ALM Risk and Hedging – Measuring and Managing Earnings Volatility

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LEHMAN BROTHERS

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

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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)

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Introduction

- The Ugly
  - SFAS 133

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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

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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)

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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

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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

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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%
Total	**100%**	**4.5**	**(0.8)**	**5.5%**
Liability		*2.6*	*0.7*	*3.9%*
Difference		**1.9**	**(1.5)**	**1.6%**

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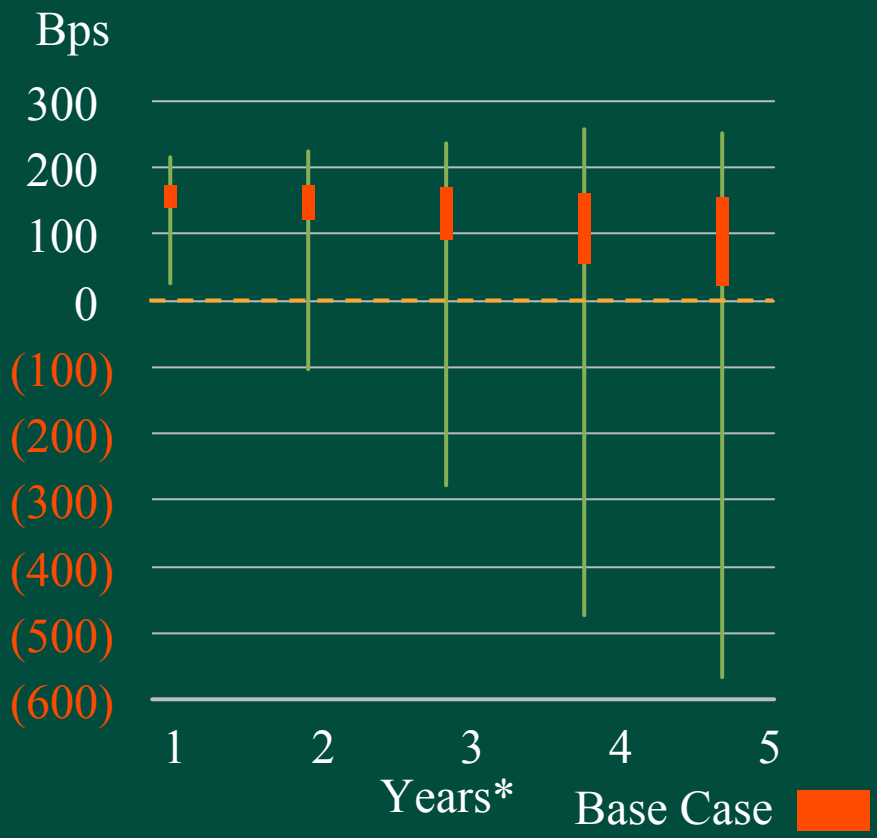
ALM Case Study – Results



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
10th Percentile	121	88	54	(16)	(79)
% Neg	0.0%	0.4%	4.8%	12.0%	19.2%

Cumulative Maximum Loss (98th 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.

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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)

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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

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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

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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

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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)

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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

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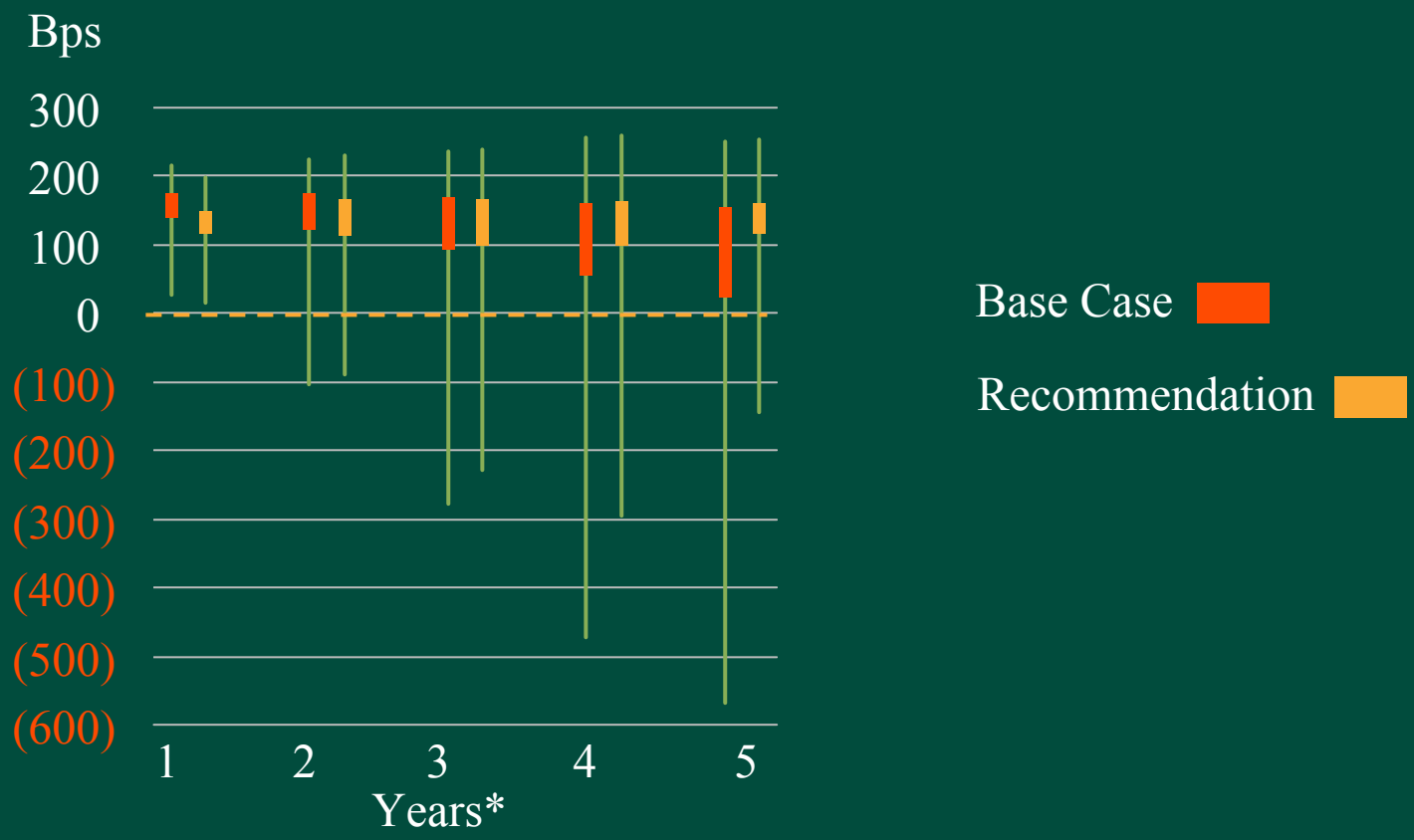
ALM Case Study – Hedge Strategy Results



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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
10th Percentile	99	84	66	54	79
% Neg	0.0%	0.4%	2.8%	5.2%	2.4%

Cumulative Maximum Loss (98th Percentile)	-1.2%

IRR (20yr)	
Mean	17.4%
S.D.	8.4%

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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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