SOCIETY OF ACTUARIES

Investment Symposium
March 2010

F6: Liability Driven Investing

Ronald Ryan
Shalin Bhagwan
Chad Hueffmeier

Moderator
Navin Sharma

Investment SYMPOSIUM
Cautiously Following the Recovery Road Sign

LDI

Ronald J. Ryan, CFA
CEO, Ryan ALM, Inc.

Actuaries
Risk is Opportunity

Investment SYMPOSIUM

Pension Plan Objective

Fund Liabilities at the Lowest Cost to the Plan

Lowest Cost	=	**Assets fully fund Liabilities**
		No Contributions
		"Pension Holiday"
Problem	=	**Assets do not know Liabilities**
		Assets are not managed vs. Liabilities

Society of Actuaries (SoA)

(Principles Underlying Asset/Liability Management)
October 2004

Accounting measures *distort* economic reality

Consistent ALM can only be achieved for Financial Objectives

Entities that focus on economic value tend to achieve their financial objectives

Entities who manage their assets based on accounting treatment end up mismatching liabilities

Translation : ALM Requires Economic Books

Custom Liability Index (CLI)

Provide a Proper *Benchmark* for the Asset side to function efficiently

Asset Allocation
Asset Management
Performance Measurement

Create a set of *Economic Books* in harmony with SoA directive

Based on Market Value
Built as a Liability Index series

Risk

Tradition	**Volatility of Total Returns**
Ryan ALM	**NOT Meeting the Client Objective** **Objective is Liability Driven** **Not Matching and Funding Liabilities**
Examples	**S&L, Pensions, Healthcare**
Sharpe	**Old Ratio = Based on 3 month T-Bill** **New Ratio = Based on Objective** **(*Information Ratio*)**

Investment SYMPOSIUM

Beta

MATCHES Return of Objective

Pension Objective = Liability Driven

Beta = Asset / Liability Matched Portfolio

Beta = Liability Index Fund

Investment SYMPOSIUM

Liability Beta Portfolio

Matches Return of Objective

Pension Objective = Liability Driven

Beta = Asset / Liability *Matched* Portfolio

Liability Beta = Liability Index Fund

Requires *Custom Liability Index*

Investment SYMPOSIUM

Alpha

Excess Return Above Objective

Pension Objective = Liability Driven

Alpha = Excess Return Above Liability Growth

Investment SYMPOSIUM

Liability Alpha Portfolio(s)

Objective = Liability Index

Alpha = Excess Return above Objective

Beat a Market Index …but Lose to Liabilities = You Lose !

Liability Alpha = Excess Growth above Liability Growth

Requires *Custom Liability Index* to Measure Alpha

Investment SYMPOSIUM

Investment SYMPOSIUM

Asset Allocation

Should be based on "*Funded Ratio*"

(Market Value of Assets / MV of Liabilities)

Requires *Custom Liability Index* to Measure MV of Liabilities

Large Deficit = Different Asset Allocation than Small Deficit

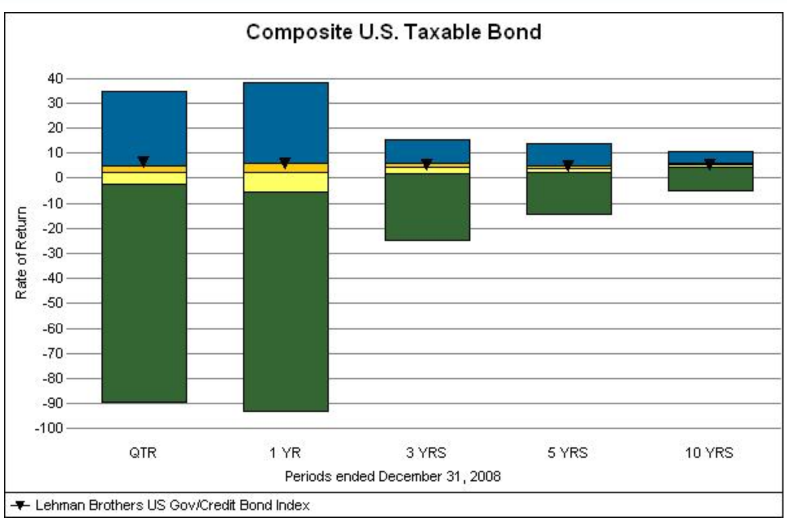
Should be Dynamic (Tactical)

No Alpha in Bonds

Total Returns
(Periods Ending 12/31/08)

	10 yrs.	20 yrs.
Lehman Aggregate	5.63%	7.43%
Ryan 5-year STRIPS	6.86%	8.39%
Difference	- 1.23%	- 0.96%
Ryan Liability Index	9.43%	11.17%

Lehman Aggregate Duration consistently @ 5 years



True Alpha

Requires CLI to Measure Liability Growth (Returns)

Actual Return of Alpha Portfolios	5.00%
- Actual Return of Liabilities	- 5.00%
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True Alpha	10.00%

Alpha Hurdle Rate

Requires CLI to Measure Economic Deficit

Economic Deficit - 30%

Deficit / Duration of Liabilities = Hurdle Rate

30% / 15 years = 2.00 %

Investment SYMPOSIUM

Allocation to Alpha

Requires CLI to Measure Economic Deficit

Economic Deficit - 30%

Deficit / Duration of Liabilities = Hurdle Rate

30% / 15 years = 2.00 %

ROA of Alpha Portfolios 8.00%
Yield of Liabilities 5.00%
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***Estimated* Alpha 3.00%**

Allocation to Alpha Portfolios :

Hurdle Rate / Estimated Alpha

2.00% / 3.00% = 67%

Liability Driven Investment

23 March 2010

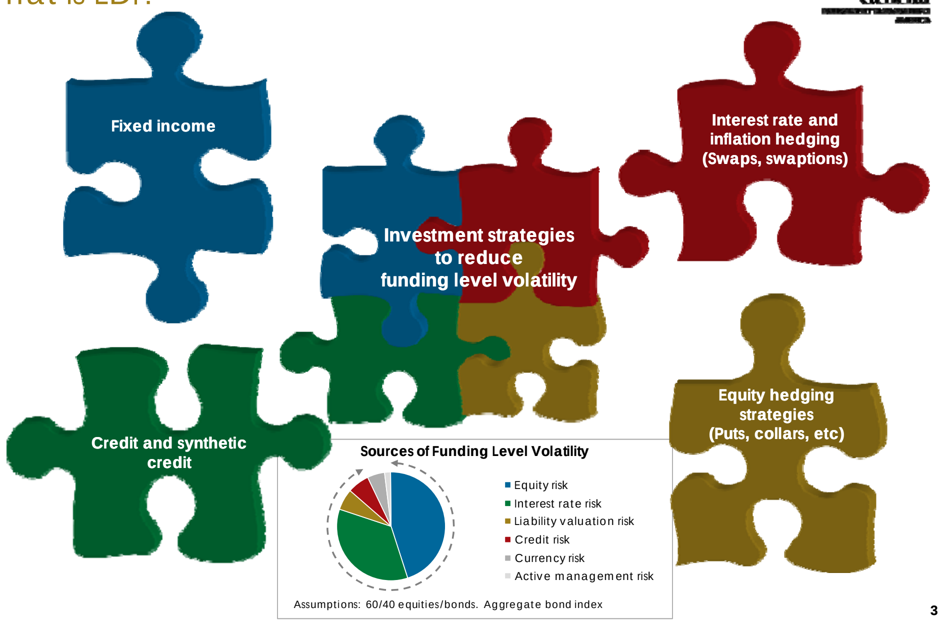
Dynamic strategies for navigating turbulent markets

Shalin Bhagwan – Global Head of Pension Solutions

Agenda

- What is LDI?
- How are LDI strategies evolving?
- How secure were LDI strategies through the market turmoil?
- De-risking in challenging market conditions
  - De-risking when long-term interest rates are at historical lows
  - De-risking in the face of funding shortfalls
- Summary

What is LDI?



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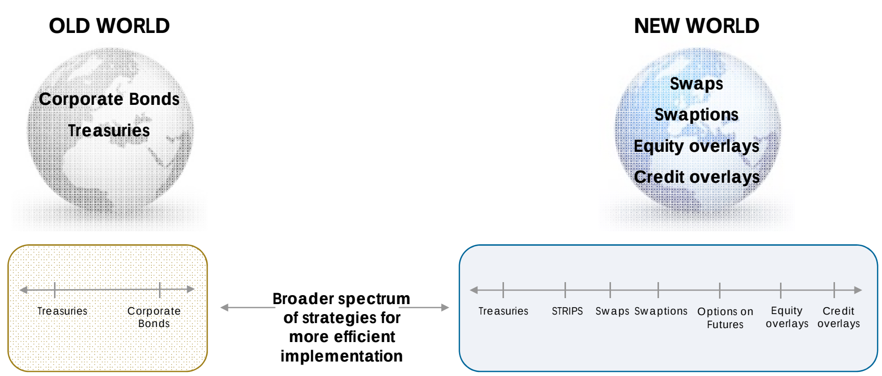
How are LDI strategies evolving?



- Return enhancement opportunities from market dislocations
- Requires more nimble approach to implementation

But how secure were these derivative strategies during the financial crisis?

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How secure were LDI strategies through the market turmoil?

Managing Counterparty Credit Risk

Diversification
- Range of counterparties
- Counterparty limits can be set

Counterparty Monitoring
- Market indicators e.g. CDS

Collateralisation
- Segregated – should be daily with high quality collateral
- Escalation process if collateral not posted by counterparty
- Tolerance checks between Bank and LGIM valuations

Derivative Documentation

ISDA Master Agreement
- Minimise Exposure
- Security of collateral assets

Swaps and OTC Options

Lehman Collapse

- **Thurs 11 Sept**
- **Fri 12 Sept**
  - Collateral received
- **Sun 14 Sep**
  - Rescue bids fail
- **Mon 15 Sep**
  - 10:00, Lehman file for Ch 11
  - LBIE goes into Administration
  - Default Notices served
- **Tues 16 Sep**
  - Collateral sold for cash
  - Replacement swap trades executed
  - Replacement cost calculated
  - Proven collateralisation process
- **Close of Business**

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De-risking in challenging market conditions

Current market levels for hedging interest rate risk

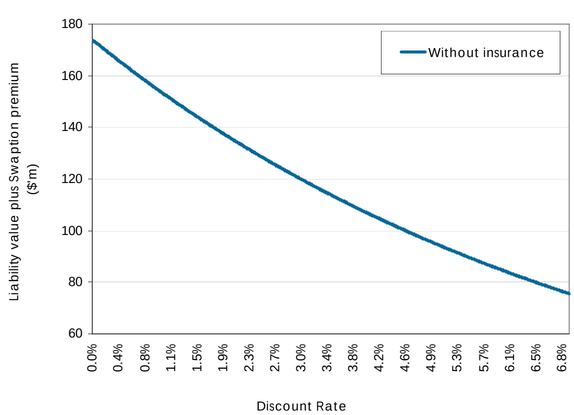
20-year swap rate

20-year swap spread over Treasuries

- 20-year swap rate has averaged **5.2%p.a.** over the last 10 years
- 20-year swap spreads over Treasuries have averaged **67bps** over the last 10 years
- Not convinced that locking into these interest rates will be favorable
- **What are my alternatives?**

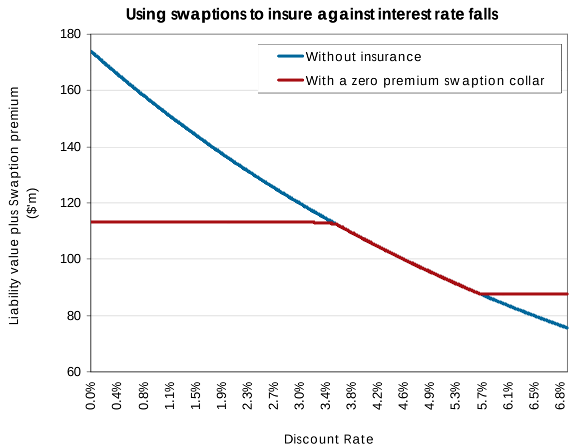
Insuring against unfavorable funding level outcomes

Using swaptions to insure against interest rate falls



- Liability value changes in response to changes in interest rates
- Would like to protect against further falls in interest rates

Insuring against unfavorable funding level outcomes



- Analagous to an equity collar to protect against falls in equity markets
- Except the Plan would want to receive a payment should **interest rates fall below a specified level**
- In exchange the Plan may be prepared to make a payment when **interest rates rise above a specified level.** This would mean the funded status would not improve by as much as might otherwise have been the case.
- The combined impact is to create a "collar" around the value of the liabilities

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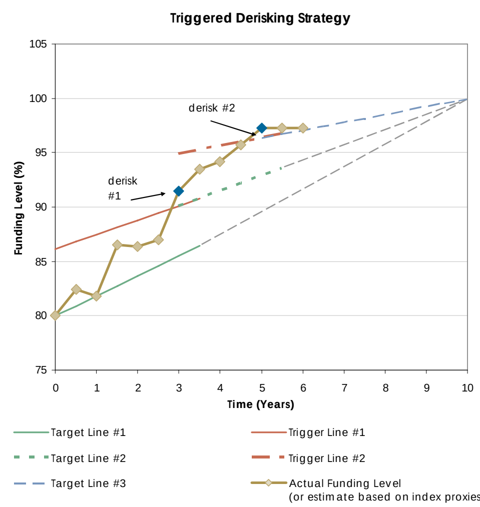
De-risking in the face of funding shortfalls

- Objective
  - linking affordability and phasing out of RSA (Return-Seeking Assets) into an LDI portfolio
  - Addresses the emotion involved in switching when markets are rallying
- How
  - Switching triggers linked to Plan's funded status
- Case study
  - This Plan is initially 80% funded
  - The initial "target line #1" represents the progression of the funding level if the assets outperform the liabilities by 2.25%pa, which is the required return to reach full funding in 10 years
  - The initial "trigger line #1" represents a requirement for only 1.50% pa outperformance to reach full funding
  - At this point, a lower risk strategy can be adopted, and the old trigger line becomes the new target line
  - The "trigger line #2" represents a 0.75% pa required outperformance. Again, risk can be reduced further at this point



Think long-term; act opportunistically

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Summary

- A philosophy of managing assets relative to liabilities
- A move to using a wider toolkit
- Robust arrangements during financial crisis
- Think long-term but act now

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Questions

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Chad Hueffmeier

March 23, 2010

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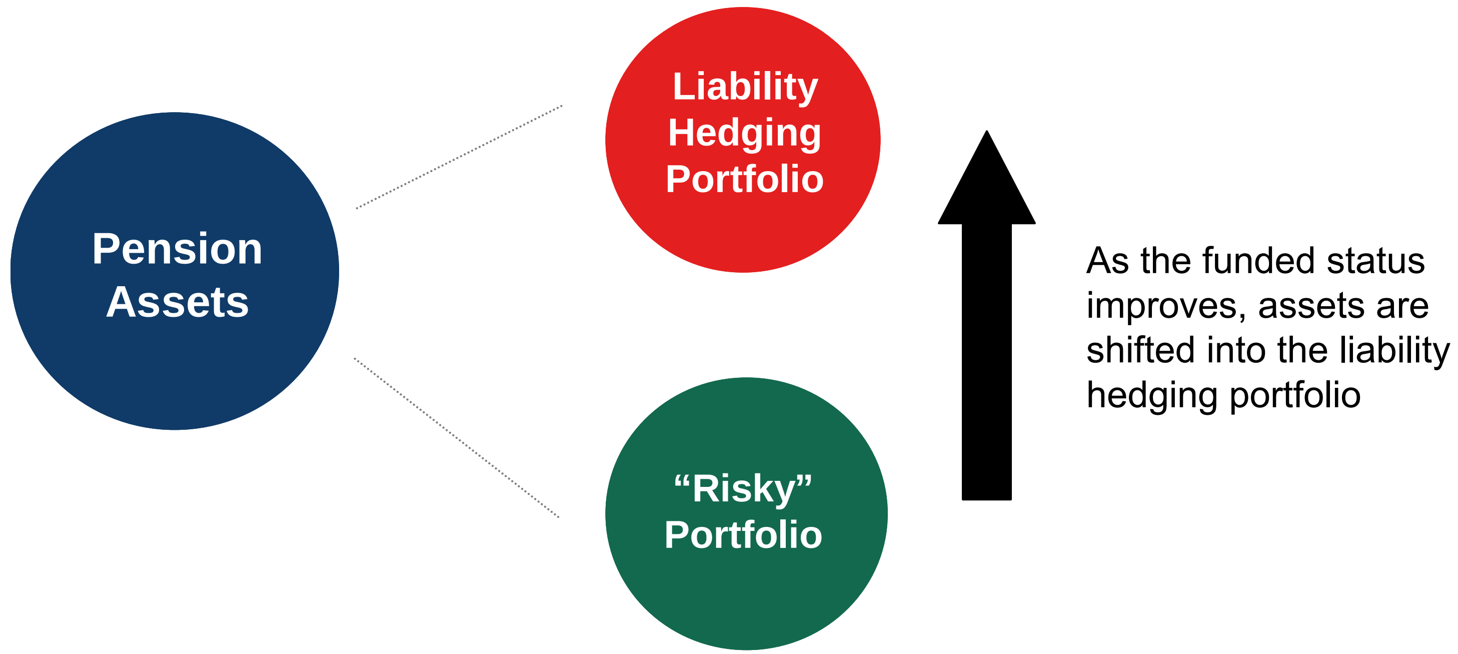
An Emerging Pension Investment Approach

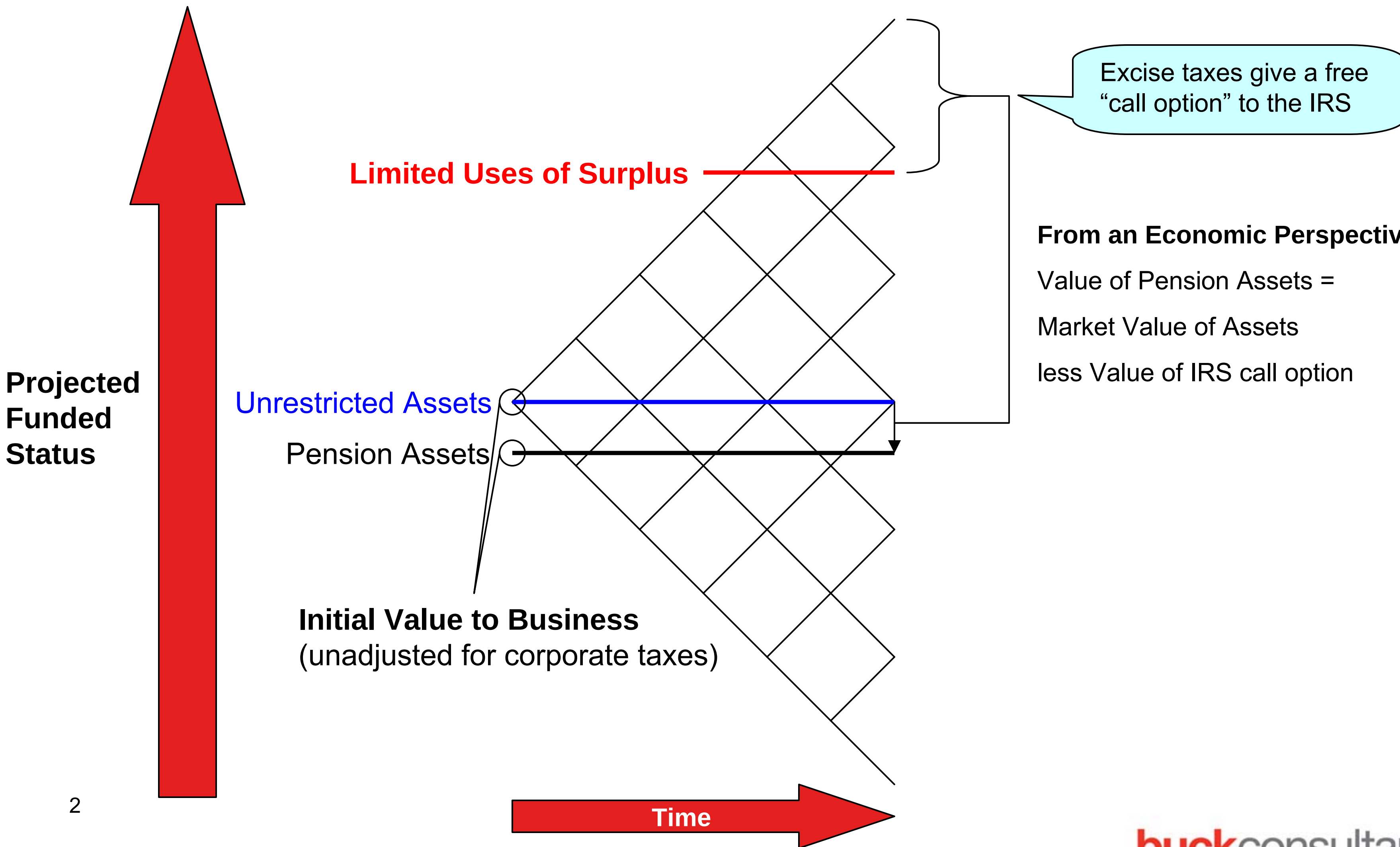
- A new investment strategy is gaining ground with plan sponsors

A Dynamic Pension Investment Policy



- Reduce risk and "hedge" liabilities as the pension funded status improves
- Gradually phase out of risky investments and impact of artificial accounting reward

Taking Risk with Limited Upside Reduces Value



From an Economic Perspective:

Value of Pension Assets =

Market Value of Assets

less Value of IRS call option

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Illustration of Measuring the Value of IRS Call Option


SOCIETY OF ACTUARIES Investment Section

Risks & Rewards

ISSUE 55 FEBRUARY 2010

Actuaries
Risk is Opportunity®

TAKING STOCK: IS BEING BIG BAD AND IS STRONG COMPETITION ALWAYS GOOD?

By Nino Boezio

For example, if participants have no claim on the surplus and excise taxes are 50 percent of the value of reverted assets, the taxing authority would have a call option on 50 percent of excessive assets. Using Black-Scholes option pricing and the following assumptions, we have estimated the shareholder value destroyed by continuously maintaining a constant asset allocation in four examples.

	Value of Tax Authority's Option ($ millions)	
	80% Funded	100% Funded
Frozen Plan	$10.8	$56.8
Closed Plan with future accruals equal to 10%	$4.8	$33.3

Assumptions:

- Liabilities of $1 billion[10]
- Demographic experience will match expectations
- Interest rate risk in liabilities (and future accruals) is fully hedged
- Liability tracking error[11] of 10 percent
- Risk-free returns are 4 percent
- The plan will be terminated in five years

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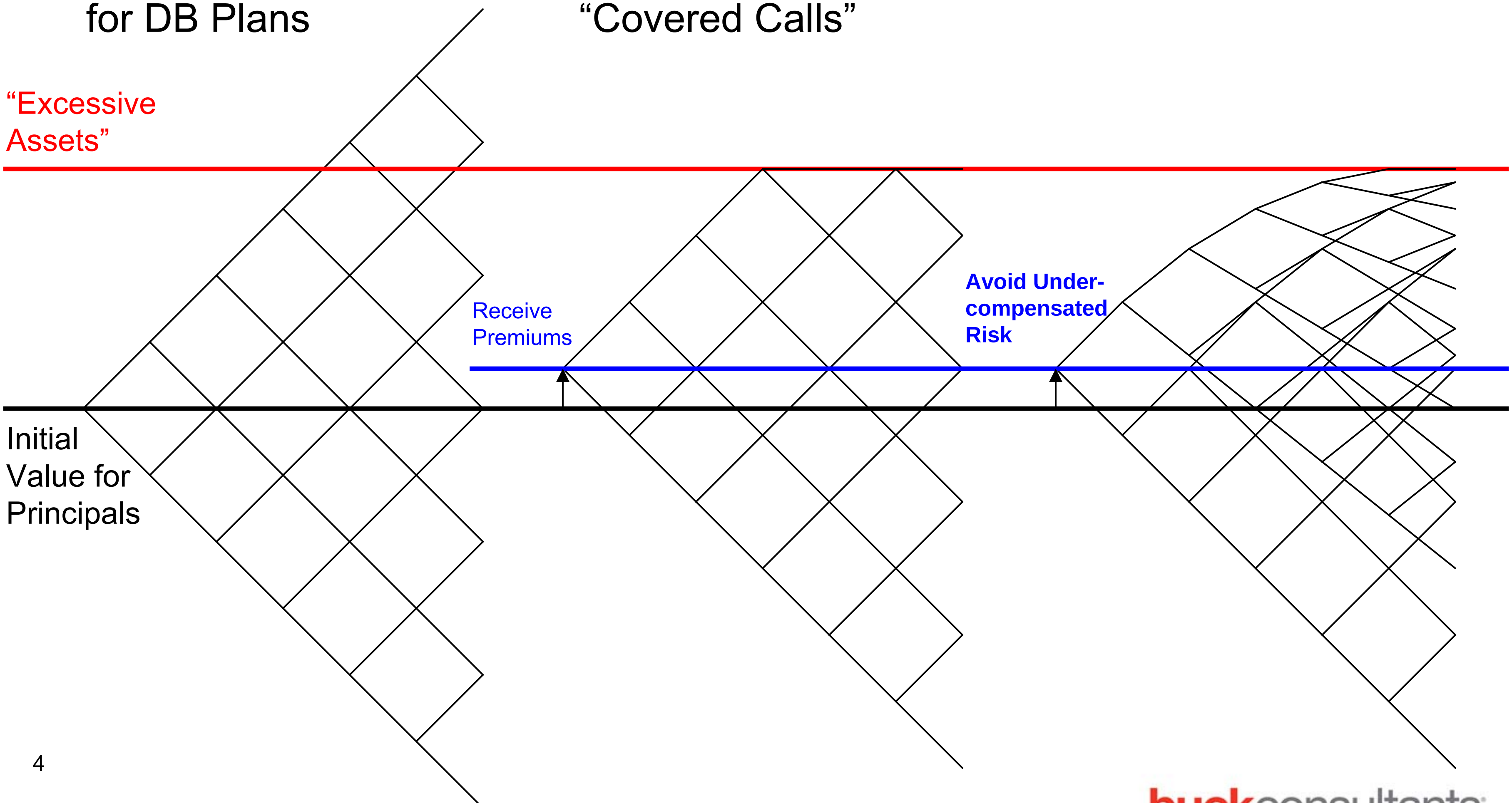
Enhance Shareholder Value

Traditional "Static" Investment Approach for DB Plans	Traditional Approach Combined with Selling "Covered Calls"	Systematically Adjust Asset Allocation

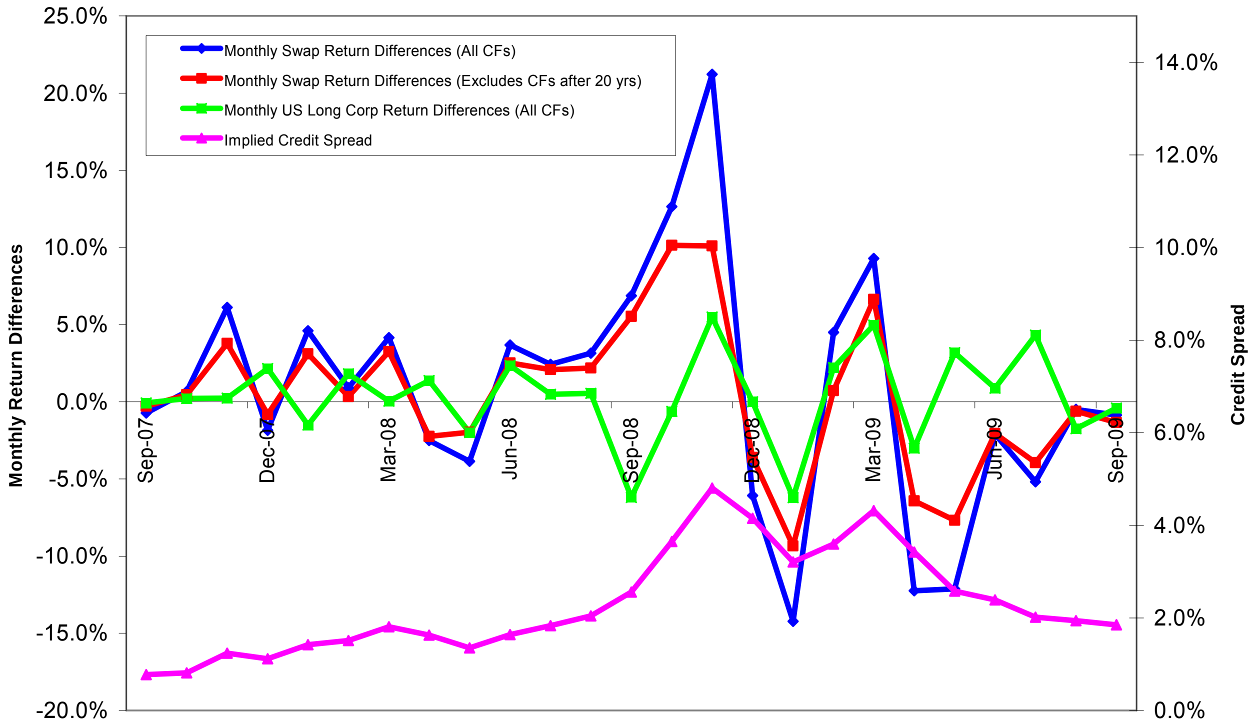


Impossible to Hedge Credit Spread and Smoothing in PPA Liabilities

It is difficult to hedge credit spread inherent in PPA measure.

Monthly Swap Return differences were calculated as the difference between the return on the plan's cash flow discounted at month-end swap curves and cash flow discounted at the PPA full yield curve.

Monthly US Long Corp Return differences were calculated as the difference between the historical returns on Barclay's US Long Corp Bonds and return on the plan's cash flows discounted at the PPA full yield curve.



Implied credit spreads were calculated based on the difference between the single effective rate of the plan under the PPA full yield curve and swap curves at month-end, including all plan cash flows.

- Tracking error using Swaps (all CFs): 26.9%
- Tracking error using Swaps (excl CFs after 20 yrs): 16.7%
- Tracking error using Barclay's US Long Corporate Bonds (all CFs): 10.4%

School of Medicine cash flows are not shown as they provide similar results.

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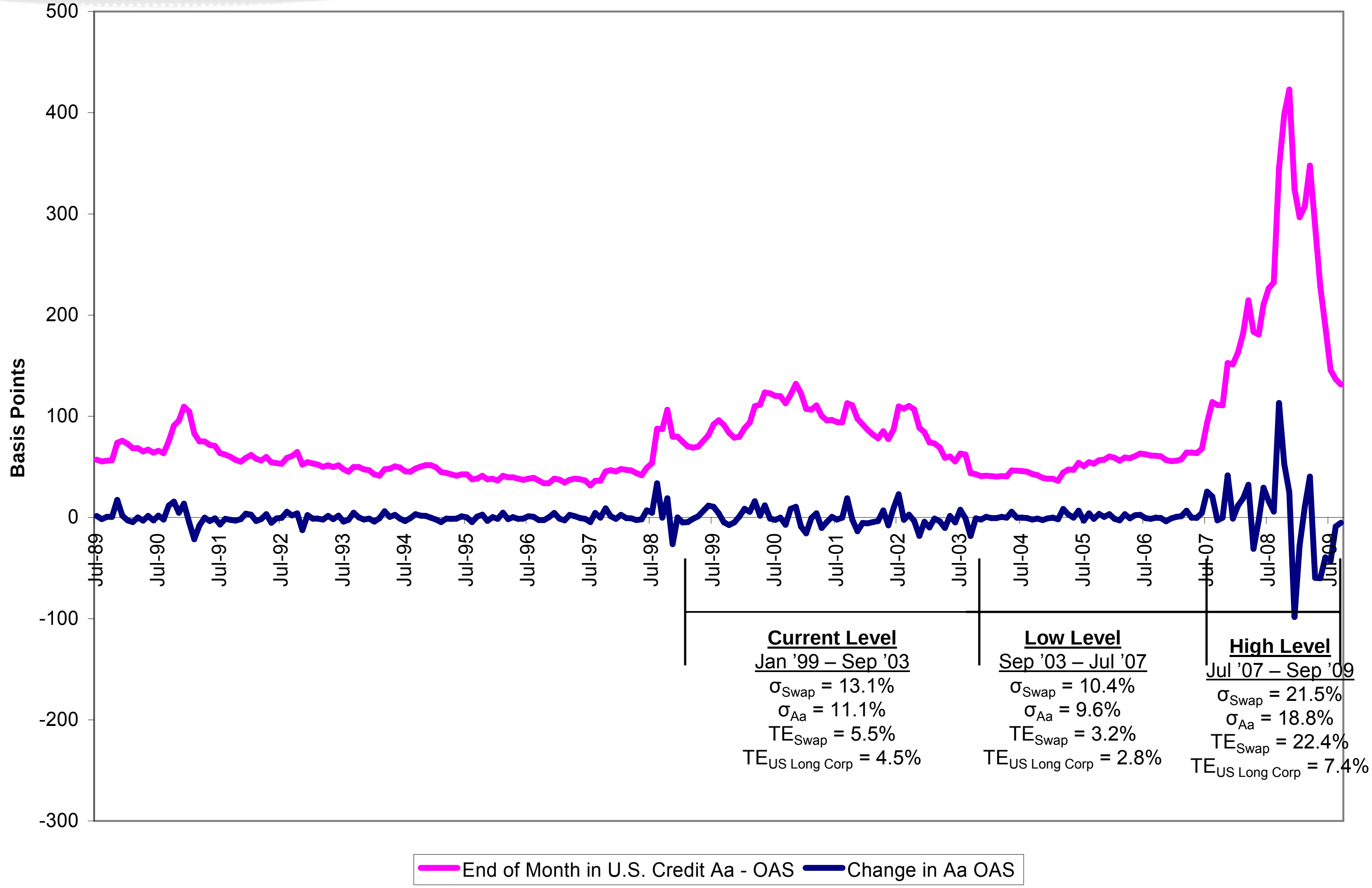
Impossible to Hedge Credit Spread in Accounting Liabilities



For purposes of this slide, volatility of the liabilities discounted at the Aa curve was based on the Citigroup yield curve.

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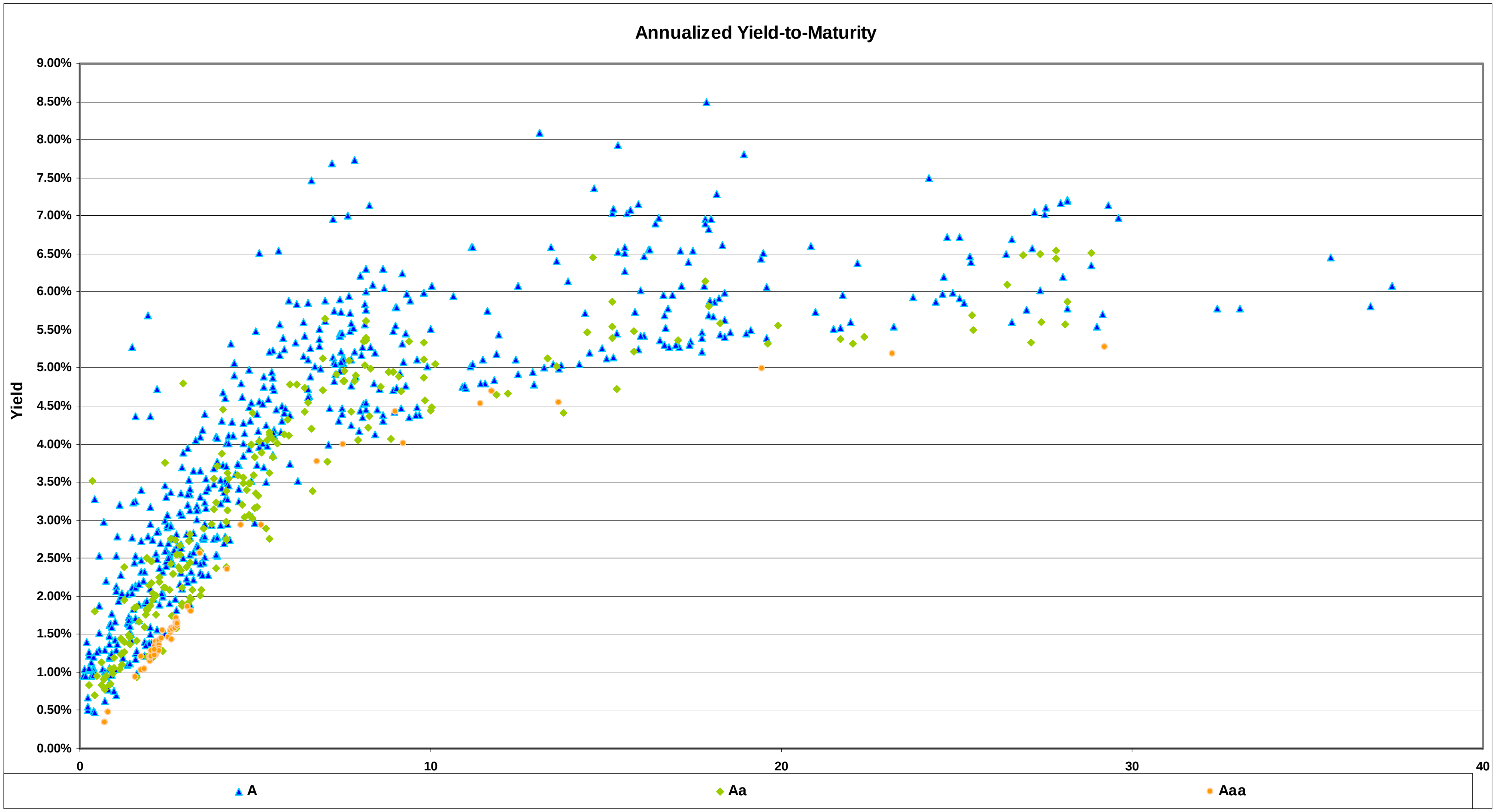
Distribution of Aaa, Aa, & A Corporate Bonds



Source: Bloomberg

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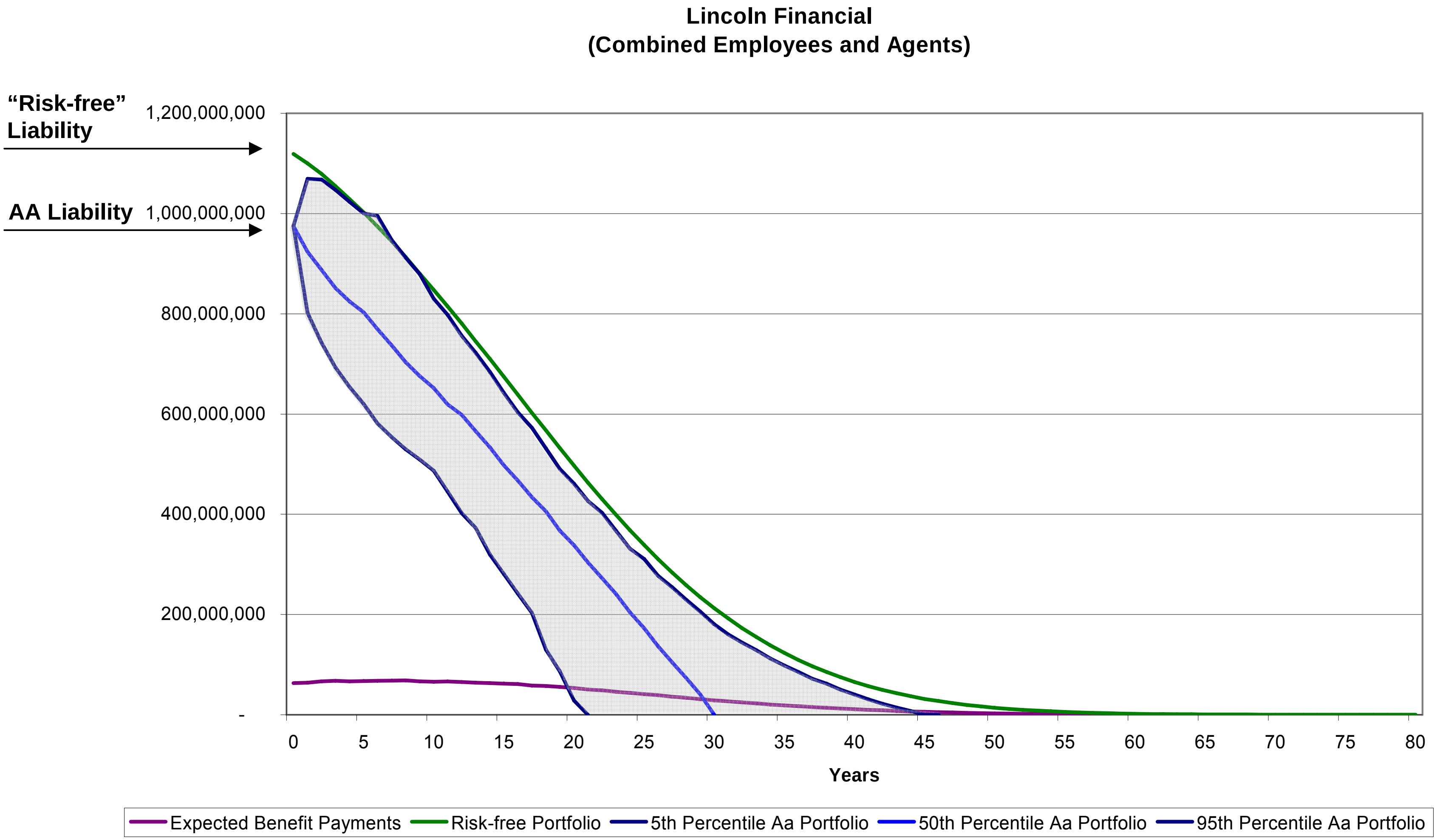
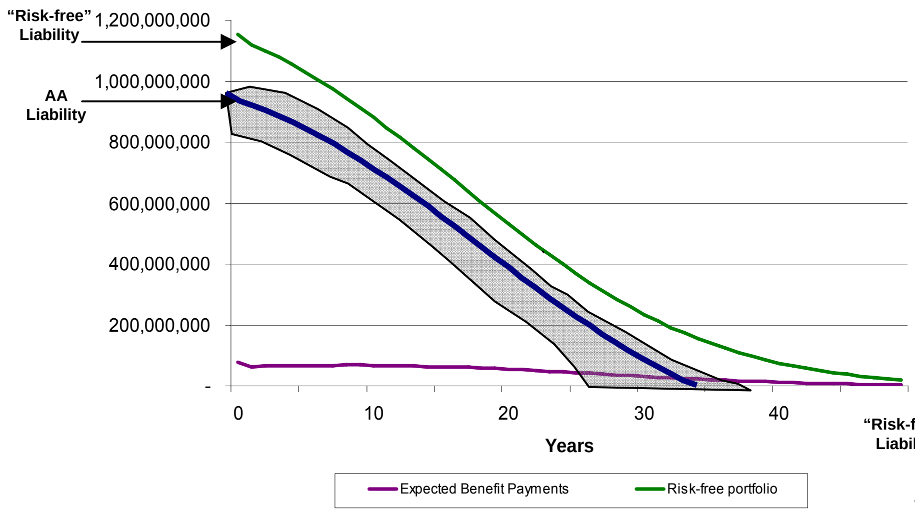
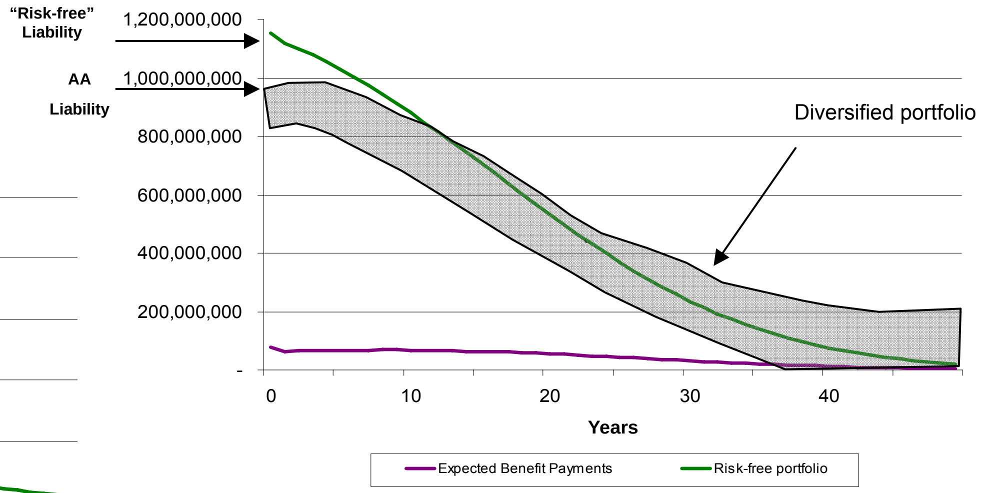
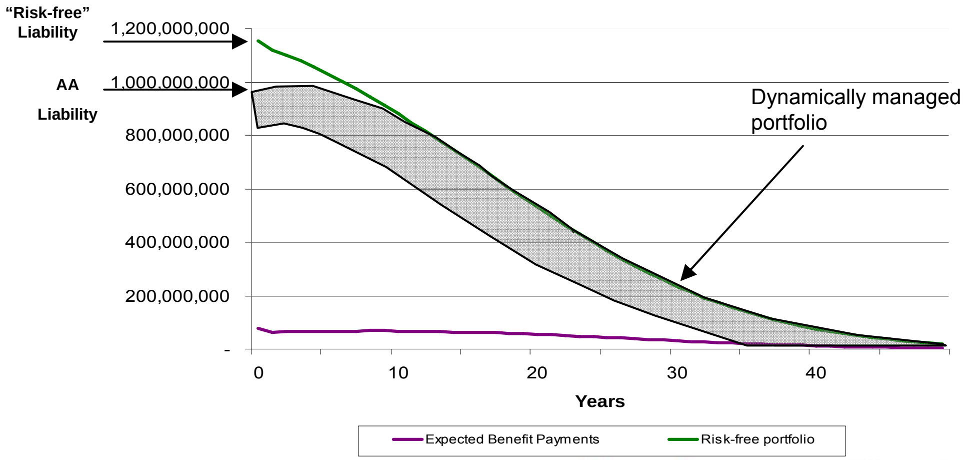
Impossible to Earn the Yield Implied on a Portfolio of Corporate Aa Bonds Due to Defaults & Downgrades



Diversifying Investment Risk Creates More Efficient Portfolios







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