



SOCIETY OF ACTUARIES

ALM Seminar
June 12-13, 2008

An Update on LDI

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Moderator
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Customizing a LDI solution

SOA ALM Seminar

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Liability Driven Investing: Key concepts

- ◆ LDI means taking compensated risk – not eliminating risk
- ◆ LDI must be customized: goal, funded status, and time horizon are key factors
- ◆ LDI needs efficient tools for implementation: iBoxx US Pension Liability indices

SECTION 1

Taking compensated risks

Liability Driven Investing

LDI does not mean...

- ◆ sacrificing long-term return in order to reduce risk
- ◆ buying long duration assets no matter what the price
- ◆ eliminating risk via immunization or cash flow matching

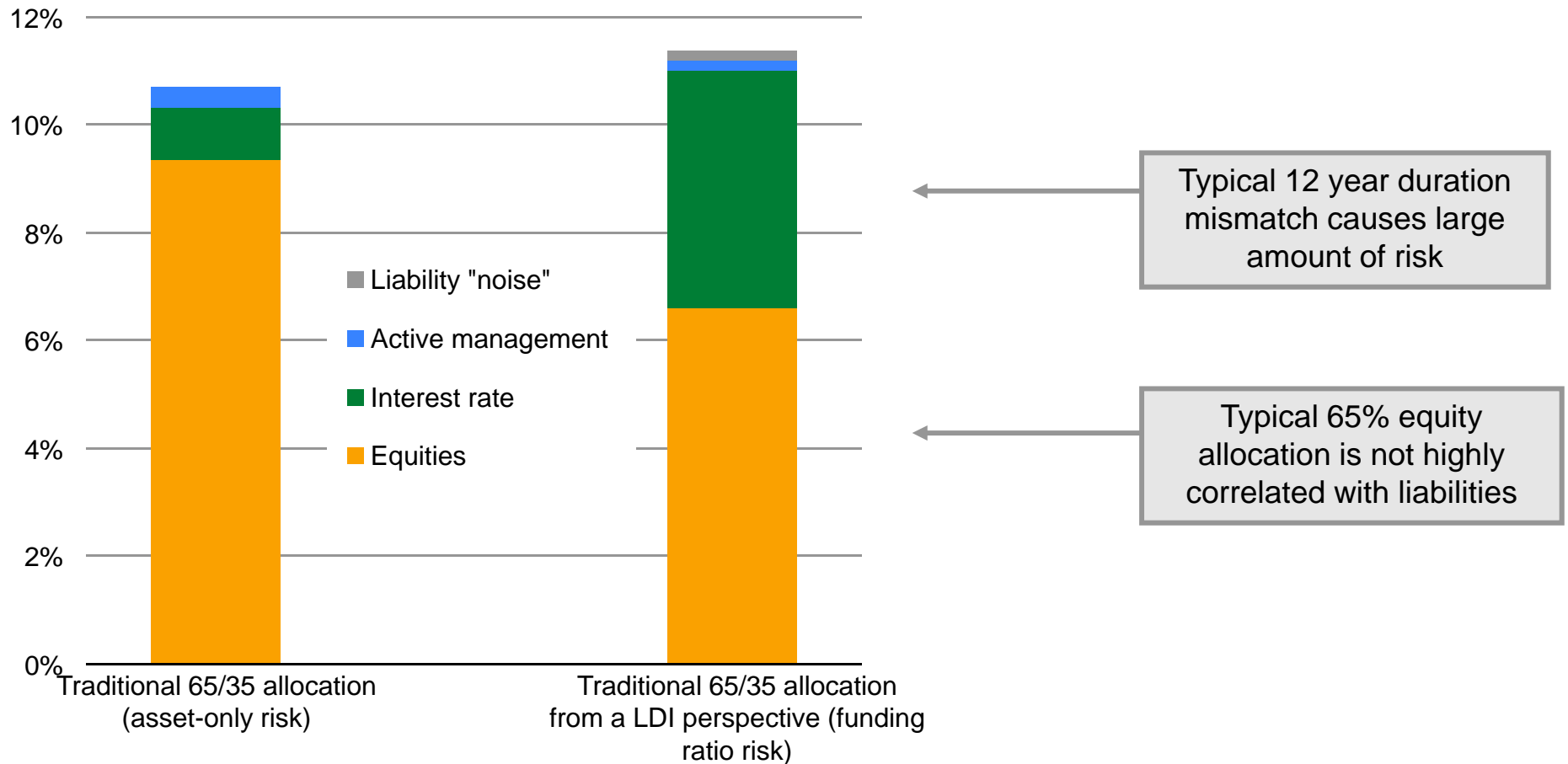
LDI does mean...

- ◆ understanding the risk being taken relative to liabilities (i.e. funding ratio risk)
- ◆ evaluating the potential compensation for the risks
- ◆ taking the risks that are compensated and hedging those that are not

Understanding risk relative to liabilities

Typical fund is invested 65% equities, 35% short-dated bonds

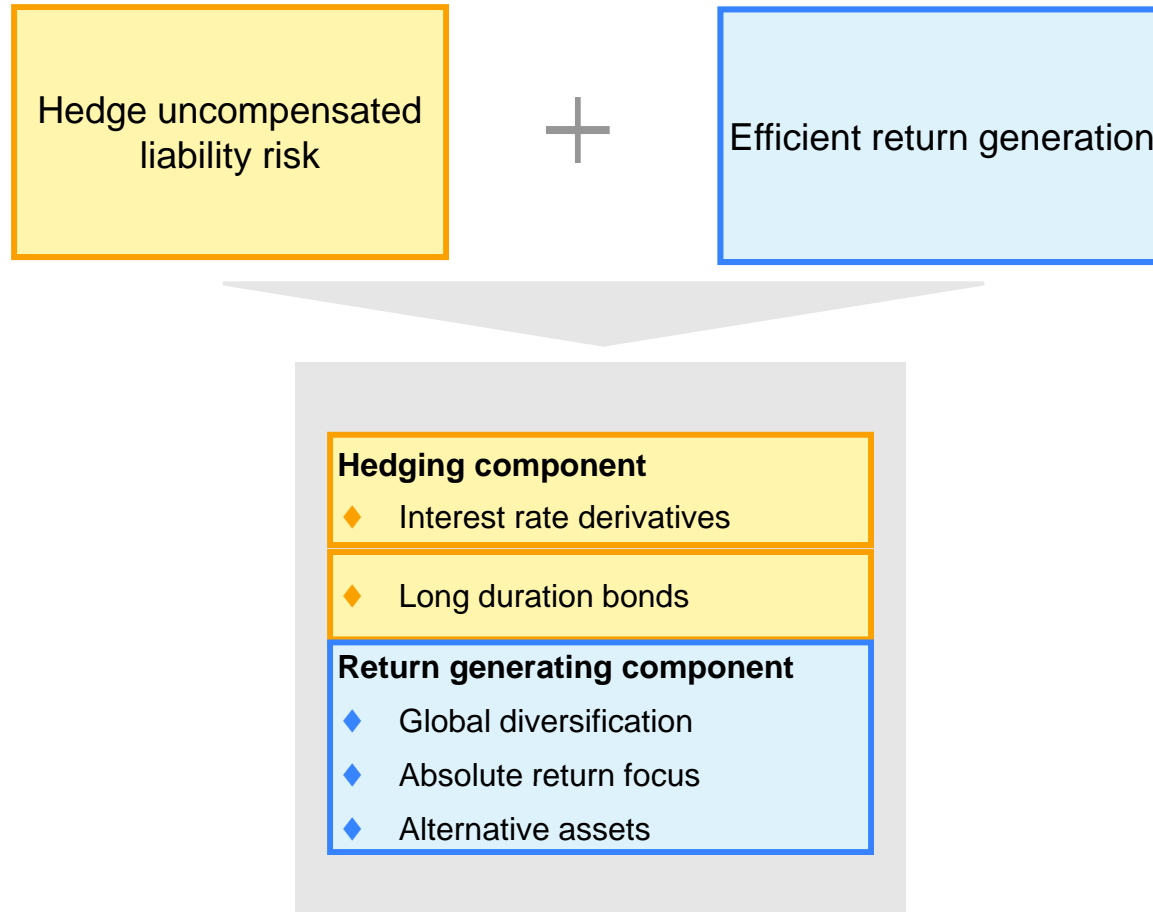
Sources of risk



Source: UBS Global Asset Management
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Constructing efficient LDI portfolios

Take compensated risks and hedge uncompensated risks

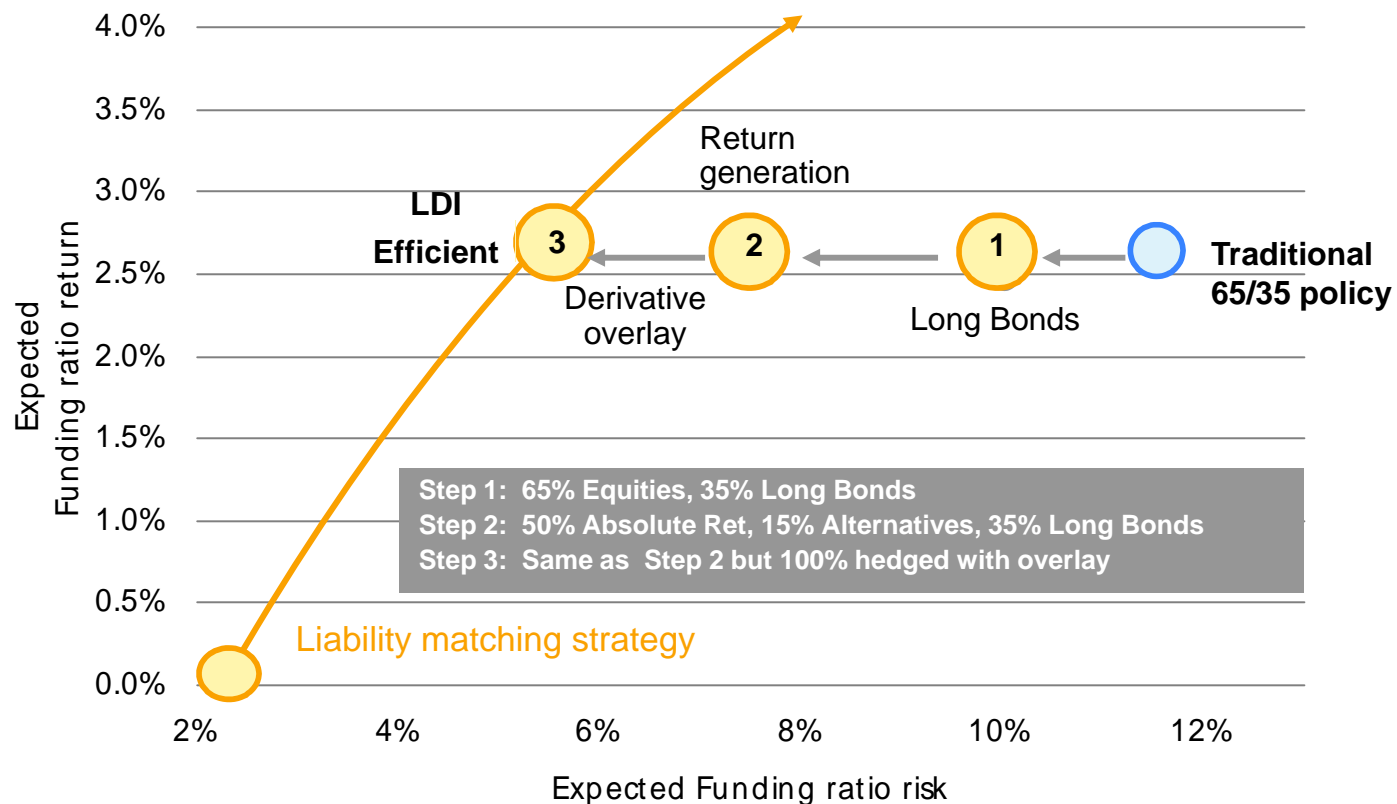


Source: UBS Global Asset Management
For illustrative purposes only.

Example: 3 steps towards the efficient frontier

Seeks to reduce risk but maintain return

Funding ratio risk/return characteristics



Source: UBS Global Asset Management

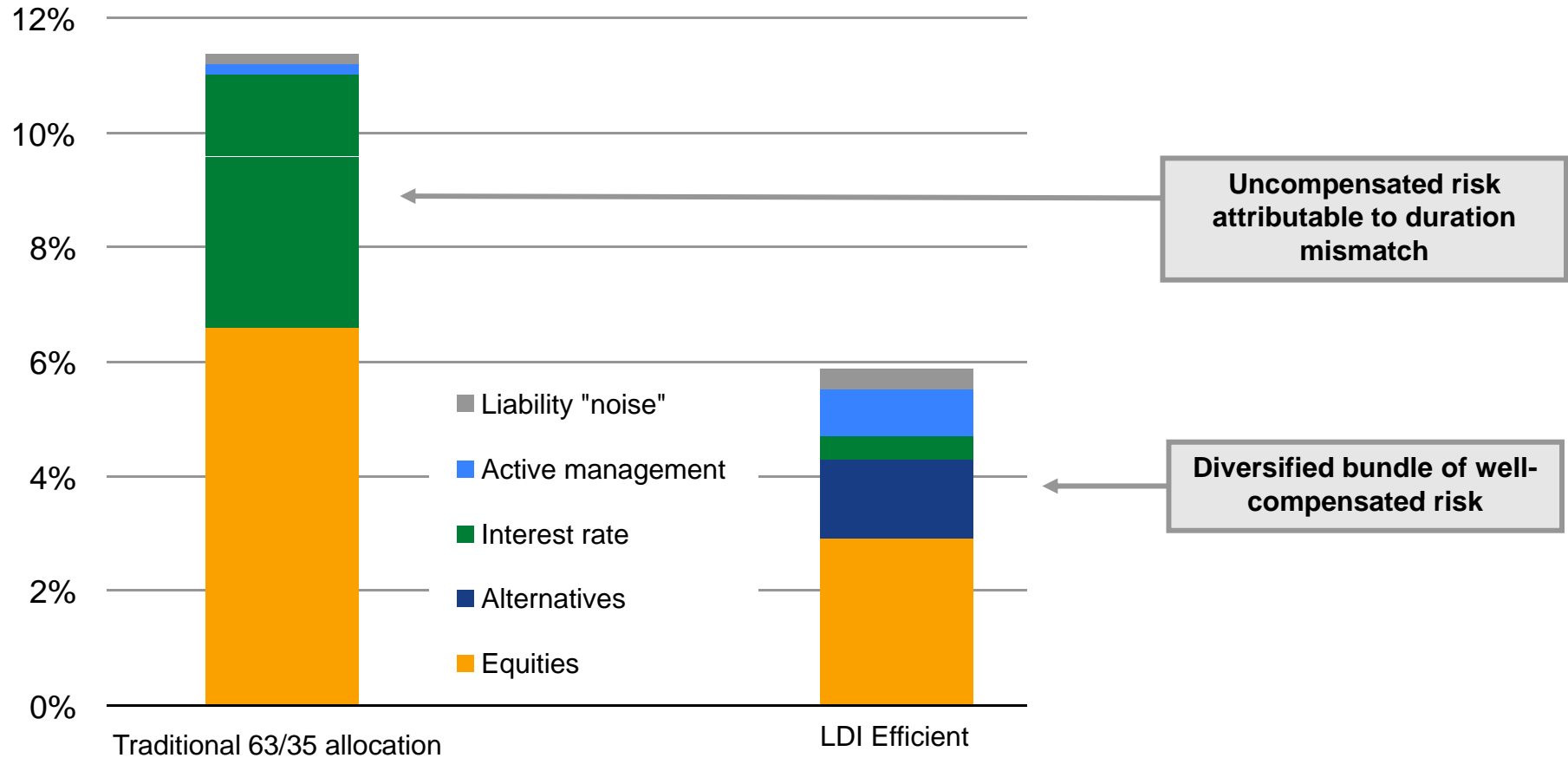
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The information presented reflects UBS Global Asset Management's expectations for prospective return and risk using current market assumptions. There is no assurance that these projections will ultimately be realized.

Example: Sources of risk

From an LDI perspective

Sources of risk



Source: UBS Global Asset Management
Please see additional disclosures at the end of the presentation.
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Example: Scenario analysis

\$1 billion fully funded plan

Traditional

(12% hedged, 65% equities)

Change in Equity Return from expected (8%)	Change in Discount Rate		
	-2%	0%	2%
-30%	(\$445)	(\$201)	\$44
0%	(\$238)	\$0	\$238
30%	(\$31)	\$201	\$433

LDI Efficient

(100% hedged, 24% equities)

Change in Equity Return from expected (8%)	Change in Discount Rate		
	-2%	0%	2%
-30%	(\$74)	(\$74)	(\$74)
0%	\$0	\$0	\$0
30%	\$74	\$74	\$74

Worst case scenario

(\$445mm)

(\$74mm)

Best case scenario

\$433mm

\$74mm

Source: UBS Global Asset Management

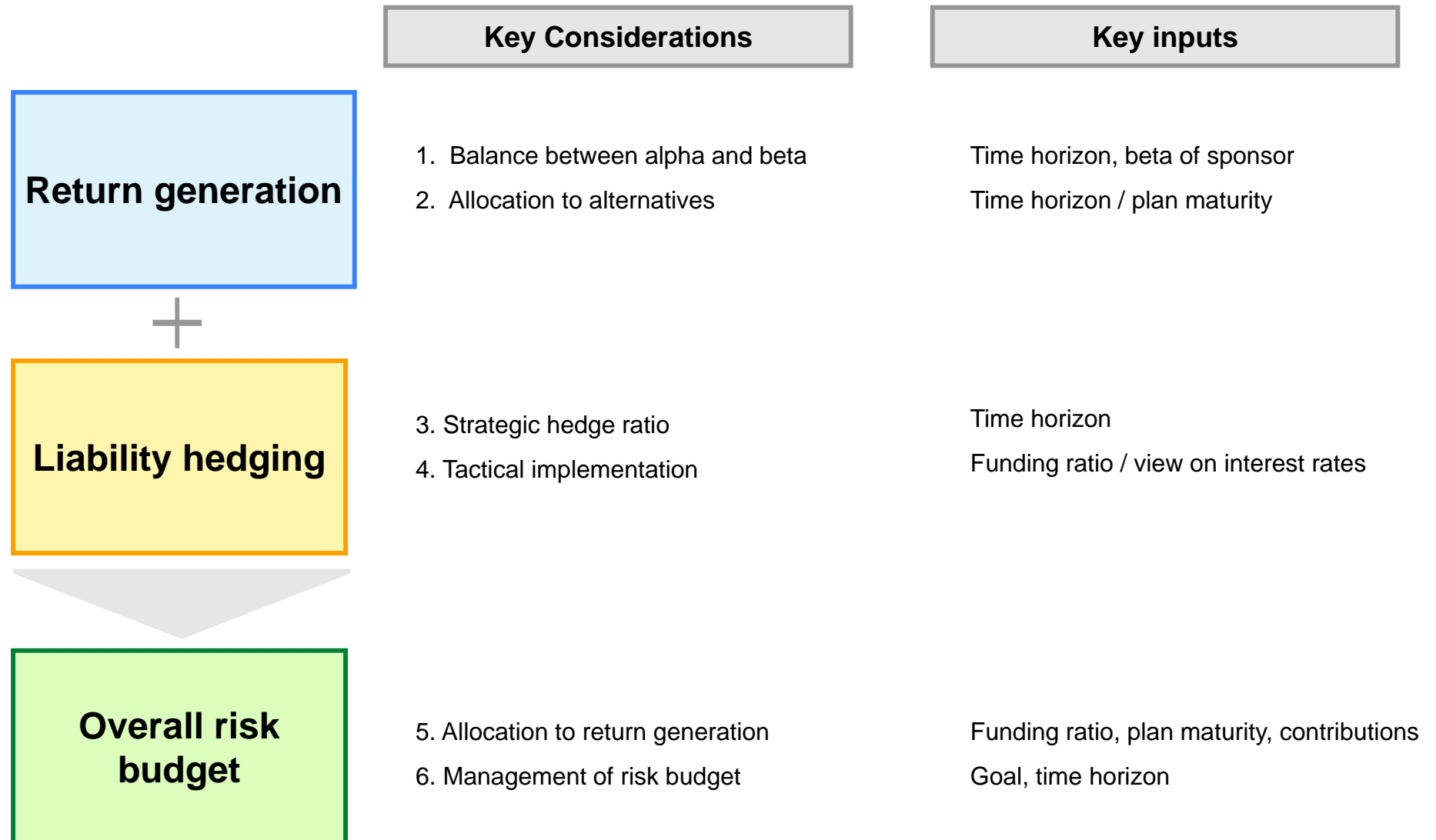
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Note: Scenario analysis assumes only equity return and interest rate sensitivity

SECTION 2

Customizing LDI for you

Six key LDI considerations



Case study: Key inputs for customization

S&P 500 sector analysis

- ◆ Key inputs: Goal, funding ratio, time horizon, and beta

Sector	Time Horizon Factors				Funding Ratio	Beta
	Liability / Market Value	Credit Rating	Excess liability growth (Service cost/PBO)	Time Horizon		
Telecommunication Services	34.9%	BBB	1.8%	Short	121%	1.0
Consumer Discretionary	34.8%	BBB	1.7%	Short	95%	1.2
Materials	32.5%	BBB	1.9%	Short	93%	1.1
Industrials	28.0%	AA	2.6%	Average	97%	1.0
Utilities	27.6%	A	2.2%	Average	96%	0.8
Information Technology	20.3%	A	2.2%	Average	97%	1.5
Consumer Staples	10.5%	A	2.9%	Long	89%	0.5
Health Care	7.8%	AA	3.9%	Long	88%	0.7
Energy	7.8%	A	2.7%	Long	81%	1.0
Financials	6.6%	A	3.1%	Long	105%	1.1
S&P 500 Sample (n = 360)	16.7%	A	2.4%		97%	1.0

- ◆ Telecom: this sector is representative of a mature, overfunded plan, short time horizon, average beta
 - assumed goal: terminate plan after reaching annuity buyout level of assets
- ◆ Health care: this sector is representative of a young, underfunded plan, long time horizon, low beta
 - assumed goal: minimize contribution volatility long-term

Source: UBS Investment Bank, UBS Global Asset Management, Bloomberg
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Case study: Summary of key considerations

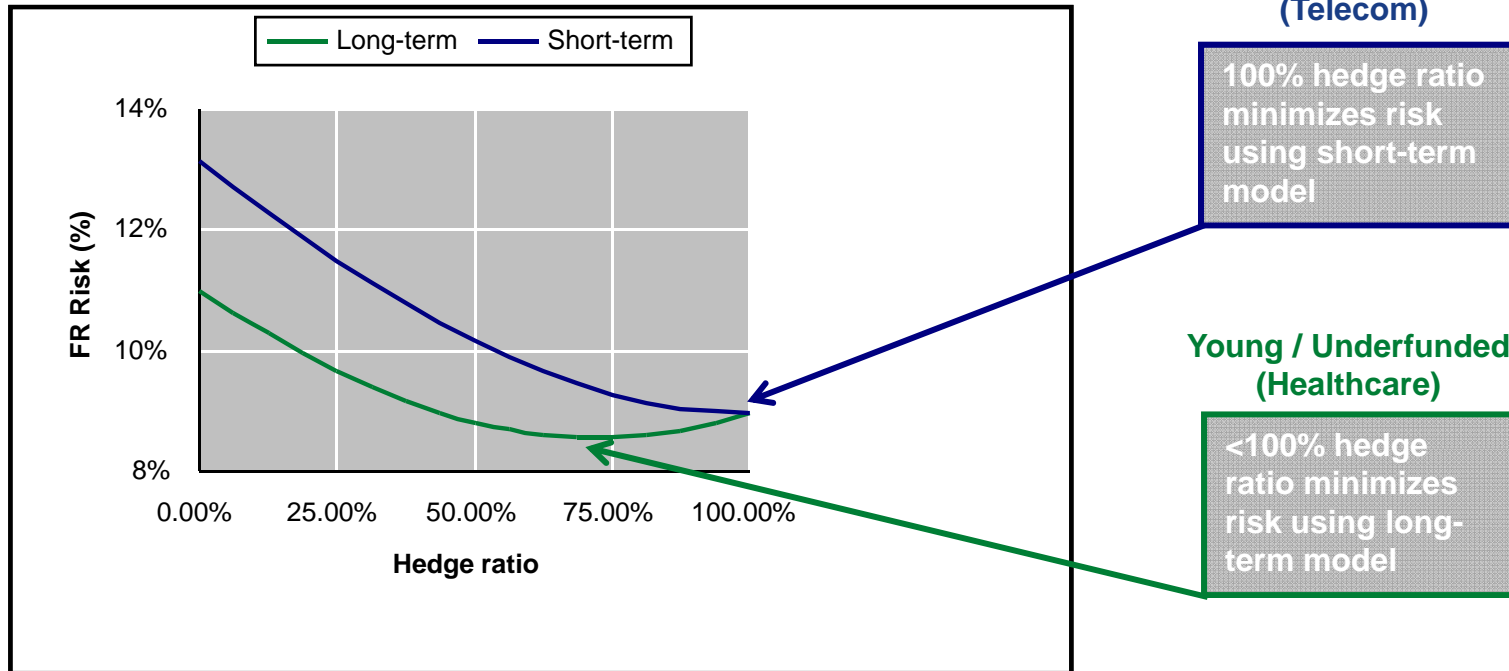
Different policies for different situations

	Mature/Overfunded (Telecom)	Young/Underfunded (Health care)
Return Generation		
1. Balance between alpha and beta	Alpha tilt	Market tilt
2. Allocation to alternatives	Low	High
Liability Hedging		
3. Strategic Hedge Ratio	100%	<100%
4. Tactical Implementation	Quickly: to protect surplus	Staged: to help close gap
Overall Risk Budget		
5. Allocation to return generation	Low	High
6. Management of risk budget	Dynamic	Least dynamic

For illustrative purposes only

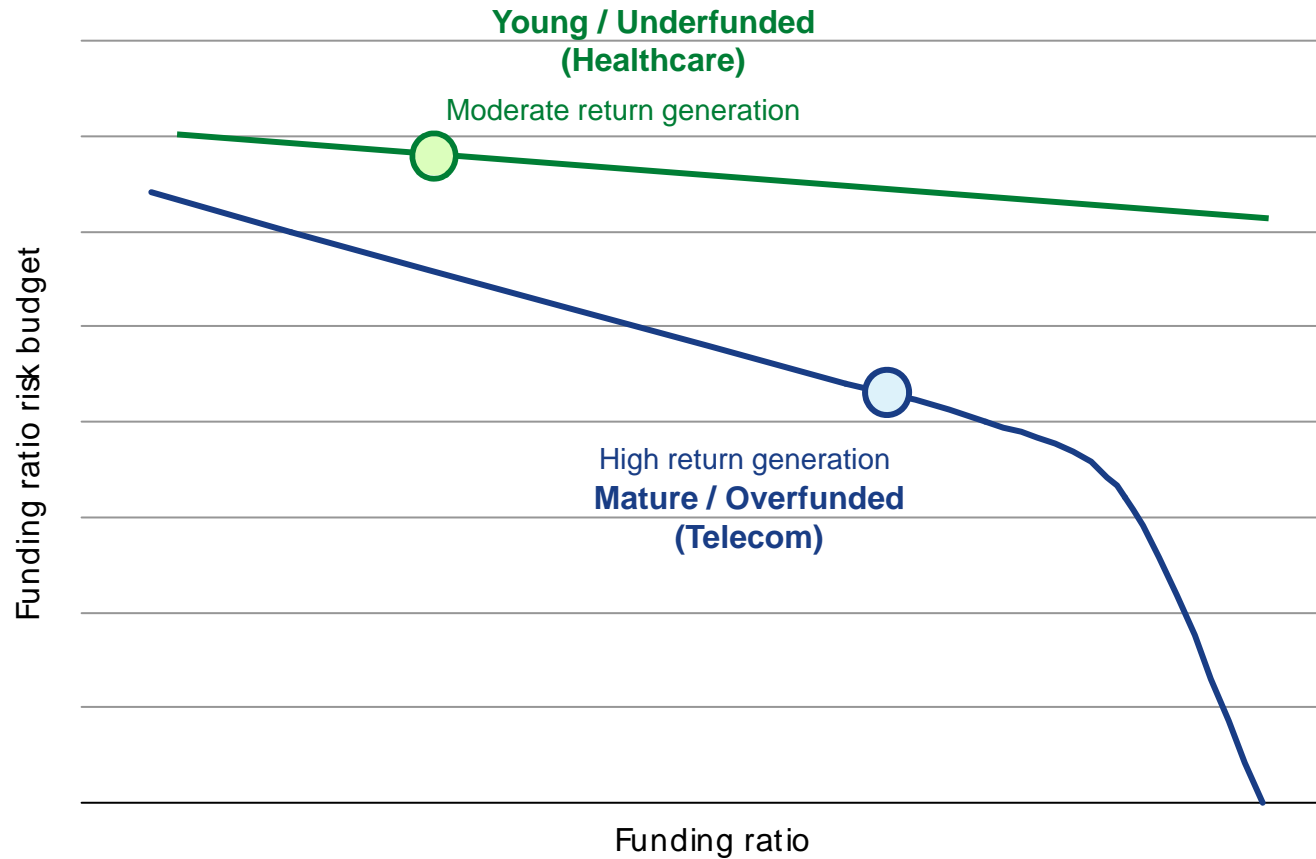
Case study: Policy hedge ratio

Chart: Long-term model versus short-term model



- ◆ The **short-term** model assumes that the return generation assets have **no** correlation with the liability and therefore do not hedge any of the liability – results in recommended hedge ratio = 100%
- ◆ The **long-term** model assumes that the return generation assets have a positive correlation with the liability and therefore hedges some of the liability over longer periods of time

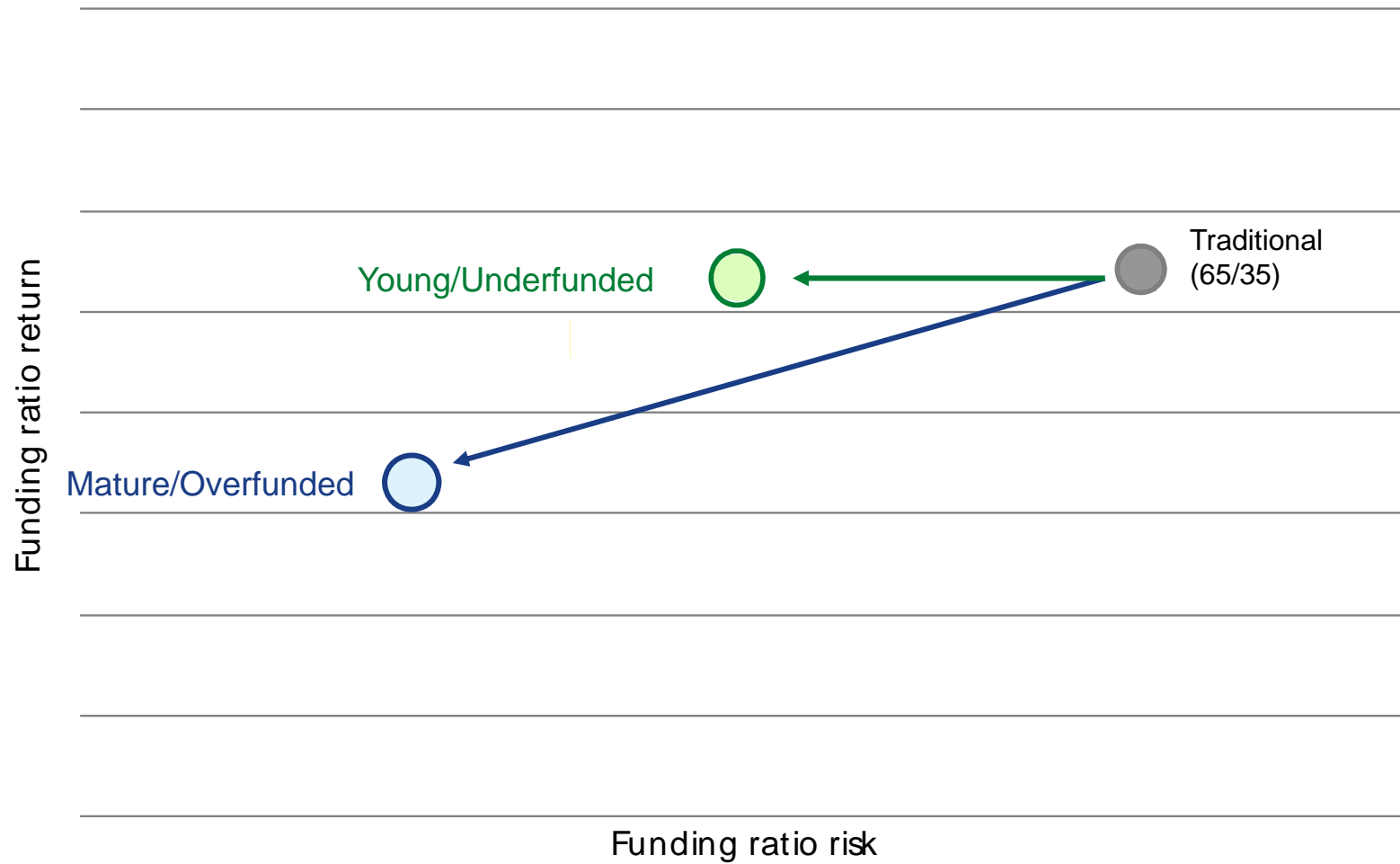
Case study: Management of risk budget



Source: UBS Global Asset Management
Please see additional disclosures at the end of the presentation

Case study: Impact

Funding ratio risk return characteristics



Source: UBS Global Asset Management
For illustrative purposes only.

Case study: Summary of all S&P 500 sectors

10 different sectors, 7 different LDI solutions

Sector	Telecom	Consumer Discretionary	Materials	Industrials	Utilities	IT	Consumer staples	Healthcare	Energy	Financials
Return Generation										
Balance between active management and market risk	Active tilt	Active tilt	Active tilt	Balanced	Balanced	Active tilt	Market tilt	Market tilt	Market tilt	Market tilt
Allocation to illiquid assets	Low	Low	Low	Average	Average	Average	High	High	High	High
Hedging										
Strategic hedge ratio	100%	100%	100%	<100%	<100%	<100%	<100%	<100%	<100%	<100%
Tactical hedging	Quickly	Staged	Staged	Staged	Staged	Staged	Staged	Staged	Staged	Quickly
Overall risk budget										
Allocation to return generation	Low	Low	Low	Average	Low	Low	High	High	High	High
Management of risk budget	Dynamic	Dynamic	Dynamic	Less Dynamic	Less Dynamic	Less Dynamic	Least Dynamic	Least Dynamic	Least Dynamic	Least Dynamic

For illustrative purposes only.

Source: UBS Global Asset Management.

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SECTION 3

One efficient tool for implementing LDI: iBoxx US Pension Liability indices

Selecting a benchmark – iBoxx US Pension Liability indices

Designed to mimic pension liabilities

- ◆ iBoxx US Pension Liability indices incorporate two important features:

1

Reflect the actual liability profile of a plan

Mimic the sensitivity of the liabilities to changes in interest rates, as well as the slope and shape of the yield curve

2

Are investable via LIBOR interest rate swaps

Provide an extremely liquid, long-dated and high-quality yield curve representative of a pension plan's interest rate exposure to the corporate bond yield curve

- ◆ **Three US Pension Indexes**

- iBoxx US Pension Index – Aggregate
- iBoxx US Pension Index – Active
- iBoxx US Pension Index – Retired

<u>Duration</u> ¹	<u>ISIN number</u>	<u>Bloomberg</u>
13.2 years	GB00B1G2GF37	IBUPAGGR
17.9 years	GB00B1G2GG44	IBUPACTI
8.2 years	GB00B1G2GH50	IBUPRETI

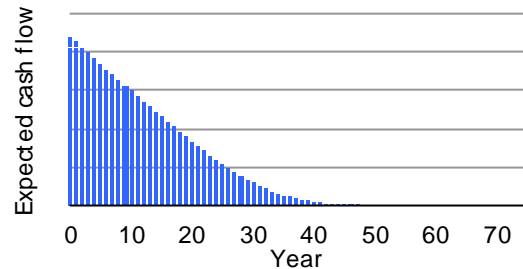
¹ Approximate, as of August 2007.
Source: International Index Company

iBoxx US Pension Liability indices: Customizable benchmarks

Can be blended to match plan specific liability profiles

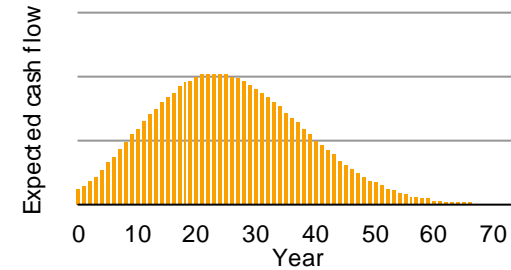
Retired Member
(duration¹ = 8 years)

Typical retired member liability profile



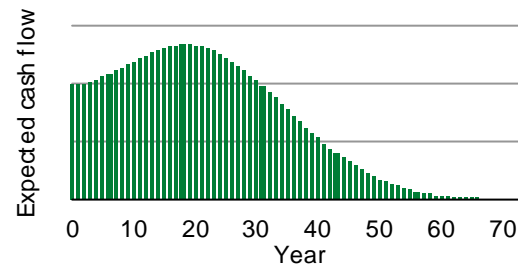
Active Member
(duration¹ = 18 years)

Typical active member liability profile



Blend the indices to
match duration and curve
of plan specific liability

Client liability profile



Note: Each index mimics the performance of an **active or retired member** liability profile for a model traditional US defined benefit plan reflecting the passage of time and changes in the term structure of interest rates.

¹ Approximate, as of August 2007.

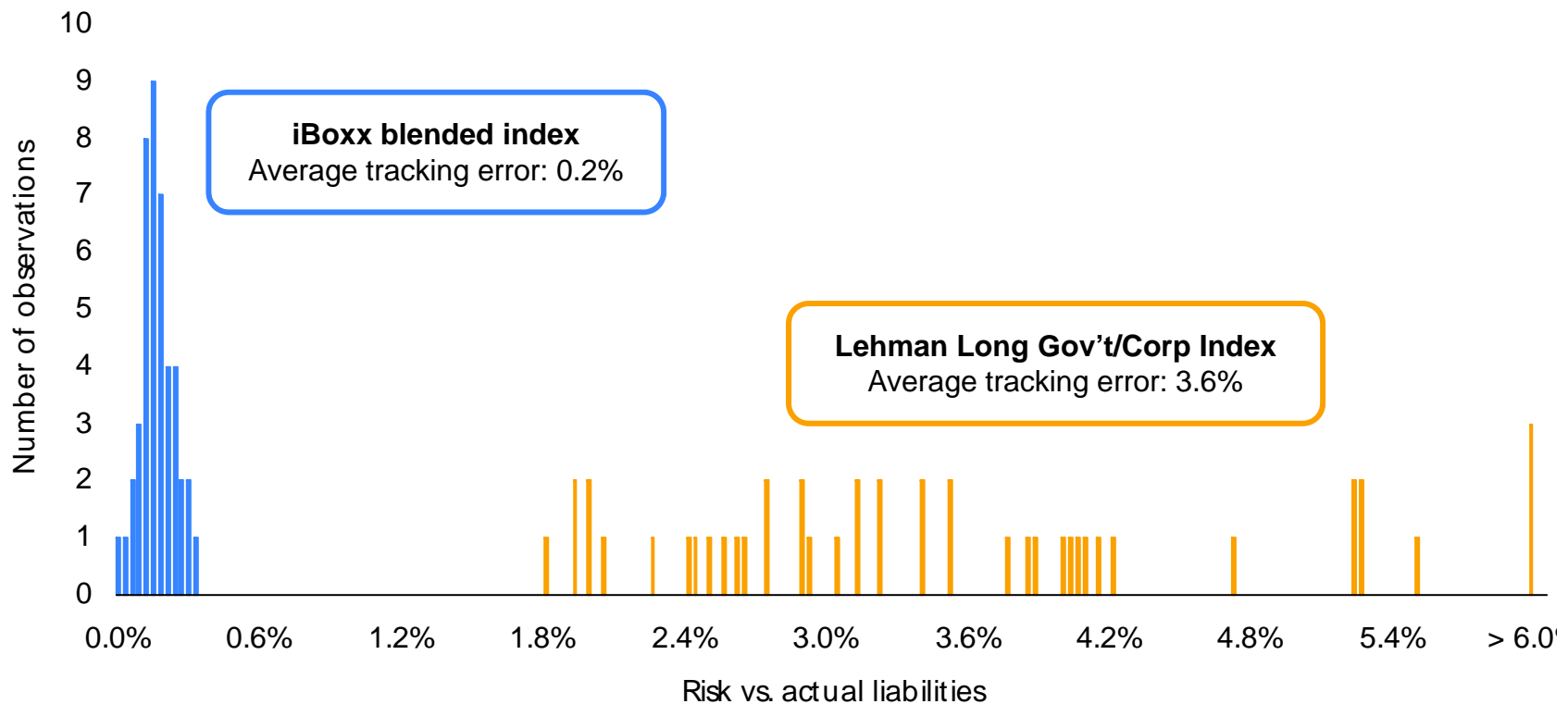
Source: International Index Company

iBoxx US Pension Liability Indices: Efficient hedging tools

iBoxx blend is almost a perfect match to liabilities – far better than the Lehman Long Gov't/Corp index

Case study of 44 actual liability profiles

Hedging efficiency of a blend of iBoxx Pension Liability indices vs. Lehman Long Gov't/Corp Index



Note: iBoxx blend is a custom index that uses a combination of the retired member and active member iBoxx indices to match each of the 44 actual liability durations. Tracking error is defined as annualized standard deviation of the difference between the monthly logarithmic returns of the investment relative to the liability benchmark.

Source: UBS Delta, UBS Global Asset Management, Bloomberg

iBoxx US Pension Liability indices: Implementation options

Three ways to use the iBoxx US Pension Liability benchmarks

- ◆ **Option 1:** Benchmark for long duration funds – e.g. can allocate 35% of assets to attain a liability hedge ratio of 35%
- ◆ **Option 2:** Benchmark for levered long duration funds – e.g. can allocate 25% of assets to attain a liability hedge ratio of 100% (assumes 4 times leverage)
- ◆ **Option 3:** Benchmark for portable alpha funds – e.g. can allocate 50% of assets to attain a liability hedge ratio of 50% and generate excess return

Summary

- ◆ LDI means taking compensated risk
- ◆ LDI must be customized
- ◆ Need efficient tools for implementing LDI

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Head of Asset-Liability Investment Solutions, Americas Executive Director

Years of industry experience: 9

Education: University of Illinois (US), BS

- ◆ Aaron Meder is Head of Asset-Liability Investment Solutions (ALIS), Americas. In this role, he is responsible for developing and managing pension fund investment strategies that focus on the plan's funding ratio risk and return. Additionally, he is an ALIS portfolio manager. In this role, he co-chairs the ALIS Investment Committee which manages clients portfolios invested in ALIS integrated solutions.
- ◆ Prior to joining the firm in 2004, Aaron was an actuary in the HR Services line of business with Towers Perrin. In that role, he managed the completion of actuarial valuations, forecasted future accounting cost results and ERISA minimum/maximum required contributions and developed funding policies for several large corporations' pension and retiree medical plans.
- ◆ Aaron's previous experience also includes work at Watson Wyatt Worldwide as an actuary.

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