



SOCIETY OF ACTUARIES

ALM Seminar
June 12-13, 2008

ALM Attribution Analysis

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ALM Seminar

ALM Attribution Analysis

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NEXUS RISK MANAGEMENT
INC

Agenda

- 1) Traditional Attribution Analysis
- 2) ALM Attribution Analysis
- 3) Numerical Example

Traditional approach

- ❑ Asset performance measured against typical benchmark(s)
- ❑ Attribution performed only against benchmark
- ❑ Active asset management decisions not explicitly measured
- ❑ No separation of sources of value-added – from ALM, passive position, active bets
- ❑ Capital and risk-adjusted performance cannot be properly factored in

Traditional approach major impediment to transparency

- ❑ Traditional measurement against benchmark cannot separate the value added by your ALM strategy from the value added or destroyed by active asset management
- ❑ Active asset management bets not explicitly disclosed *ex ante* nor measured *ex post*
- ❑ Unintended, implicit bets not recognized
- ❑ Result – may reward a poorly matched position
 - E.g. interest rate exposure not from a deliberate view on rates

Traditional attribution analysis not transparent

- ❑ **Benchmark may be inappropriate**
 - benchmark and or targets frequently oversimplified for benefit of asset manager
- ❑ **Entire process may cater more to needs of asset manager, not client**
 - asset manager requires specification of investment objectives, not financial objectives
 - asset manager requires benchmark and targets that may bear little resemblance to actual liabilities
 - value-added ALM strategies may disrupt performance measurement of asset manager
- ❑ **Traditional asset management divorces assets from liabilities for benefit of asset manager**

There is a better way...

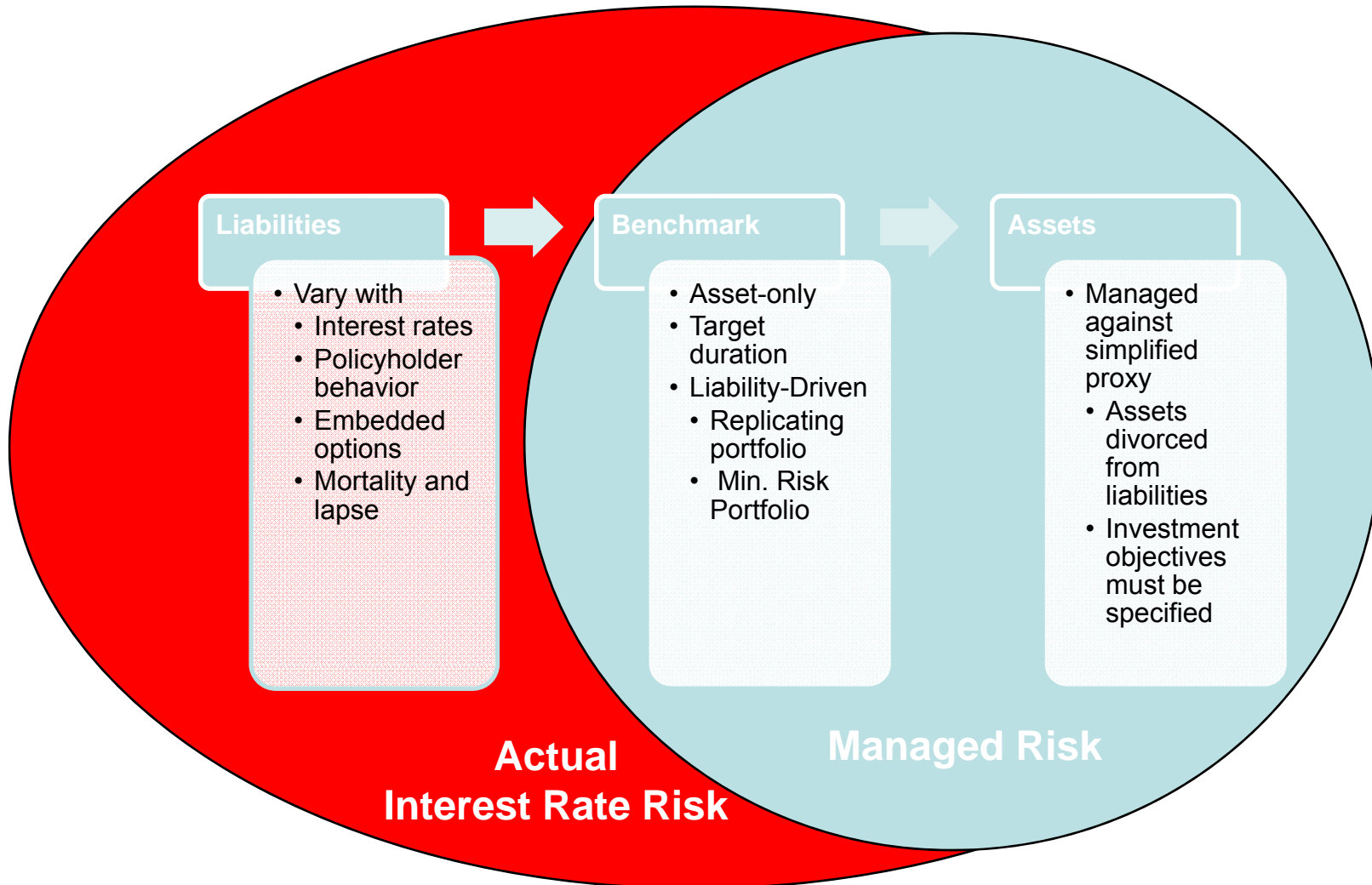
- ❑ Replace traditional benchmarks with actual liabilities
- ❑ Replace focus on narrow investment objectives with focus on overall financial objectives
- ❑ Change process so that ALM drives investment decisions

... ALM attribution analysis

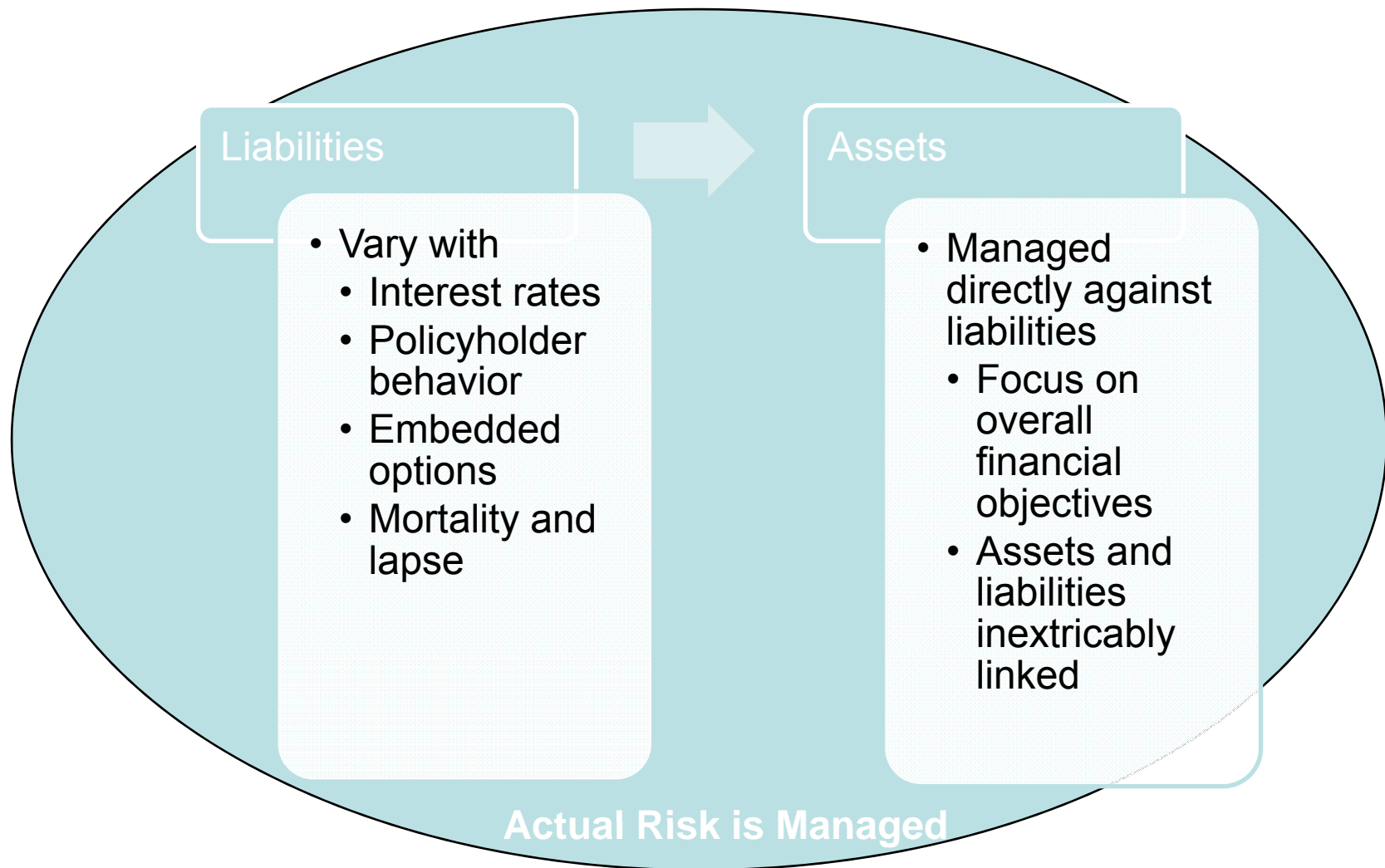
ALM attribution analysis

- ❑ Identify value from both ALM and active management
 - ALM strategies (excluding tactical credit views, security selection, rate anticipation, etc)
- ❑ Active asset management can add value on top of ALM optimized portfolio
 - Any bets (i.e., active positions) are recorded *ex ante* and measured *ex post* – thus fully transparent
 - Measure actual value added from active management, not just value against a benchmark
- ❑ Attribution not restricted to a particular measurement basis
 - could be change in ES, accounting results or other financial objective(s)
- ❑ Impact of passive position / prior period decisions / noise

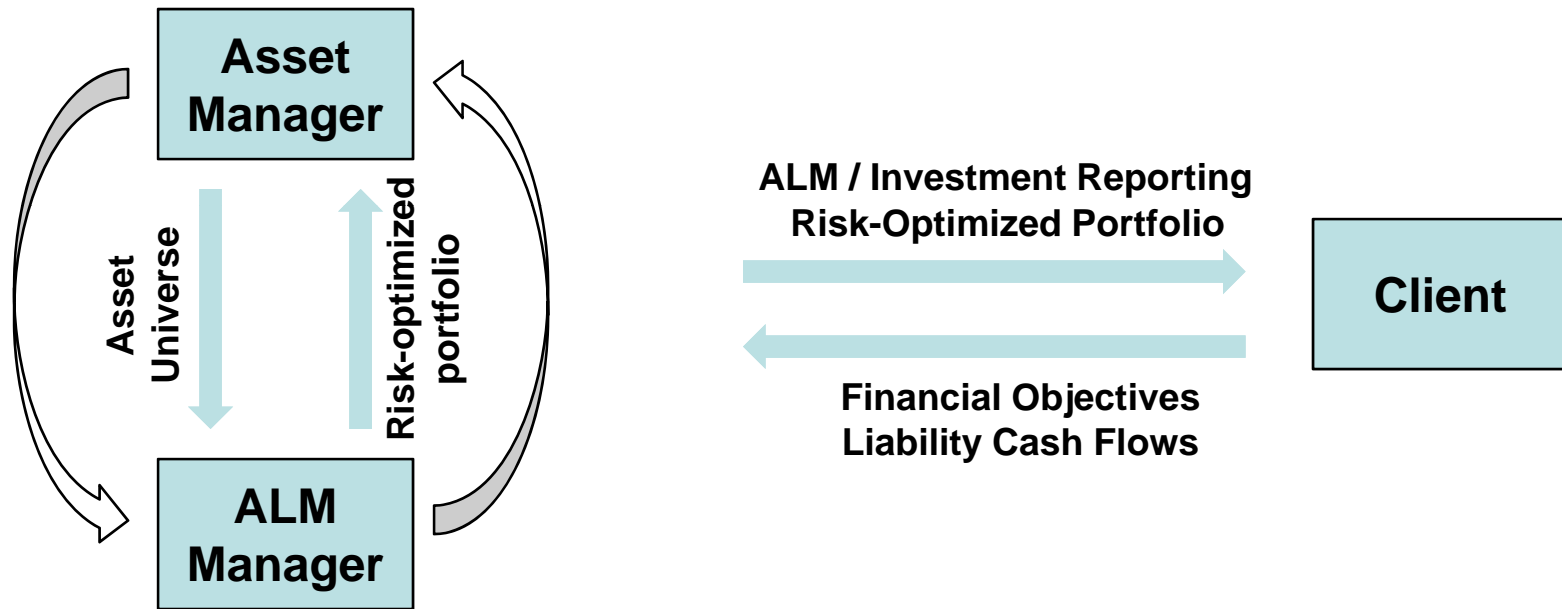
Assets managed separately under traditional approach



Shortfalls of traditional approach can be overcome



Executing Asset Management within an ALM framework



Numerical Example

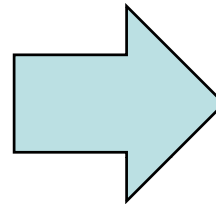
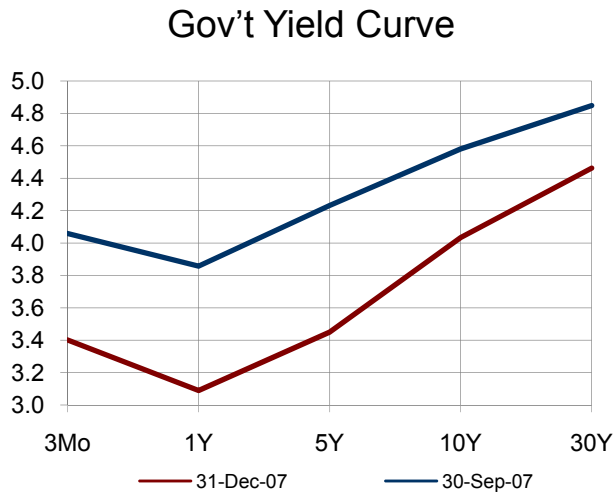
❑ ALM attribution analysis

- Quantify impact / value added from ALM strategies
- Quantify impact / value added from active asset management

❑ Limitations of simple risk metrics

- Can be poor predictors of actual risk
- if limitations not understood or naively applied can lead to unexpected results
- Need for comprehensive, coherent approach

Attribution analysis – decomposing sources of value added



Economic Surplus BOP	111,673
Change due to Yield Curve	2,292
Change due to Liabilities	(19,982)
Change due to Assets	26,718
Total Change	9,028
Economic Surplus EOP	120,701

Impact of ALM Strategies

Change in ES Before Rebalance	(5,045)
Change in ES After Rebalance	9,028
Total	14,073

Impact of Active Asset Management

Change in ES due to rate anticipation	1,213
Change in ES due to credit selection	(750)
Total	463

Avoid reliance on simple risk measures

Change due to Yield Curve	2,292
Change predicted by Duration	(190)
Contribution predicted by Convexity	(205)
Change predicted by $-D(\Delta i) + .5C(\Delta i)^2$	(395)
Change predicted by Effective Duration	(1,700)
Change predicted by Effective Convexity	(1,026)
Change predicted by $-D(\Delta i) + .5C(\Delta i)^2$	(2,726)
Change predicted by Partial Duration	2,606
Change due to Liabilities	(19,982)
New Business	(12,413)
Change due to aging of cash flows	(7,569)
Change due to assumptions changes	-
Change due to Assets	26,718
New Business	14,399
Asset trades	2,244
Change due to aging of cash flows	10,075
Change due to assumptions changes	-

Recap

❑ Traditional Approach

- No separation of sources of value-added – from ALM, passive position, active bets

❑ ALM Attribution

- Replace focus on narrow investment objectives with focus on overall financial objectives

❑ Numerical results

- Decompose sources of value added, linkage to overall financial objectives
- Don't rely on over-simplified risk metrics

ALM Attribution Analysis

ALM Seminar

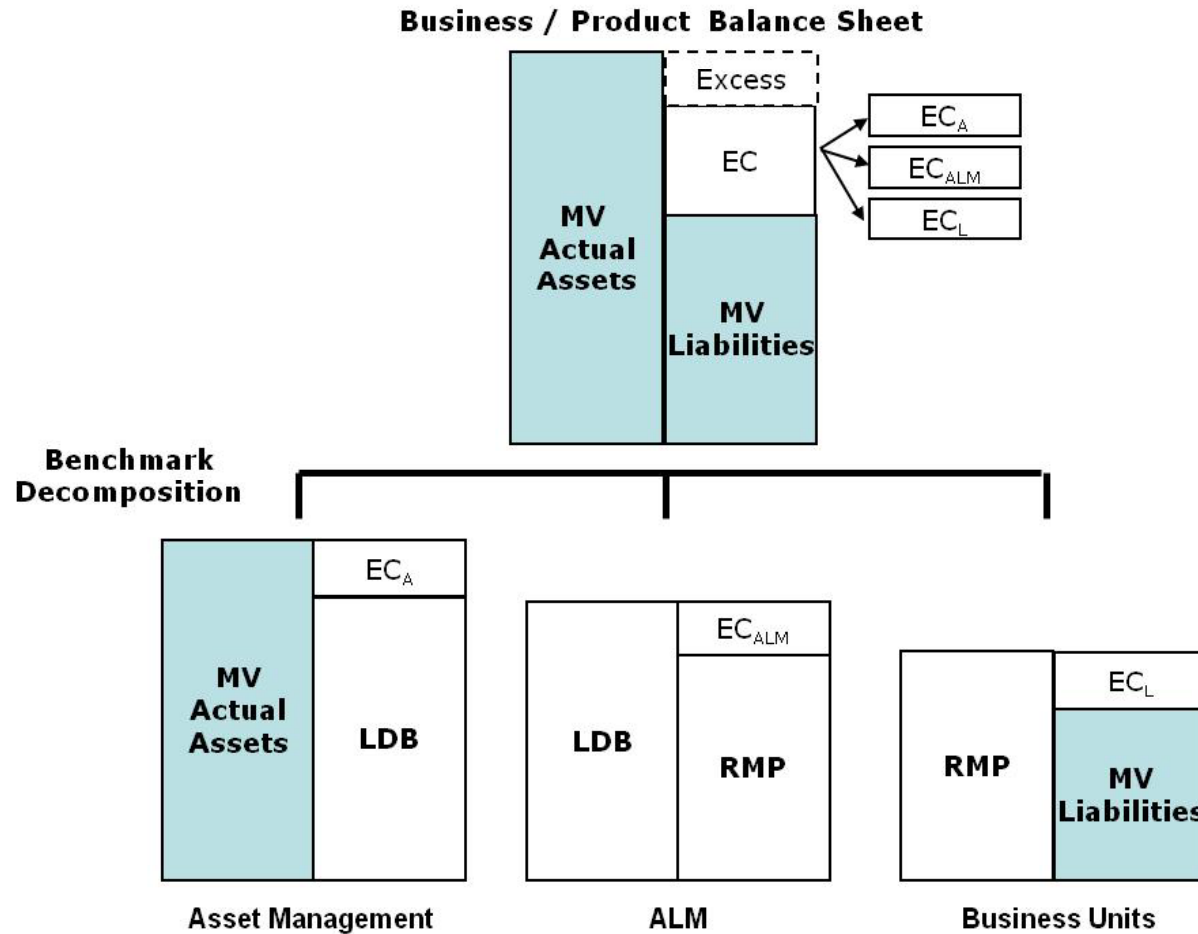
Toronto, June 2008

Gary Hatfield

Agenda

- Securian's approach for understanding sources of value
- Why do attribution?
- Attribution
- Issues/questions
- Summary

Securian's Approach



Securian's Approach

- Starts with liabilities
- Perform market consistent valuation of all liabilities
 - Modeled in Prophet
 - Uses risk neutral interest rate and equity scenarios
 - Obtain key rate durations (up and down) and equity delta of each business unit (vegas and equity gamma to be considered later)

Securian's Approach

- For each business unit, construct a portfolio of “risk free” assets to offset liability Greeks.
- Asset palette consists of zero coupon bonds, swaptions, equity future and put options.
- Portfolios are referred to as “Risk Minimizing Portfolios” (RMPs).
- Functions as “assets” of business units’ balance sheets for the purpose of understanding economic value creation

Securian's Approach

- RMP's in aggregate serve as the liability of the ALM Group
- Purpose is to
 - Increase transparency of ALM choices
 - Better understand how value is created over time via ALM

Securian's Approach

- Liability Driven Benchmark is the asset of the ALM Group's balance sheet
- Benchmark consists of investable, well known indices (e.g. Lehman intermediate credit A, Lehman CMBS, etc)
- Benchmark chosen through process resembling mean variance optimization
 - Each asset class has an expected return above the risk free rate
 - For every given combination of benchmark assets, the mismatch from the liability determines a risk measure
 - Goal is maximize the return relative to the risk measure(s)
 - Subjective, iterative process

Why do attribution?

- Understand where value was created or destroyed
- Understand primary drivers of economic profit
- Helps to assess whether ALM choices are paying off
- Assess value-add of asset management function

Attribution

- RMP constructed – consists of zero coupon bonds, swaptions, equity forwards and put options
- LDB selected to be combination of various investible indices
- Both modeled in appropriate software (E.G. Factset/Derivatives Solution, Lehman Point, Blackrock Aladdin, etc.)
- Evaluation period from $T=0$ to $T=1$

Attribution

- ALM return = $\Delta\text{LDB} - \Delta\text{RMP}$
- Asset Manager's Return = $\Delta\text{Actual Assets} - \Delta\text{LDB}$
- Key is to understand the components of the changes (returns)

Components of change

- Carry changes
- Yield Curve Changes
- Volatility changes
- Spread changes
- Equity market Changes
- Cash flows

Carry

- interest (coupons + accrual)
 - Can be approximated by $\text{Yield} * \Delta t$
- Roll-down
 - Captures gain due to upward sloping yield curve not flattening
 - Calculate by valuing securities at time 1 using time 0 yield curve

Yield Curve Changes

- Shift
 - e.g. $\frac{1}{4} (\Delta Y_2 + \Delta Y_5 + \Delta Y_{10} + \Delta Y_{30})$ applied across curve
- Twist
 - e.g. $\Delta(Y_{30} - Y_1)$ applied with pivot point
- Butterfly (sometimes not bothered with)
- Shape (residual)

Volatility Changes

- Revalue with new set of swaption implied volatilities
- Might do equity implied here as well, but as separate impact

Spread Changes

- Captures the impact of changes in credit worthiness
- Captures changes in credit risk premia
- Also captures changes in risk premia for liquidity and convexity

Equity Markets

- Captures equity exposure inherent in liabilities and which is not hedged
- Need to adjust if hedging programs are in place for GMWB's etc.

Cash Flows

- For comparison of LDB to RMP, not really an issue
- For comparison of Actual Assets to LDB a very important consideration.
- Commonly accepted approach is Modified-

Dietz:

$$R_{md} = \frac{MV(1) - MV(0) - \sum_j CF_j}{MV(0) + \sum_j (W_j \times CF_j)}$$

Where the W 's represent the proportion of measuring period days that were after the particular cash flow.

ALM performance

- Based on the relative performance of LDB versus RMP, an assessment of how the strategic ALM bets of the firm paid off.
- Example (returns in bps):

	Int.	Roll	Shift	Twist	Shape	Vol.	Spread	Equity	Total
LDB	150	10	(100)	(15)	30	(5)	(25)	0	45
RMP	100	5	50	(3)	(5)	12	0	(50)	109
ALM net	50	5	(50)	(12)	35	(17)	(25)	50	(64)

Asset Management Return

- First look at the yield curve and volatility pieces described above (roll, shift, twist, shape, vol).
- These show how that yield curve and volatility positioning of the assets relative to the LDB paid off.
- But also want more detail on how asset manager performed at what asset managers are supposed to be good at (not generally betting the yield curve)
- Want to look at:
 - Sector Selection
 - Security Selection

Sector Selection

- This measure the outperformance due to the asset manager's decisions to deviate from the chosen benchmark
- After pulling out the returns due to market risks, we are left with interest and spread returns.

Sector Selection

$$\text{Sector Selection} = \sum (W_{\text{act}}(i) - W_{\text{LDB}}(i))(\text{interest}(i) + \text{Spread}(i))$$

where

$W_{\text{act}}(i)$ = the proportion of the actual portfolio invested in sector i

$W_{\text{LDB}}(i)$ = the proportion of the LDB invested in benchmark sector i

$\text{Interest}(i)$ = interest return from sector i

$\text{Spread}(i)$ = spread return from sector i

Security Selection

- There are other approaches, but one can simply take security selection return to be what's not explained by all the other returns

Issues/Questions

- How often to change Benchmark?
- If LDB = RMP is not reasonable, should ALM Committee get full credit for the difference?
 - Is there some minimum level of credit risk that an insurer must take because it is central to the business model?
- Framework is total return oriented. But there are other considerations:
 - Yield requirements
 - Realized gains/loss limits
 - Liquidity
 - etc

Issue/Questions

- What risk measure(s) to use for setting LDB?
 - EC
 - 1 in 10 year risk measure
 - Variance
- How to measure the credit risk associated with the LDB choice?
- Need to make sure that metrics used for attribution align with investment mandate

Issues/Questions

- How best to deal with asset classed for which public benchmarks are not available?
 - Private placements
 - Commercial Whole loans
 - Etc

Summary

- Decomposition of insurance balance sheet into underwriting, ALM and asset management balance sheets allows for clearer transparency as to where value is created and what kinds of ‘bets’ are being made
- This also allows for a performance attribution that separates the ALM return due to the strategic choices of the firm from the tactical positioning of the asset manager
- Furthermore, it allows for explicit benchmarking of the asset manager’s performance.