
- Termination Rates (distinct by cause, monthly for three years, annual thereafter)
- Salvage Rates (distinct by cause and banded by volume, monthly for three years then annual)
- Region Percentiles (not currently used)
- Active Mortality (A2000 Basic ANB – select)
- Claimant Mortality (A2000 Basic ANB – ultimate only)
- Lapse (since issue and since recovery)
- Interest Scenario (interest rate, real return, CPI rate, CPI, currently no discounting is done)

Requirements

Basis Rates

- Expenses:
 - Expense Per Policy (\$)
 - Expense Per Premium (%)
 - Commission (%)
 - Initial Expense Per Claim (\$)
 - Ongoing Expense Per Claim (\$)
 - Ongoing Expense Per Claim Paid (%)
- Pre and post claim multiples for the incidence, selection factors, active mortality and lapse rates
- Post claim multiples for the mortality and termination rates

Requirements

Sundry Items

- Valuation Date
- Number of Trials
- Maximum Number of Loops for one Trial
- Test of a Policy Subset



Basic Output Items

Stochastic Valuation



Basic Output Items

Result of Each Active Trial

- Record Number
- Policy ID
- Trial Number
- Age
- Event Type
- Event Date
- Next Premium
- End of Premium Payment Period
- Mode
- Modal Premium

Basic Output Items

If Active Trial Results in a Claim Event

- Claim Number
- Record Number
- Policy ID
- Trial Number
- Age Last at Event
- Cause
- Date of Event
- Date of Birth
- Date of Issue
- Volume
- Premium Mode
- Gender
- Elimination Period
- Benefit Period
- Age Last at Issue
- Benefit Limit
- Adjusted Benefit Limit
- Original Elimination Period
- Elimination Period Type
- Cause 2 Adjustment
- Minimum Index
- Maximum Index
- Index Type
- Current Volume
- Modal Premium



Basic Output Items

Result of each Claim Trial

- Claim Number
- Record Number
- Policy ID
- Trial
- Date of Claim
- Age at Event
- Type
- Event Date
- Adjusted Event Date
- End of Premium Payment Period After Event
- Benefit Days
- Total Paid



Basic Output Items

If Claim Trial Results in a Recovery Event

- Recovery Number
- Claim Number
- Record Number
- Policy ID
- Trial
- Age at Event
- Type
- Event Date
- Adjusted Event Date
- End of Premium Payment Period After Event
- Benefit Days
- Date of Birth
- Date of Issue
- Volume
- Premium Mode
- Gender
- Elimination Period
- Benefit Period
- Age Last at Issue
- Benefit Limit
- Adjusted Benefit Limit
- Original EP
- Elimination Period Type
- Cause 2 Adjustment
- Minimum Index
- Maximum Index
- Index Type
- Current Volume
- Modal Premium

Basic Output Items

Result of Each Recovery Trial

- Recovery Number
- Claim Number
- Record Number
- Policy ID
- Trial
- Age
- Type
- Event Date
- Next Premium
- End of Premium Payment Period



Final Output Items

Sum Over All Records for Each Trial

- Premium
- Time Weighted Premium
- Number of Policies for Expense
- Commission
- Policy Expense
- Net Premium
- Claims
- Time Weighted Claims
- Number of New Claims
- Number of Claims for Expense
- Claim Expense
- Total Claim Cost



Final Calculation

The Formula for Net Cash Flow is Added Later as:

- Net Premium less Total Claim Cost
- Used in the present value (PV) calculations



Active Policy Logic

Stochastic Valuation



Active Policy Logic

Basic Loop

- Calculate ${}_t p_x$ for all $t \geq 0$
- Calculate benefit exposure at time t for all $t \geq 0$
- Draw random number
- Multiply random number by ${}_s p_x$, where s = valuation date less Issue date
- Compare adjusted random number to ${}_t p_x$ values
- Interpolate between the next largest and next smallest values of ${}_t p_x$ to determine an exact event date
- Calculate the hazard rates at the event date
- Normalize the hazard rates so they sum to 1.
- Draw a second random number
- Compare the second random number to the hazard rates and determine the event type

Active Policy Logic

Basic Loop

- Calculate any adjustments to event date due to event type (e.g., lapse occurs at end of premium payment period)
- Calculate monthly cash flow and timing from valuation date until the adjusted event date
- Record monthly cash flow and timing for the sum for each trial
- Record items listed in result of each active trial
- When event type is a claim, record items listed in if active trial results in a claim event
- Repeat above until number of trials is reached
- Proceed to next seriatim record until all seriatim records are processed

Claim Logic

Stochastic Valuation



Claim Logic

Basic Loop

- Calculate ${}_t p_{x+r}$ for all $t \geq 0$ and $r =$ claim date less issue date
- Calculate benefit payment at time t for all $t \geq 0$, considering remaining benefit period
- Draw random number
- Compare adjusted random number to ${}_t p_{x+r}$ values
- Interpolate between the next largest and next smallest values of ${}_t p_{x+r}$ to determine an exact event date
- Calculate the hazard rates at the event date
- Normalize the hazard rates so they sum to 1.
- Draw a second random number
- Compare the second random number to the hazard rates and determine the event type



Claim Logic

Basic Loop

- Calculate any adjustments to event date due to event type (e.g., prior benefit maturity)
- Calculate monthly cash flow and timing from valuation date until the adjusted event date
- Record monthly cash flow and timing for the sum for each trial
- Record items listed in result of each claim trial
- When event type is a recovery record items listed in if claim trial results in a recovery event
- Repeat above until all claim records are processed

Recovery Logic

Stochastic Valuation



Recovery Logic

Basic Loop

- Calculate ${}_t p_{x+r}$ for all $t \geq 0$ and $r =$ recovery date less issue date
- Calculate benefit exposure at time t for all $t \geq 0$, considering any restoration of benefits
- Draw random number
- Compare adjusted random number to ${}_t p_{x+r}$ values
- Interpolate between the next largest and next smallest values of ${}_t p_{x+r}$ to determine an exact event date
- Calculate the hazard rates at the event date
- Normalize the hazard rates so they sum to 1.
- Draw a second random number
- Compare the second random number to the hazard rates and determine the event type



Recovery Logic

Basic Loop

- Calculate any adjustments to event date due to event type (e.g., lapse occurs at end of premium payment period)
- Calculate monthly cash flow and timing from recovery date until the adjusted event date
- Record monthly cash flow and timing for the sum for each trial
- Record items listed in result of each recovery trial
- When event type is a claim, record items listed in if active trial results in a claim event
- Repeat above until all recovery records are processed
- Restart the claim record process if any new claim records are created and the maximum number of loops for each trial has not been exceeded.

Model Enhancement Discussion

- **Model refinements**
 - Additional states (e.g. assisted living facility stay)
 - Inforce block
 - Run-off of disabled life reserves (DLR)
- **Interest rate interaction**
- **Management action**
- **Parameter risk**
- **Speed**



Questions?



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