

Asset Liability Management

Risk Optimization Of Insurance Portfolios

Charles L. Gilbert, FSA, FCIA, CFA, CERA
Victor S.F. Wong, FSA, FCIA, CFA, CRM

Many insurance company and pension portfolios are risk inefficient. This means that for a given level of risk, the financial objectives are not maximized. Risk optimization can add substantial value in many cases, on a default-free basis while simultaneously reducing the exposure to the multiple dimensions of interest rate risk.

Beyond ensuring that their portfolios are risk efficient, insurance companies and pension funds can add further value by executing ALM at a strategic level within an ERM framework to optimize the amount of risk taken within the specified risk appetite.

Agenda

- 1. ALM Challenges in Asia**
- 2. Risk Efficiency**
- 3. Optimization Techniques**
- 4. Risk Optimization**
- 5. Integrating ALM and Pricing to Gain Competitive Advantage**
- 6. Executing ALM at a Strategic Level**

ALM Challenges In Asia

- 1. Limited fixed income assets**
 - Illiquid corporate bond market
 - Insufficient long term instruments available
 - Insurers invest more in government bonds and infrastructure given limited investment options
- 2. ALM is undermined by conflicts between investment and ALM functions**
 - This is also common in North America
- 3. Active asset management has a good track record so far resulting in less urgency to implement ALM strategies**
- 4. Multiple dimensions of interest rate risk not well understood**
- 5. Fast growing asset and liability portfolios with significant mismatch risk**

Available ALM Solutions Are Not Being Utilized

Most Insurance And Pension Portfolios Are Risk Inefficient

1. Financial objectives are not maximized for the amount of risk being taken
2. In some cases financial objectives are not well defined
3. As a result it is not clear what risk should be managed
 - Manage both credit spread risk and interest rate risk combined or separately?
 - Focus on volatility of economic surplus, net income, embedded value, economic capital or other?
4. A portfolio is risk efficient if the financial objective is maximized for a given level of risk and set of constraints

Leaving Money On The Table

There Are Three Ways To Optimize A Portfolio

Optimization Basis	Object	Real Value Added?
Asset Mix	Expected Return	<ul style="list-style-type: none">• Actual return not necessarily maximized• High dependency on assumptions• Mismatch risk
Credit Spreads	Portfolio Yield	<ul style="list-style-type: none">• Credit risk premia front ended• No free lunch – higher credit risk taken in order to get higher yield
Yield Curve	Portfolio Yield	<ul style="list-style-type: none">• Yield maximized on default-free basis• Real value added

Important To Understand Whether Value Added Is Real

Optimization Basis: Asset Mix

1. Efficient Frontier Optimization based on

- ❑ Available asset class universe
- ❑ Assumptions for correlations, std dev, expected returns

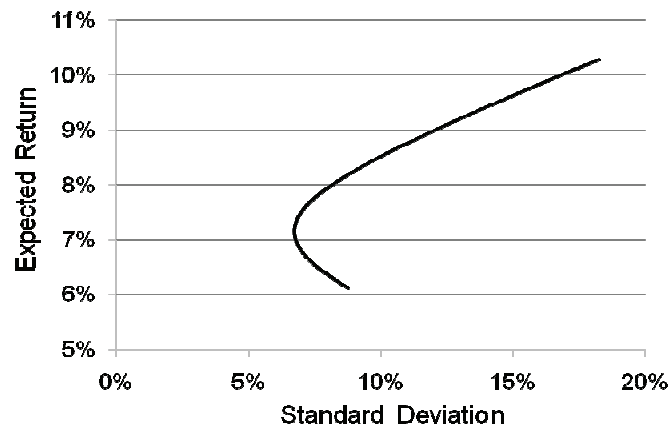
2. Maximizes risk-adjusted expected total return of asset portfolio

3. $E[R]$ is not what will be realized

4. Realized return has wide distribution

5. Does not immunize portfolio

- ❑ Non-fixed income assets results in mismatch risk



Maximize Expected Return For A Given Level Of Volatility

Optimization Basis: Credit Spread

1. **Goal is to maximize portfolio yield while without changing duration or average credit quality of the portfolio**
2. **Asset universe includes all available or selected corporate bonds, current credit spreads and ratings**
3. **Optimization consists of maximizing credit spread for average credit quality or for given rating category**
4. **Oftentimes results in higher credit risk exposure**

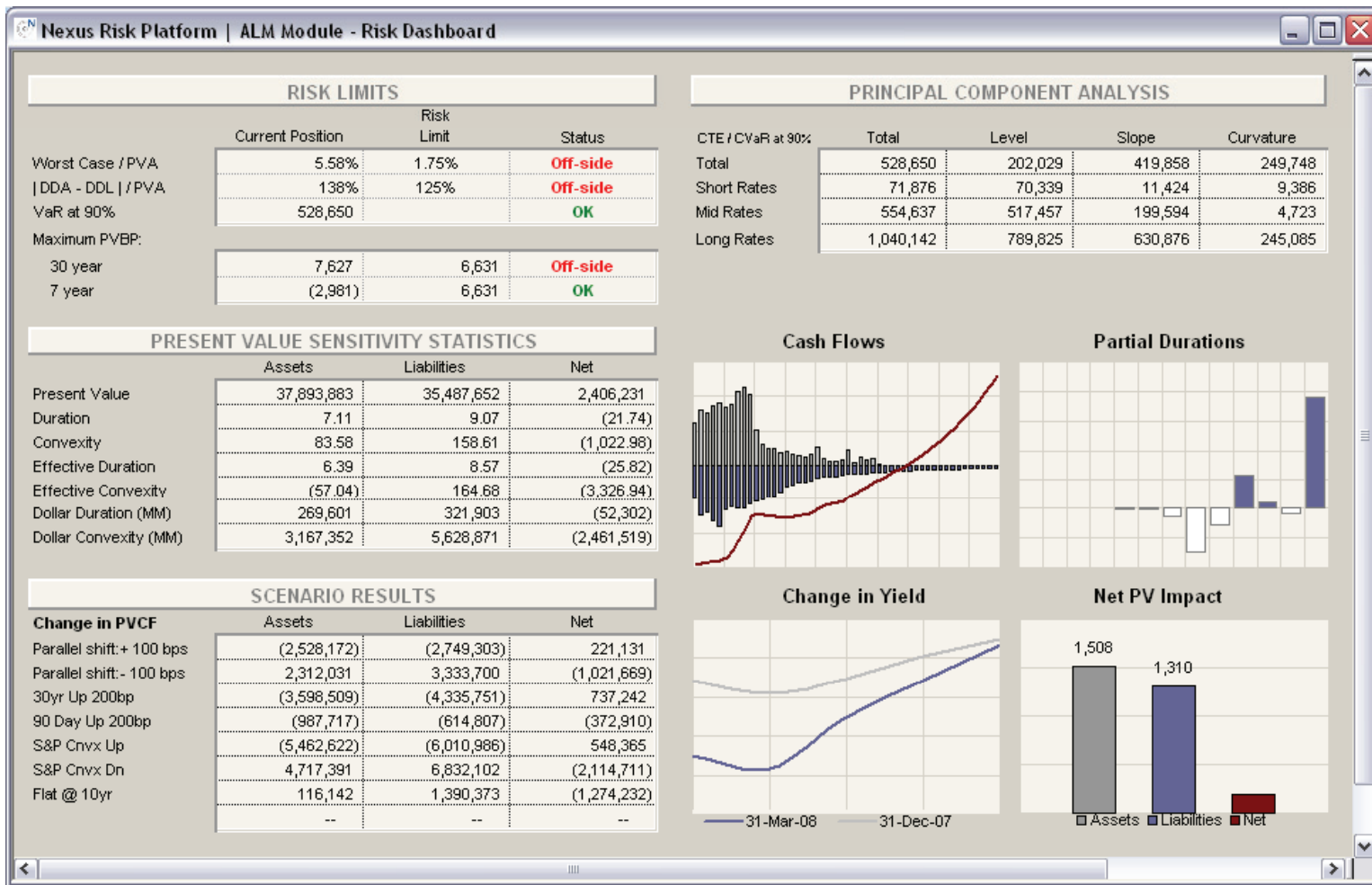
Maximize Portfolio Yield For A Given Credit Quality

Optimization Basis: Term Structure Of Risk-Free Interest Rates

- 1. Goal is to maximize portfolio yield on a default free basis**
- 2. Optimization is performed using risk-free government yield curve**
- 3. Simultaneously maximize yield and minimize interest rate risk exposure at all points across the yield curve**
- 4. Involves executing a partial duration immunization strategy with risk limits specified for all term to maturities**
- 5. Potential to add significant value**

Maximize Portfolio Yield Based On Shape Of Yield Curve

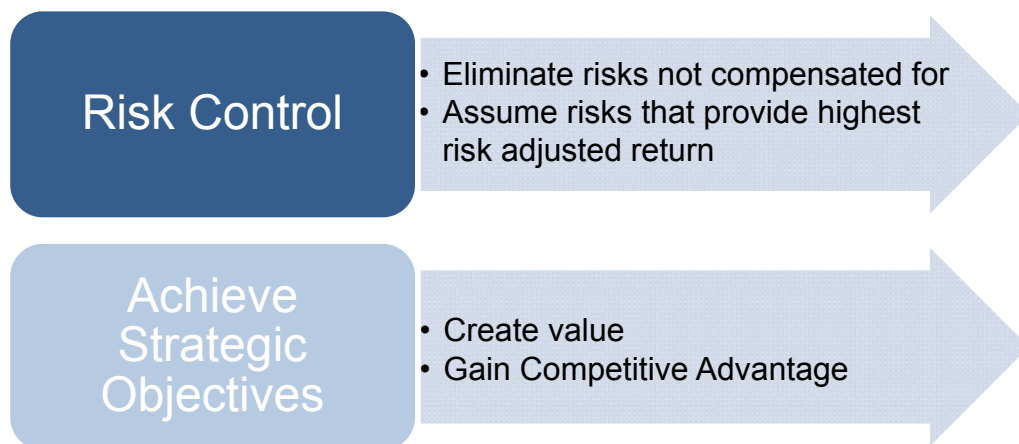
How It Works...



Insurers Have Added 5 To 30 bps Yield For Same Level Of Risk

Ensuring Portfolio Is Risk Efficient Is First Step

1. Is the level of risk appropriate?
2. Amount of risk taken needs to be consistent with risk appetite.
3. Taking too little risk may be inconsistent with risk capacity and risk strategy and may forgo being well compensated for the amount of risk taken
 - ❑ Determine how much a particular ALM strategy and risk limits are costing
 - ❑ Quantify how much additional income / value can be added for some measure of additional risk



Insurers Need To Determine Whether They Are Taking The Right Amount Of Risk

Risk Optimization To Execute ALM At Strategic Level

- 1. Risk management best practices require that ERM be implemented as a strategic decision making framework to run the business**
 - ❑ Rating agencies and regulators are placing greater emphasis on this
- 2. Risk optimization provides the means for executing this**
 - ❑ Requires that the ALM conceptual framework be integrated with the risk appetite and ERM objectives



Financial Objectives:

- Maximizing EV / MCEV
- Maximizing GAAP earnings

Risk Tolerance:

- Quantitative limits
- Qualitative limits

Specific Constraints:

- Rating triggers
- Earnings / Economic Capital

ALM Conceptual Framework Needs To be Integrated With ERM

Multiple Dimensions Of Risk Are Not Effectively Managed

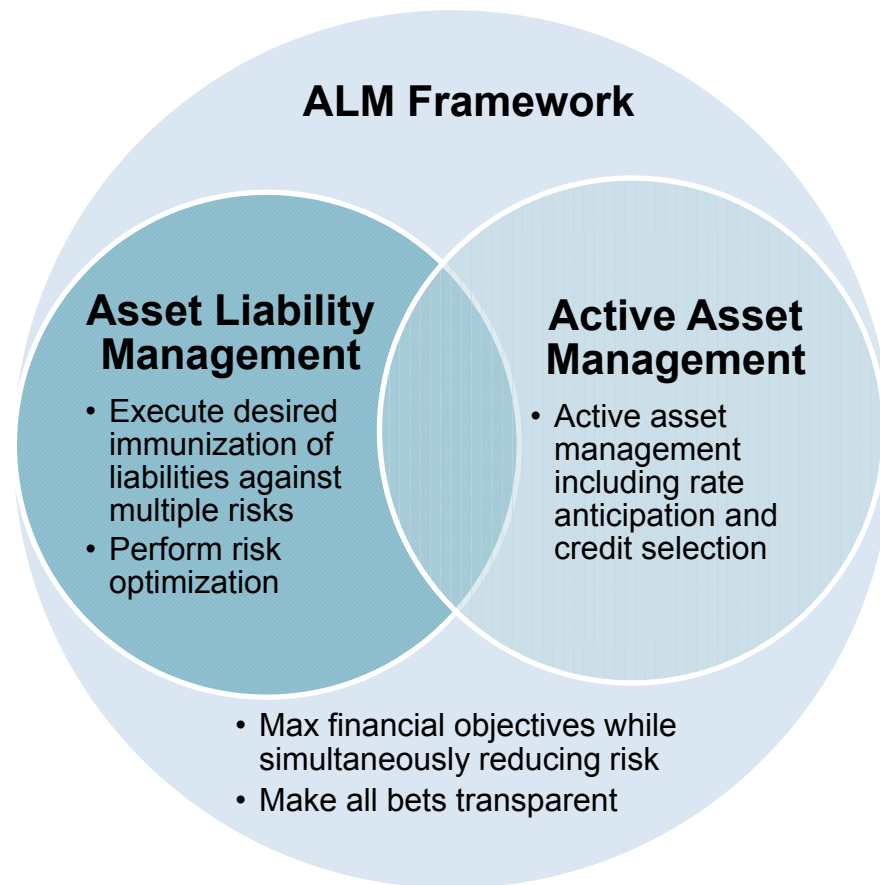
- 1. Perfectly immunized on a duration basis is not sufficient**
 - ❑ Economic surplus not protected if $pV \text{ Assets} > pV \text{ Liabilities}$ for any change in interest rates
- 2. Perfectly immunized on a dollar duration is not sufficient**
 - ❑ Not protected against a large change in interest rate (i.e. can still have significant second order / convexity exposure)
- 3. Perfectly matched first and second order exposure is not sufficient**
 - ❑ Not protected against a non-parallel shift in interest rates
- 4. Perfectly immunized on a partial duration basis is not sufficient**
 - ❑ Not protected against embedded options or interest sensitive cash flows in the liabilities or assets
- 5. Perfectly immunized on an effective duration and convexity basis is not sufficient**
 - ❑ Only protected for the change used in calculating the effective measures
- 6. Stochastic modeling, VaR, Economic Capital and Principle Component Analysis will measure the extent to which all the multiple dimensions of the interest rate risk exposure are effectively managed**

Risk Optimization To Gain Competitive Advantage

1. **Integrate ALM and Pricing**
2. **Perform risk optimization to determine the maximum earned rate that can be achieved for a given ALM Strategy**
 - Use available asset universe
 - Model ALM strategy

Risk Optimization For Performance Attribution

1. Perform risk optimization
2. Replace Minimum Risk Portfolio (MRP) benchmark with Risk Optimized Portfolio (ROP) benchmark
3. Greater transparency of value added from ALM strategies and value added from active asset management decisions



Increasing The Risk Efficiency Of An Existing 60/40 Mix

1. Does not require reducing equity exposure; can simultaneously:

- Reduce first-order interest rate risk exposure, and
- increase portfolio yield on risk-adjusted basis

2. Perform risk optimization

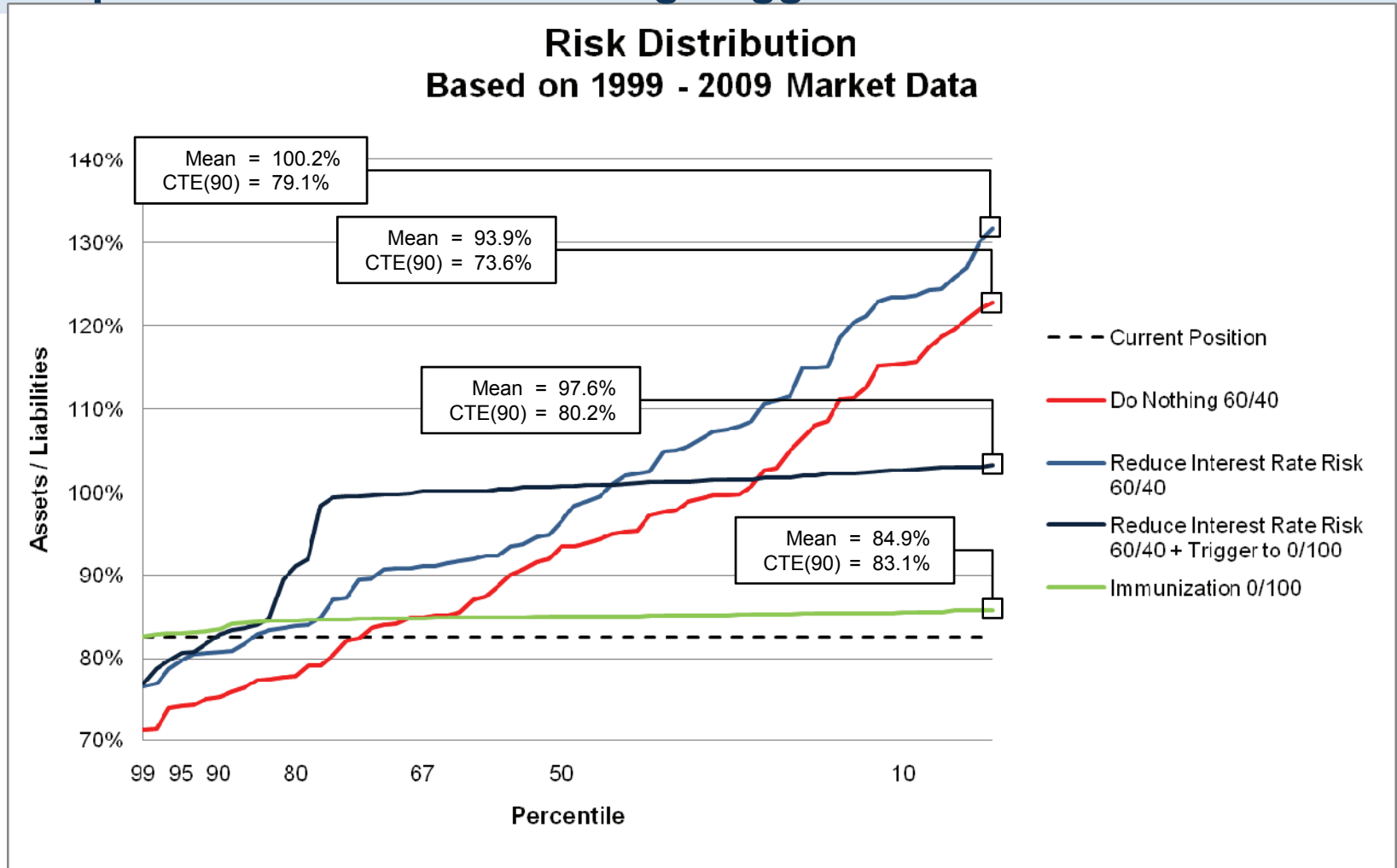
- If no view/bet on interest rates:
Lengthen duration and optimize based on term structure
- View that interest rates will rise:
Optimize based on anticipated term structure

3. Add desired level of credit, alpha

- Corporate and government bonds, active equity management

Reduce Or Eliminate Uncompensated Interest Rate Risk

Risk Optimization And De-Risking Triggers Offer Quick Wins



Three Ways To Add Value And Be Happy

Eliminate Uncompensated Risk

- Simultaneously:
 - 1) reduce interest rate risk exposure, and
 - 2) increase portfolio yield on risk-adjusted basis

Achieve Specified Objectives

- Define financial objectives, risk tolerances and constraints
- Maximize Net Income, EV, ES, ...
- Reduce risk Exposure on Both an Economic and Valuation Basis

Increase Risk Efficiency

- Set up linear programming problem
 - Perform risk optimization
 - Test impact on objectives
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Effective Execution Of Risk Management To Achieve Objectives

Thank You



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Toronto

Seoul

Hong Kong

Nexus Risk Management
905 - 170 University Ave
Toronto ON M5H 3B3
Canada
+1 416 593 9642
inquiries@nexusrisk.com
www.nexusrisk.com

Nexus Risk Management
2105, Kwangwhamun Officia
163 Sinmunro 1-Ga, Jongro-Gu
Seoul, Korea 110-999
+82 2 3276 2353
ki-hong.joo@nexusrisk.com
www.nexusrisk.com

Real Actuarial Consulting
Level 30, Bank of China Tower
1 Garden Road, Central
Hong Kong
+ 852 2251 8593
victor.wong@real-consulting.com
www.real-consulting.com