

# ALM Risk and Hedging – Measuring and Managing Earnings Volatility

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# ALM – Risk of Rising Rates

## Introduction

Current market conditions (low rates, tight spreads, steep yield curve) and recent regulatory changes have created a complex situation for fixed annuity products

### ♦ The Good

- Rebounding economy makes Japan scenario appear less likely
- Lower floors on new business further reduces falling rate risk (however, existing business is unaffected)
- Existing blocks should perform well in near term as assets typically in a gain position due to low rates and tight spreads

# ALM – Risk of Rising Rates

## Introduction

### ♦ The Bad

- Net spreads on existing blocks are compressing
  - Asset prepayments (e.g., MBS) in 2002 and 2003
  - Low net spreads on recently sold business
- Earnings could be reduced further if rates rise rapidly
  - Eroding asset gains (exacerbated by negatively convex assets)
  - Higher policy lapses (magnified as surrender charges expire)
- Penalty free transfers from the GA fixed portion in variable annuities could accelerate as equities rally (and rates rise)



# ALM – Risk of Rising Rates

## Introduction

- ♦ The Ugly
  - SFAS 133

# ALM – Risk of Rising Rates

## Typical Options in Annuity Products

- ♦ **Minimum Rate Guarantee**
  - Risk aggravated as liabilities extend when guarantee is in the money
- ♦ **Surrender Option**
  - Put option for the policyholder; risk mitigated by surrender charges
- ♦ **Free Partial Withdrawals**
  - Similar to surrender option but 1) penalty free and 2) amount is capped (e.g., up to 10% per year)
- ♦ **Rate Reset Provision**
  - Valuable option for the insurance company, particularly during the surrender charge period
  - Must be balanced with other factors (e.g., marketing objectives, policyholders) to determine optimal utilization

# ALM – Risk of Rising Rates

## Typical Options in Annuity Products

### ♦ Fixed Portion of Variable Annuities

- Free policyholder option to transfer from fixed (GA) to variable (SA)
- Fixed accounts often represent a short liability credited an intermediate rate
- For many, fixed accounts (and corresponding short optionality positions) have grown considerably over recent years (due to volatile equity markets)
- Transfers from fixed accounts (and related GA asset sales) should increase as equities rally and rates rise (an economic forecast shared by many)



# ALM – Risk of Rising Rates

## ALM Performance and Risk Metrics

ALM modeling is a useful management tool to evaluate the risk/reward profile of interest sensitive business lines (i.e., not just for cash flow testing or actuaries)

- ♦ Analyze profitability across various economic scenarios
- ♦ Relevant financial metrics include
  - Income (period by period & present value)
  - Return on Capital / IRR
  - Standard deviation of results
  - ALM (C-3) risk (Cumulative Maximum Loss)
    - Measured by the interim cumulative maximum decrease in surplus
    - E.g., -100bp income for 3 consecutive years → CML = 300bp

# ALM – Risk of Rising Rates

## ALM Case Study

A \$20+ billion fixed annuity block was modeled under 250 stochastic yield curve scenarios

### ♦ Liability Assumptions

– Initial Crediting Rate (incl. exp.)	=	3.9%
– Duration	=	2.6
– Convexity	=	0.7
– Avg. Yrs to Surr. Charge Expiry	=	4 years



# ALM – Risk of Rising Rates

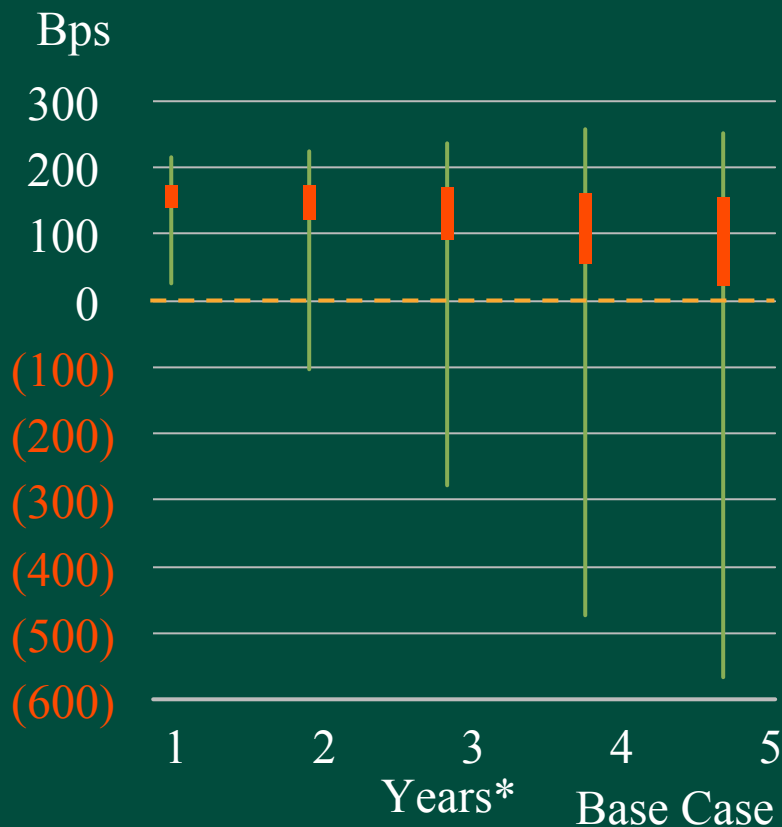
## ALM Case Study

### ♦ Asset Assumptions

Asset	% Portfolio	Duration	Convexity	Book Yield
ABS/CMBS/Other	6%	5.8	0.2	4.7%
IG Corporates	38%	5.3	0.4	5.3%
HY Corporates	7%	4.0	0.0	7.0%
CMOs	16%	4.1	(2.4)	5.3%
Pass Thrus	22%	3.6	(2.6)	5.0%
Commercial Mortgage Loans	11%	3.7	0.0	7.4%
<b>Total</b>	<b>100%</b>	<b>4.5</b>	<b>(0.8)</b>	<b>5.5%</b>
<i>Liability</i>		<i>2.6</i>	<i>0.7</i>	<i>3.9%</i>
<b>Difference</b>		<b>1.9</b>	<b>(1.5)</b>	<b>1.6%</b>

# ALM – Risk of Rising Rates

## ALM Case Study – Results



Base Case	ROA 1	ROA 2	ROA 3	ROA 4	ROA 5
Mean	155	143	128	99	73
S.D.	28	46	66	99	126
10 <sup>th</sup> Percentile	121	88	54	(16)	(79)
% Neg	0.0%	0.4%	4.8%	12.0%	19.2%

Cumulative Maximum Loss  
(98<sup>th</sup> Percentile) -3.0%

### IRR (20yr )

Mean	16.7%
S.D.	11.1%

\* The end points of the vertical lines in the candle chart reflect the Maximum and Minimum ROA figures by year. The colored boxes represent the 75th and 25th Percentile results.

# ALM – Risk of Rising Rates

## ALM Case Study – Observations

- ♦ Average earnings are initially robust but trail off considerably over time
  - Net income declines by over 50% in 5 years (from 155bps to 73bps)
- ♦ In addition, potential income volatility increases considerably
  - Standard deviation of net income increases from 28bps to 126bps
  - Approximately 20% incidence of negative earnings scenarios in year 5
- ♦ Cumulative Maximum Loss equals 3.0% (represents measure of the economic capital required for ALM (C-3) risk)

# ALM – Risk of Rising Rates

## Hedge Considerations

- ◆ Insurance companies generally recognize benefits of hedging
- ◆ Challenge is implementing cost-efficient strategies to effectively mitigate risk
- ◆ SFAS 133 has been an additional impediment for hedging
- ◆ Accounting concerns stem from the complexities of insurance liabilities
  - E.g., annuities with embedded optionality, discretionary rate resets, etc.
  - Difficult to qualify for hedge accounting
- ◆ This has limited insurance company derivative hedging activity in several (and possibly many) cases

# ALM – Risk of Rising Rates

## Hedge Strategies

Strategies pursued to address potential SFAS 133 accounting volatility:

- ◆ Purchase options that are considerably out of the money
  - Focus on tail risk and keep hedge premiums small
  - Low premiums prevent significant mark to market volatility, except for when the tail event has materialized (and the mark is significantly positive)
- ◆ Tailor the derivative strategy to achieve hedge accounting under SFAS 133. For example,
  - Using reference rates of 5 or 10 year CMS rather than LIBOR
    - Should display higher correlations with liability crediting rates
  - Document the derivative strategy (for accounting purposes) as a hedge of other assets or liabilities that more easily qualify for hedge accounting

# ALM – Risk of Rising Rates

## ALM Case Study – Hedge Strategy

### Accounting Issues and Considerations

- ♦ Interest rate caps were an effective economic hedge against rising rates
- ♦ However, FAS 133 issues included:
  - Difficulty to achieve high correlation between reference rate (indexed) and liability credited rate (discretionary)
  - Could CF hedge future sales but cap notional limited to sales expectations
    - New sales not sufficient to support the desired hedge amounts
  - Could fair value hedge the assets but administratively rigorous
    - Required frequent adjustments for accounting hedge to remain highly effective
- ♦ Income volatility may have resulted if caps were used for hedging purposes

# ALM – Risk of Rising Rates

## ALM Case Study – Hedge Strategy

### Payer Swaption Strategy

- ♦ Can provide a similar economic hedge as interest rate caps
- ♦ Series of payer swaptions were used to construct an economic payoff similar to an interest rate cap
- ♦ Required swaption notionals considerably less than for a similar cap (benefit of duration)
- ♦ Reduced notional provides additional capacity for hedge accounting purposes (to hedge new sales)
  - Strategy similar as using a rate lock to hedge a future debt issuance



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## ALM Case Study – Hedge Strategy

### ♦ Hedge Accounting Results

- Swaptions marked to market through OCI until future annuity sales occur
- Recognition of swaption economics deferred for income purposes
  - If swaption expires worthless
    - ✓ Upfront premium amortized into income after the annuity sale occurs
    - ✓ Recognized as an increase to the credited rate of the annuities sold
  - If swaption settles in the money
    - ✓ Net gain amortized into income after the annuity sale occurs
    - ✓ Recognized as a decrease to the credited rate of the annuities sold
- Accounting ineffectiveness recognized in income immediately (and not deferred)

# ALM – Risk of Rising Rates

## ALM Case Study – Hedge Strategy

### ♦ Recommendation

#### – Asset Repositioning

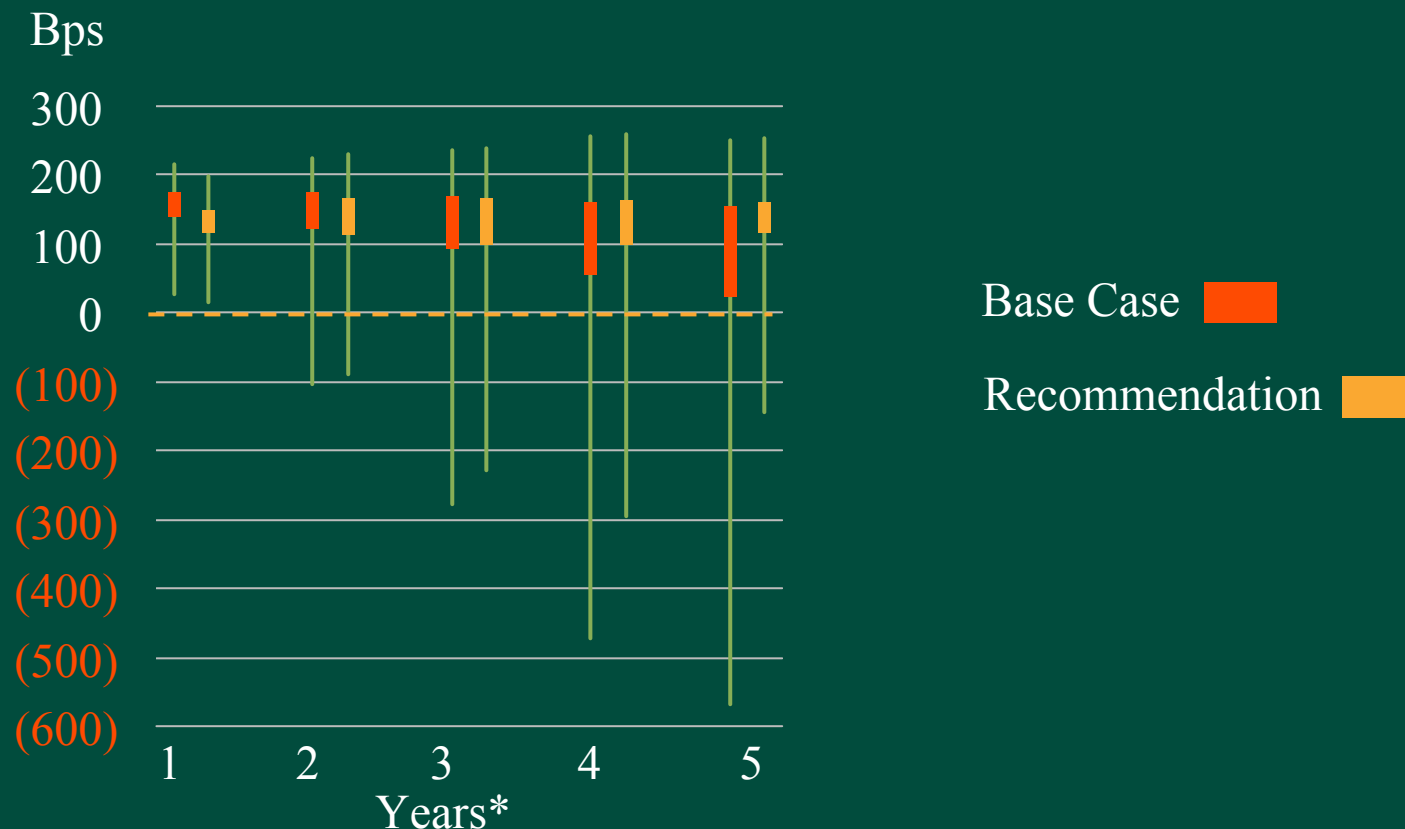
- Considerably reduce MBS/CMO (from 40% to 15% of the portfolio)
- Reinvest in non-negatively convex assets (e.g., IG corp, AAA/AA CMBS/ABS, etc.)

#### – Derivative Hedging

- Purchase payer swaptions (approximately \$1.25bn notional) to hedge the earnings decline in years 4 and 5
- Payer swaptions (to hedge the existing block) designated to hedge future sales for accounting purposes

# ALM – Risk of Rising Rates

## ALM Case Study – Hedge Strategy Results



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# ALM – Risk of Rising Rates

## ALM Case Study – Hedge Strategy Results

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Cumulative Maximum Loss  
(98<sup>th</sup> Percentile)

-3.0%

### IRR (20yr )

Mean	16.7%
S.D.	11.1%

### Recommendation

	ROA 1	ROA 2	ROA 3	ROA 4	ROA 5
Mean	132	136	129	125	131
S.D.	27	45	58	69	58
10 <sup>th</sup> Percentile	99	84	66	54	79
% Neg	0.0%	0.4%	2.8%	5.2%	2.4%

Cumulative Maximum Loss  
(98<sup>th</sup> Percentile)

-1.2%

### IRR (20yr )

Mean	17.4%
S.D.	8.4%

# ALM – Risk of Rising Rates

## ALM Case Study – Hedge Strategy Observations

- ♦ Mitigation of tail risk in years 4 and 5 more than compensates for sacrifice of net income in earlier years
  - Average IRR increases (from 16.7% to 17.4%) and standard deviation decreases (from 11.1% to 8.4%)
- ♦ Potential income volatility significantly reduced
  - Incidence of negative earnings each year are capped at approximately 5%
  - Cumulative Maximum Loss decreases from 3.0% to 1.2%
- ♦ Using payer swaptions afforded hedge accounting for the company
  - Avoided near term accounting volatility
  - Enabled company to execute a derivatives strategy to prevent potential “real” income volatility



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