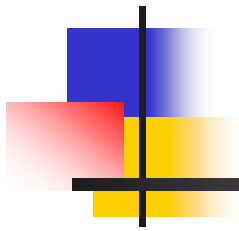


Principles-Based Reserving for Health Insurers



Amy Pahl, FSA, MAAA; Milliman, Inc.
John K. Heins, FSA, MAAA; PolySystems, Inc

Session 17
2007 Valuation Actuary Symposium, Austin, Texas
Monday September 17, 2007



Session Outline

- Principles-Based System Introduction
 - State Long Term Care Principles-Based Work Group
 - State Health Principles-Based Work Group
- Recent work of the LTCPBWG
 - Issues Subgroup
 - Technical Subgroup



Principles-Based System

Introduction

Long Term Care Products

- LTC is the Academy's starting focal point for the Healthcare Insurance Industry - LTCPBWG
- A second committee was formed this year to address all other health lines - HPBWG

Principles-Based System Introduction

Current Valuation & Accounting Bases

Current Valuation Bases

- ❖ Standard Valuation Law
- ❖ Health Insurance Reserve Model Regulation
- ❖ Health Reserve Guidance Manual

Current Statutory Accounting Bases

- ❖ AP&P Manual, SSAP #54 & SSAP #55
- ❖ AP&P Manual, primarily Appendix A-010
- ❖ AP&P Manual, primarily Appendix A-641

LTC Statutory Reserves Must Meet:
Minimum Statutory Reserve Standards
Gross Premium Valuation Testing
Asset Adequacy Test

Principles-Based System Introduction

Current Valuation of LTC Policies

Before Claim (Active Life Reserves)

- ❖ One-Year Preliminary Term Method (Generally)
- ❖ Defined Mortality Tables
- ❖ Limitations on Lapses and Interest Rates
- ❖ No Prescribed Morbidity Table

After Claim (Claim Reserves)

- ❖ PV Future Payments
- ❖ Include Incurred But Not Reported Claims
- ❖ Interest Rates by Incurred Year

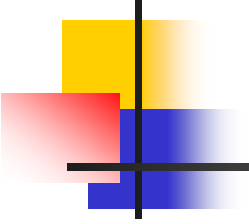


Principles-Based System

Introduction

Reasons for Change

- Current Statutory Standards include “lock-in”
 - May not capture all risks
 - Over/understate reserves and capital
- Value of consistency with PBR within companies and with GAAP
 - Coordination with the IASB and FASB



Principles-Based System

Introduction

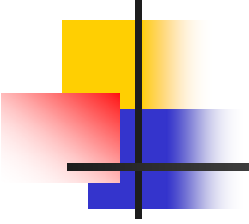
The Principles

- As developed by AAA for LHATF
- June 3, 2007 NAIC exposure draft of overarching principles
 - Principles-based reserving framework
 - Reserve liabilities
 - Capital adequacy
 - Corporate governance
 - Disclosure & financial examinations

Principles-Based System Introduction

Statements Defining PBA – for LHATF

1. Reserves reflect all material risks
2. Utilizes risk analysis & risk management techniques
3. Incorporates assumptions & methods consistent with company's overall risk assessment process
4. Use of company experience
5. Assumptions based on prudent estimate
6. Reflects risk in calculation of reserves and capital



Principles-Based System

Introduction

LTC Risk Characteristics

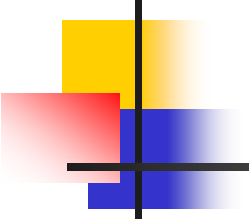
- Lapse Rates
- Morbidity
 - Incidence/severity
 - Claim variability
- Mortality
- Interest Rates & Economic Environment
- Movement among status categories

Principles-Based System

Introduction

Key Concerns for LTC

- Reflection of rate increases in future cash flows under stochastic scenarios
- Changing marketplace & government programs' impact on assumptions, products
- Margin in rates vs. margin in reserves
- Limited experience
- Anticipated limits on interest rate assumptions



LTCPBWG

Issues Subgroup

- Chair: John Timmerberg
- Identify and address PBS Issues for LTC
- Monitor and support PBS development in life/annuity products
- Monitor international developments



LTCPBWG Issues Subgroup

Discussions to Date

- Defining risk margins
 - What level
 - Variability by business
- Investigating statistical distributions of claims
- Monitoring efforts relating to data availability for morbidity table
- Developed outline of modeling issues



LTCPBWG Issues Subgroup

Issues to Address in Stochastic Model

- Premium rate changes
 - Unscheduled vs. planned
 - Timing
 - Trigger point
 - Reaction time
 - Effectiveness
 - Policyholder behavior



LTCPBWG Issues Subgroup

Issues to Address in Stochastic Model

- Interest Rate Scenarios
 - Traditional impacts
 - Impact on policyholder behavior



LTCPBWG Issues Subgroup

Issues to Address in Stochastic Model

- Unanticipated changes in morbidity or benefit utilization
 - Shift in claim cost curve
 - Examples



LTCPBWG Issues Subgroup

Issues to Address in Stochastic Model

- Regulatory Intervention
 - Examples
 - Retroactive application



LTCPBWG Issues Subgroup

Issues to Address in Stochastic Model

- Morbidity and/or mortality improvement?
 - Measurable “population” impact
 - Treatment breakthroughs
 - Exist in isolation?



Health PB Work Group

- Chair: Shari Westerfield
- Purpose
- Discussion Items to date
 - Health Reserves Guidance Manual
 - Commenting on Principles



Recent Work of the LTCPBWG Technical Subgroup

John K. Heins, FSA, MAAA
PolySystems, Inc



LTCPBWG

Technical Subgroup

- Chair: Al Schmitz, Milliman
- Specify Model Requirements
- Design, Develop and Test Model
- Analyze Results
- Monitor and Support LRWG and LRWG Modeling Subgroup
- Coordinate with SVL2 Economic Scenario Group



LTCPBWG Technical Subgroup

Considerations and Progress

- Consider potential management action
- Ease of ability to program the multi-stochastic-variable LTC product lines
- How much variance is acceptable?
- # of trials to run to establish the proper reserve and capital levels



LTCPBWG Technical Subgroup

Modeling Stage

- Non-Excel models not viable
 - confidentiality issues
 - portability
- Launching pad: Excel-based Cash Flow projection model developed by Jim Robinson, independent consultant
- Must consider business segmentation



LTCPBWG Technical Subgroup

Modeling Stage – Method 1

Method 1 – Random Walk on each Policy

Generate a random number to test each policy's probability of a change in status, duration by duration



LTCPBWG Technical Subgroup

Modeling Stage – Method 2

Method 2 – Random Walk by Duration

- Generate the book of business at a specific point in time
- Generally the same as method 1, but better suited to management action considerations



LTCPBWG Technical Subgroup

Modeling Stage – Method 3

Method 3 – Stochastic Simulation by Database Lookup

- Every Possible Random Walk is Generated and placed into a table
- Generate the book of business at all points in time based on a random number generator data lookup from the table
- Method effectively eliminated from consideration due to run time and data storage considerations



LTCPBWG Technical Subgroup

Modeling Stage – Method 4

Method 4 – Waiting Time Model

- Developed by Eric Stallard, Research Professor, Duke University
- Generate two random numbers
 - The first determines the time of the next change in status
 - The second determines what the status change is



LTCPBWG Technical Subgroup

Modeling Stage – Method 4

Method 4 – Waiting Time Model

- Relies on the hazard rate function:

$${}_k H_{x+t} = -\log {}_k p_{x+t}^r$$

- Assuming independent probabilities,
Total Hazard Rate = Σ Individual Hazard Rates



LTCPBWG Technical Subgroup

Modeling Stage – Method 4

- Results provide a cash flow projection for each policy
- May permit use of fewer trials to establish statistical significance of results
- Point-in-time analysis is possible for management action



LTCPBWG Technical Subgroup

Modeling Stage – All Methods

- Interpolation used to choose the exact point of occurrence within the random period generated
- Assets and Yield Rates must be chosen since PBS requires Asset Cash Flow net of Liability Cash Flow
- Survival at valuation date x is normalized to that date from the issue date $x-n$
- Change in assumptions required for policies that have been on claim?



LTCPBWG Technical Subgroup

- All Methods

- Method 1 & Method 2 to be used as corroboration for Method 4 results
- Method 3 seems overly time-intensive and space-intensive and not a viable option



LTCPB Work Group

Next Steps

- Development of a Standard Morbidity Table to assist companies with small blocks of LTC business -- Issues Group
- Model 4 runs, timing and checking with Model 1 and/or Model 2, discussion of results, findings documentation – Technical Group



Questions/Discussion
