2018 Investment Symposium

Session 3B: Duration Matching Versus Cash Flow Matching for Pension Plans

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2018 Investment Symposium

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3B, Duration Matching Versus Cash Flow Matching for Pension Plans

8th March 2018

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Duration matching vs cashflow matching
Kevin McLaughlin, Insight Investment

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Duration matching versus cash flow matching

Why?

- Assets are required to perform several functions
  - Control funded status volatility
  - Close the funding gap; and
  - Be available to pay benefits

What's different, why now?

- Closed/frozen plans with a cash-flow negative profile
- Underfunding - insufficiency of matching assets
- Decumulation phase creates heightened sensitivity to timing of returns and forced selling risks

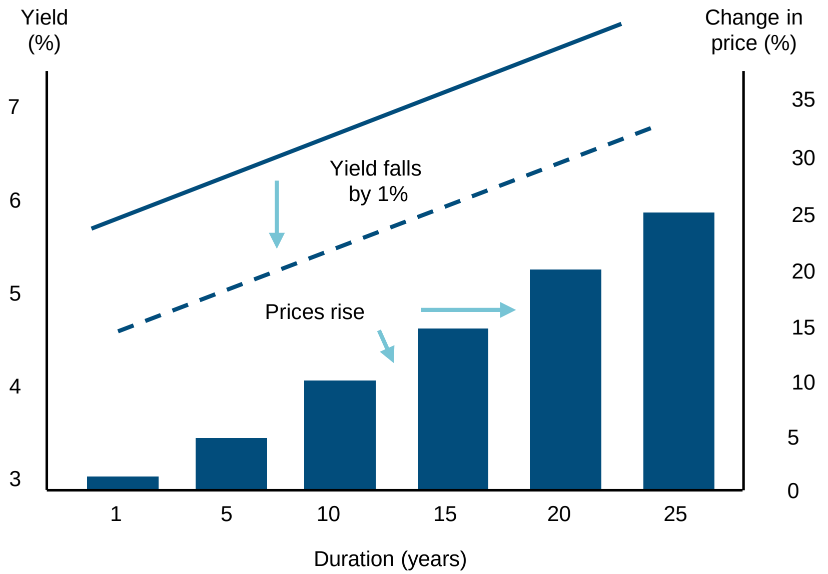
Duration: Why does it matter?

Duration is a key measure of interest rate risk

- When yield falls, price rises
- Long duration bond prices rise (or fall) by more than short duration prices

So…

- If we expect yields to fall, we want to hold more long duration instruments
- If we expect yields to rise, we would not want to hold long duration instruments



Duration matching instruments

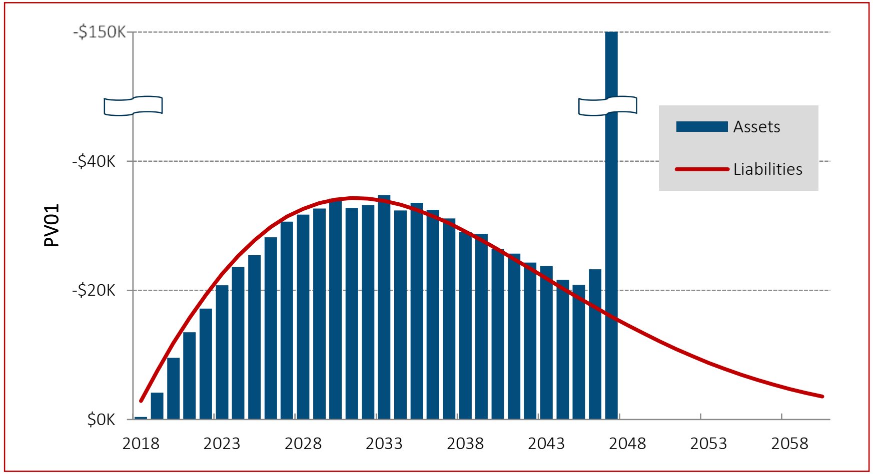
- Solutions can be optimized relative to a liability benchmark
- Liquidity and cashflow needs are not considered

Duration instrument	Advantage	Disadvantage
Treasuries	✓ Liquidity	✗ Expensive ✗ Inconsistent with desire to hedge Accounting / ERISA/PPA liability
STRIPS	✓ Greater capital efficiency	
Long corporate/credit	✓ Lower cost ✓ Better match for GAAP / PPA	✗ Benchmark limitations restrict matching fit ✗ Additional benchmark inefficiencies ✗ Liquidity ✗ Tracking error to liability cash-flows
Cash plus swaps / futures	✓ Flexible ✓ Most capital efficient	✗ Need to manage leverage ✗ Expensive if fully cash backed ✗ Basis risks introduced
Custom approaches	✓ Optimize cost and risk trade-offs	✗ Do not generate required cash-flows

Structure of a typical duration matching solution

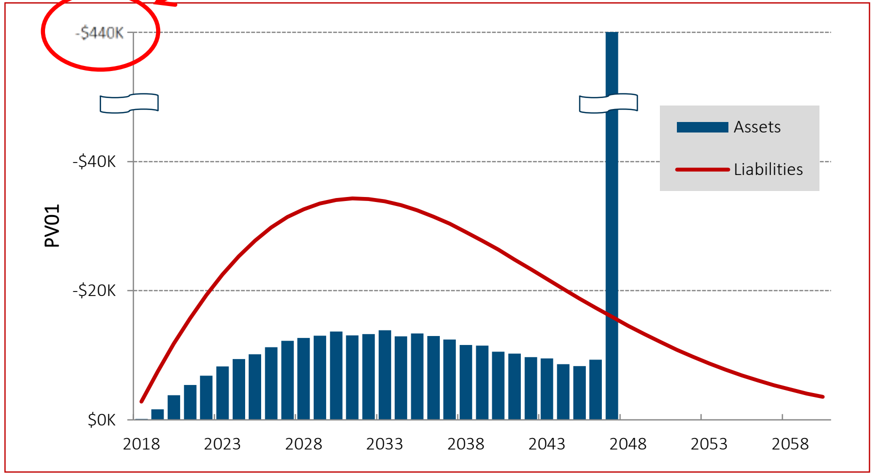
Well funded solution

- 100% duration matched with minimal exposure across the curve



Typical underfunded solution

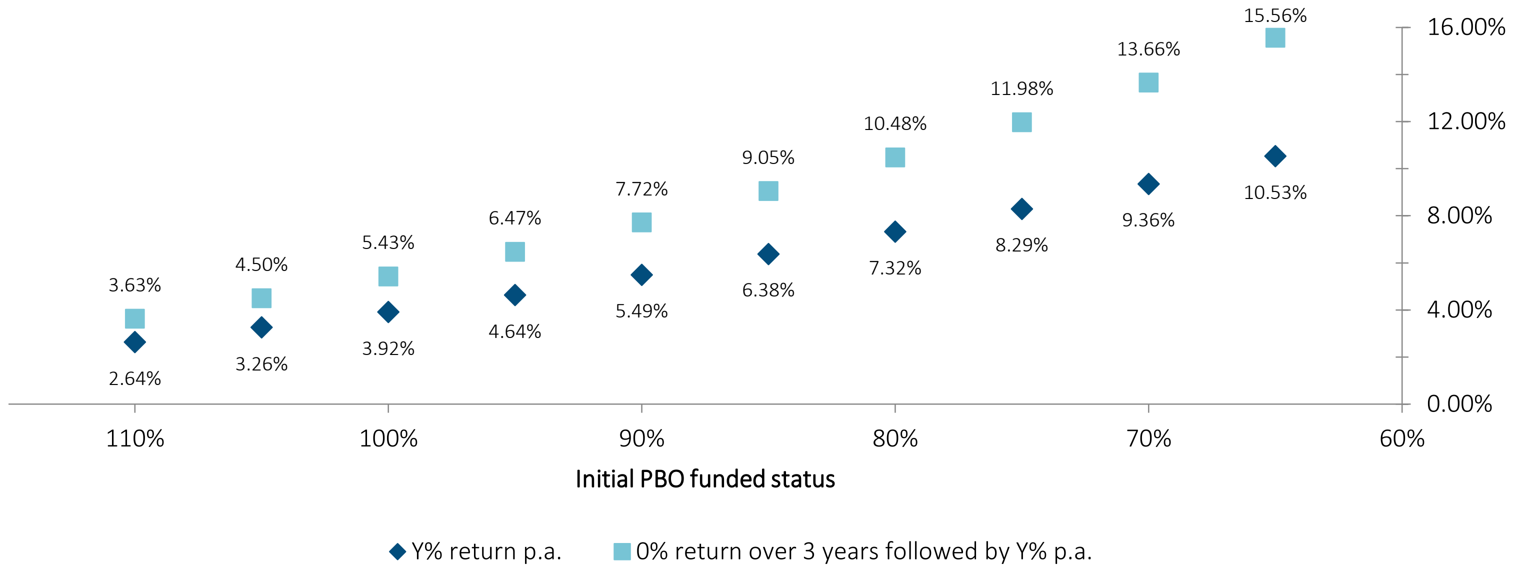
- 80% duration matched with large key rate duration exposures



Insight calculations are estimates only and based on summary data. Actual outcomes may differ materially from modeled outcomes.

Cash flow matching risks

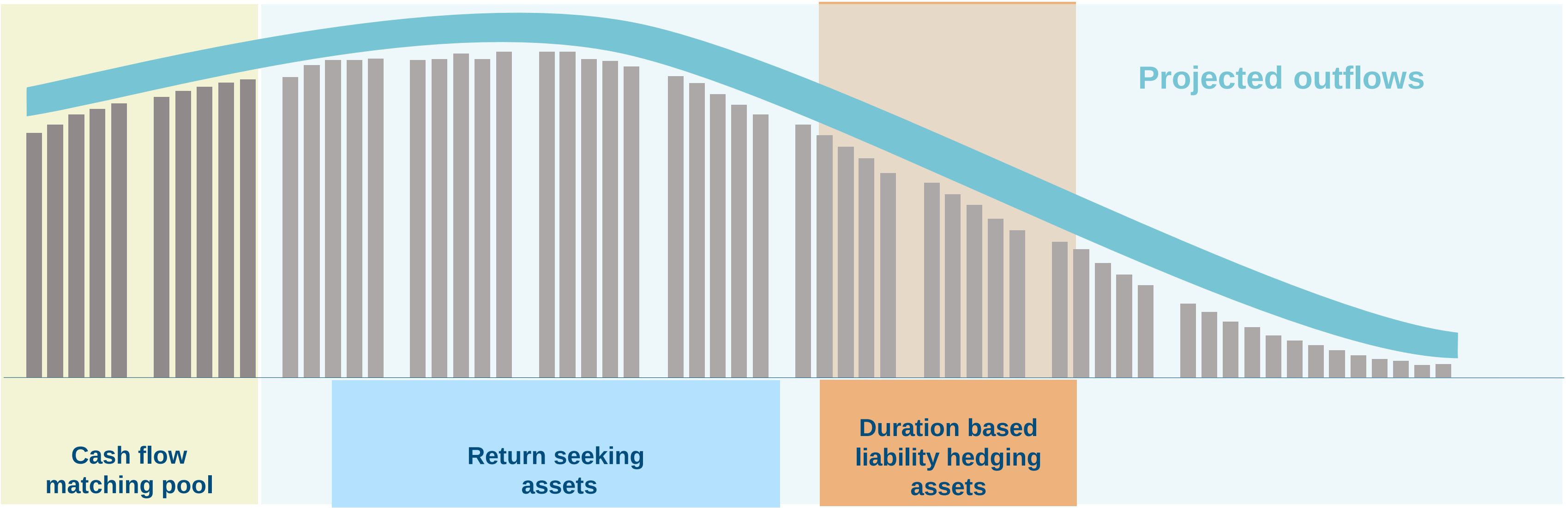
Forced selling risk and timing of returns - required asset returns p.a.



For illustrative purposes only. PBO single effective discount rate = 3.56%. Considers 10 years of benefit payments, admin expenses and PBGC premium outflows. Liability target = 110% PBO + PV expenses at year 10.

Revisiting liability cash flows

For many plans 40%-70% of current assets may be spent down in the next 10 years



For illustrative purposes only.

Summary

- Increasingly plans have to manage assets to meet cashflow and to manage duration
- Combined solutions may be attractive
- But how much should you allocation to each?
- How can this fit into a glide path strategy?

Duration matching vs cashflow matching
Matthew Bale, Risk First

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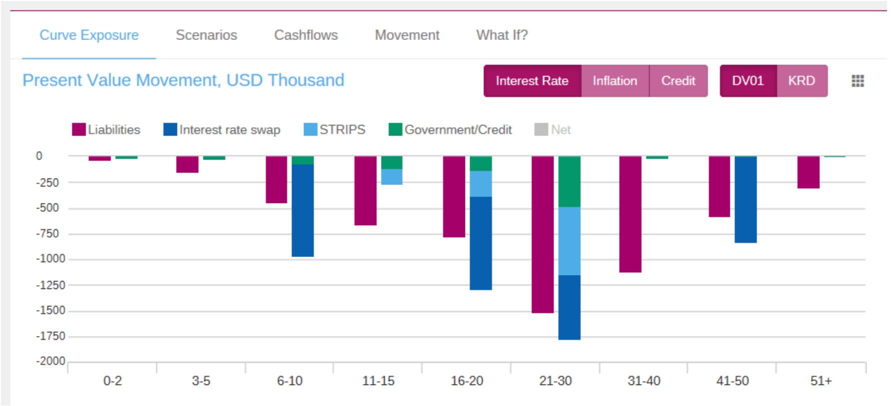
Case Study 1

- Traditional DB plan
- 80% funded on US GAAP
- 60% growth assets
- 40% fixed income
  - 20% Long Govt Credit
  - 20% Long Strips
  - Plus swap overlay to get 100% hedge ratio

Case Study 1 – VaR and Hedge Ratio



- Completion manager has used strips and overlays to hedge interest rate risk
- Significant growth asset risk remains
- Credit risk not addressed in this example

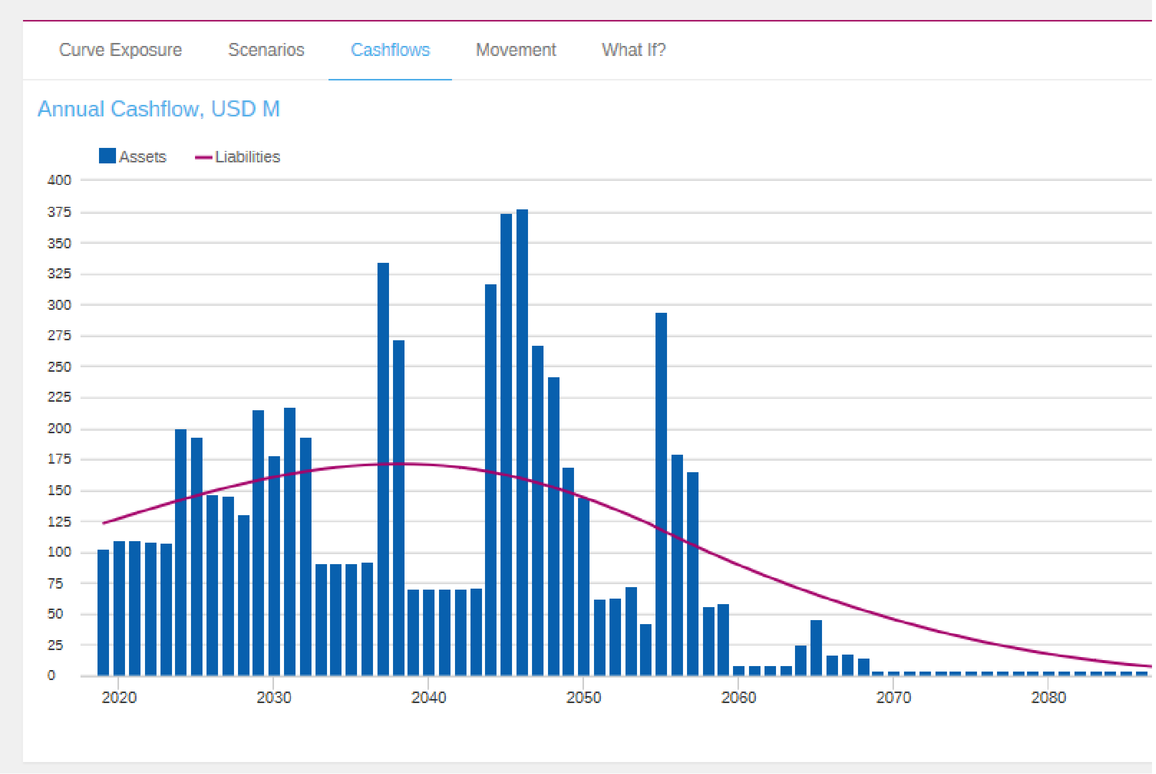
Case Study 1 – The hidden cashflow risk…

- Duration at expense of short term cashflows
- Need to pay pensions!
- If contributions are low, plan is a forced seller of assets
- Exposed to short term asset shocks
- Illiquid growth assets compound issue

Case study 2

- Cash balance plan
- 100% funded
- 100% cashflow matching
  - Treasuries
  - Strips
  - Corporates

Case study 2 – “Perfect” cashflow match



- Close match across maturities
- Some issues remain
  - Some bucketing at longer tenors
  - Lack of available assets to meet ultra long cashflows
  - Credit defaults
  - …

Case study 2 – More hidden risk!

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17 SOA US Demo Logout

Dashboard Analytics Setup

VaR, 1yr Monte Carlo 95%

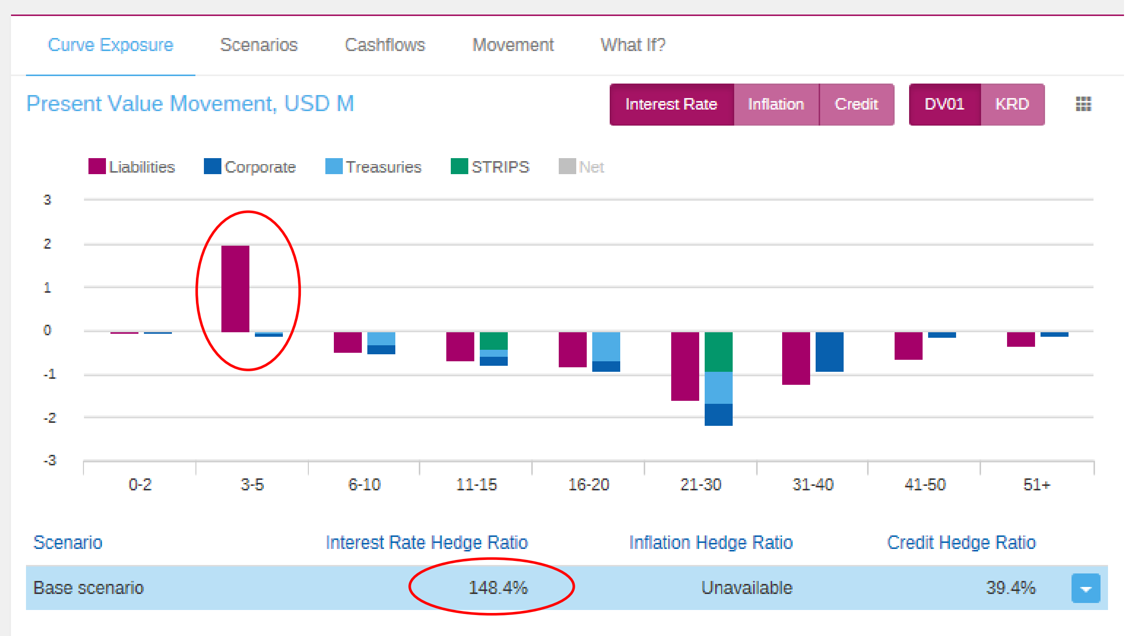
USD 298,592,423

Valuation Summary, USD

Combined Liabilities Assets

At 31 Dec 2017	Value	1mth Change
Assets	3,500,000,000	2.8% ▲
Liabilities	3,500,000,000	(1.4%) ▼
Surplus / (Deficit)	(0)	145,590,361 ▲
Funding Level	100.0%	4.1% ▲
Interest Rate Hedge Ratio	148.4%	5.7% ▲
Credit Hedge Ratio	39.4%	(13.0%) ▼
Single Equivalent Discount Rate	3.46%	0.03% ▲
Liability Duration (Modified)	16.70	(0.51%) ▼

Case study 2 – It's a cash balance plan



- The cashflows aren't fixed
- Cashflows vary in line with Interest Crediting Rate
- Cashflows themselves are interest rate sensitive
- Duration of plan is much lower

Lessons from case studies

- Cashflow matching
  - Important for near-term cashflows
  - Works well for traditional annuities, but think through other benefit structures
- Duration matching
  - Flexible to address non-traditional benefit structures
  - Short-term cashflows often compromised
- A well rounded de-risking strategy probably looks at both!

Duration matching vs cashflow matching
Sean Kurian, Conning

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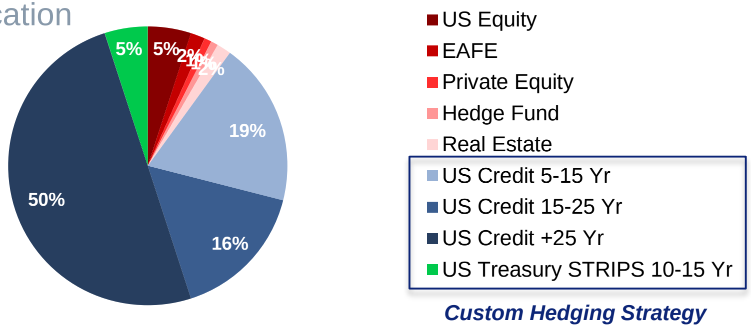
Target Strategy: Customization At 110% Funded

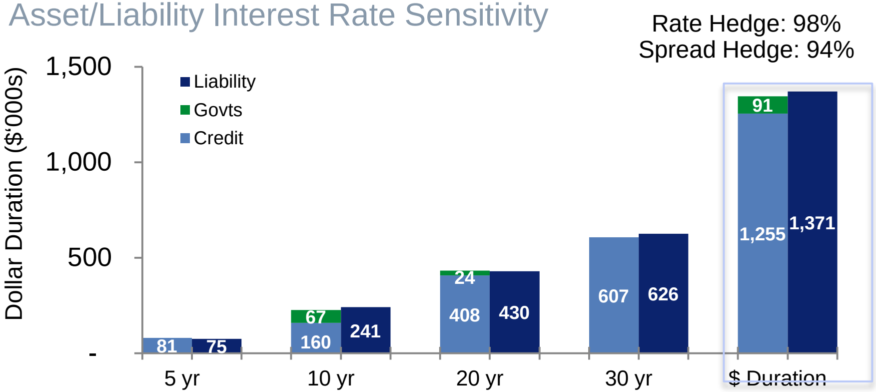
Target Strategy

Asset Allocation



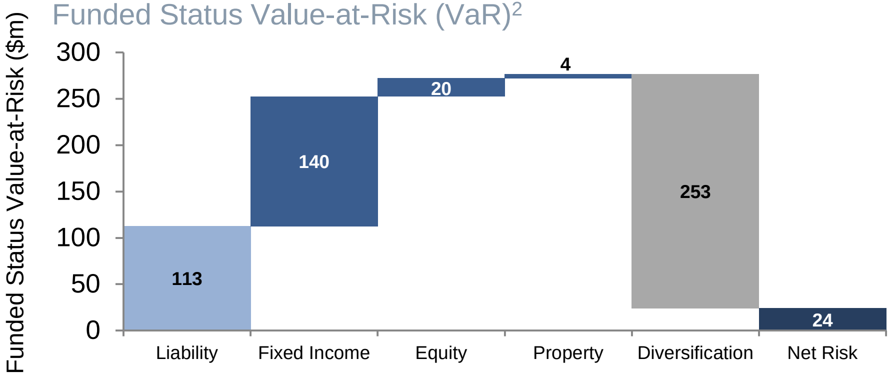
Duration Profile[1]

Asset/Liability Interest Rate Sensitivity



Risk Profile

Funded Status Value-at-Risk (VaR)[2]

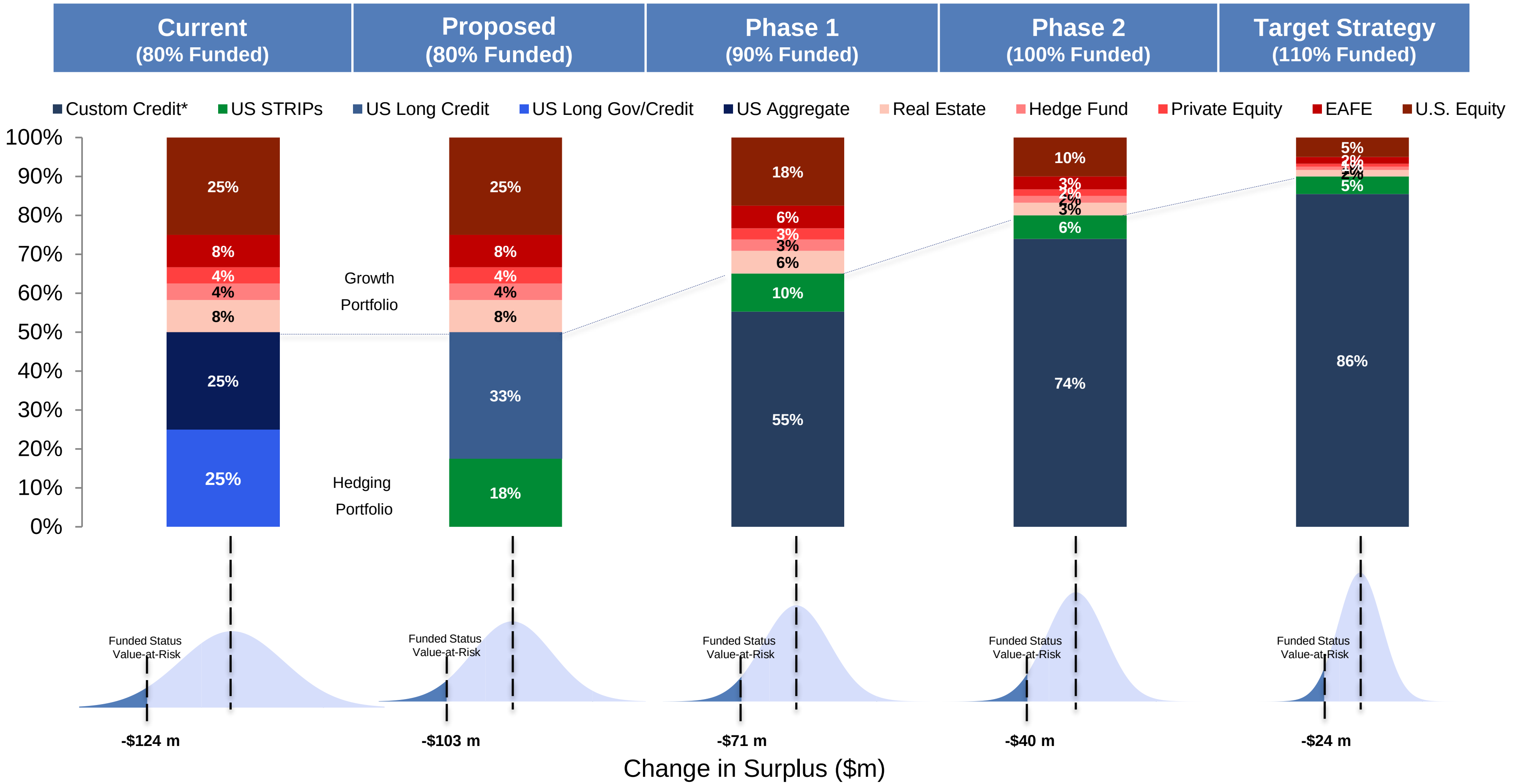


- Target LDI strategy reduces the Funded Status VaR to $24m.
- Customized hedging strategy matches the liability sensitivities, while improving spread hedge.

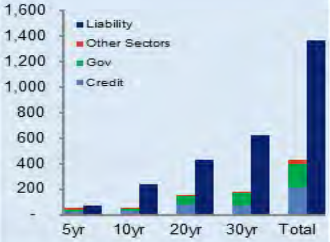
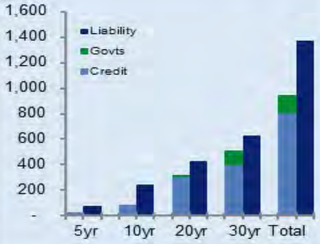
[1]Source: Bloomberg Index Services Limited. Used with permission.

[2]Hypothetical model results are generated using GEMS® Economic Scenario Generator. See LDI Hypothetical Model Disclosure at the end of the presentation for additional information. Represents sample pension plan analytics. Prepared by Conning, Inc., using pension plan data provided by the client and/or its consultant, for illustrative purposes only.

Strategic Glidepath: Customization Reduces VaR Before Target Strategy is Reached

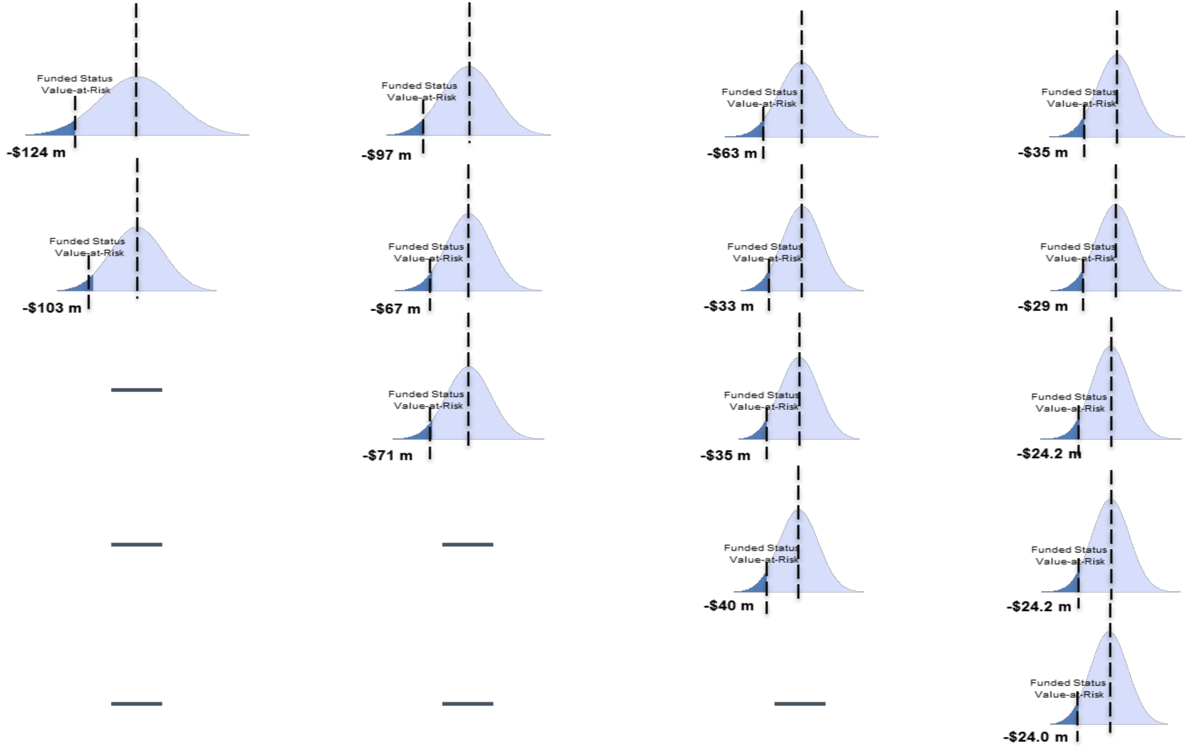


Hedge Portfolio: Key Metrics

	Current	Proposed	Phase 1	Phase 2	Target Strategy
Funded Status / Trigger	80%	80%	90%	100%	110%
Strategic Hedge Benchmark	50% US Aggregate Bond 50% US Long Gov/Credit	65% US Long Credit 35% UST STRIPs 25+ Yrs	10% US Credit 5-15 Yrs 15% US Credit 15-25 Yrs 60% US Credit 25+ Yrs 5% UST STRIPS 10-15 Yrs 10% UST STRIPS 25+ Yrs	18% US Credit 5-15 Yrs 15% US Credit 15-25 Yrs 60% US Credit 25+ Yrs 8% UST STRIPS 10-15 Yrs	21% US Credit 5-15 Yrs 18% US Credit 15-25 Yrs 56% US Credit 25+ Yrs 5% UST STRIPS 10-15 Yrs
Duration Positioning					
Hedge Portfolio Duration (years)	10.0	18.5	15.7	14.5	13.3
Hedge Ratio Target Range	25% - 35%	50% - 60%	70% - 80%	80% - 90%	95% - 100%
Credit Hedge Ratio Target	10% - 20%	25% - 35%	50% - 60%	70% - 80%	90% - 95%
Hedge Portfolio Yield*	3.30%	3.39%	3.88%	3.89%	3.90%

Funded Status VaR Matrix

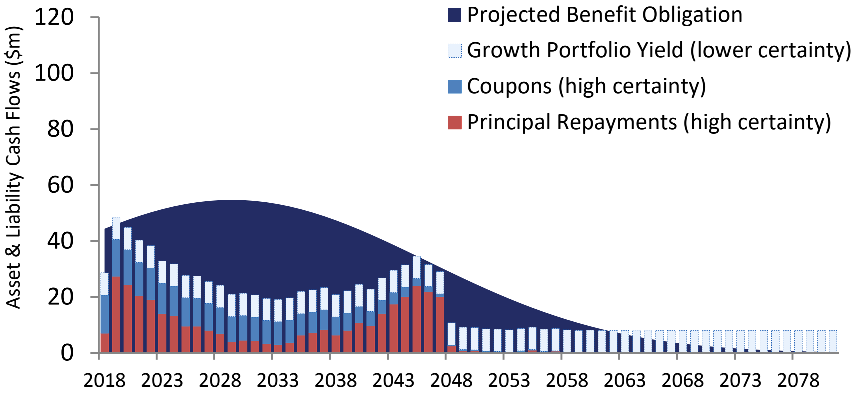
	80% Funded Assets/Hedging Assets: $800m/$400m	90% Funded Assets/Hedging Assets: $900m/$585m	100% Funded Assets/Hedging Assets: $1.0b/$800m	110% Funded Assets/Hedging Assets: $1.1b/$990m
Assume Current Hedging Portfolio (Portfolio Yield: 3.30%)	-$124 m	-$97 m	-$63 m	-$35 m
Assume Proposed Hedging Portfolio (Portfolio Yield: 3.39%)	-$103 m	-$67 m	-$33 m	-$29 m
Assume Phase 1 Hedging Portfolio (Portfolio Yield: 3.75%)	—	-$71 m	-$35 m	-$24.2 m
Assume Phase 2 Hedging Portfolio (Portfolio Yield: 3.90%)	—	—	-$40 m	-$24.2 m
Assume Target Hedging Portfolio (Portfolio Yield: 3.92%)	—	—	—	-$24.0 m



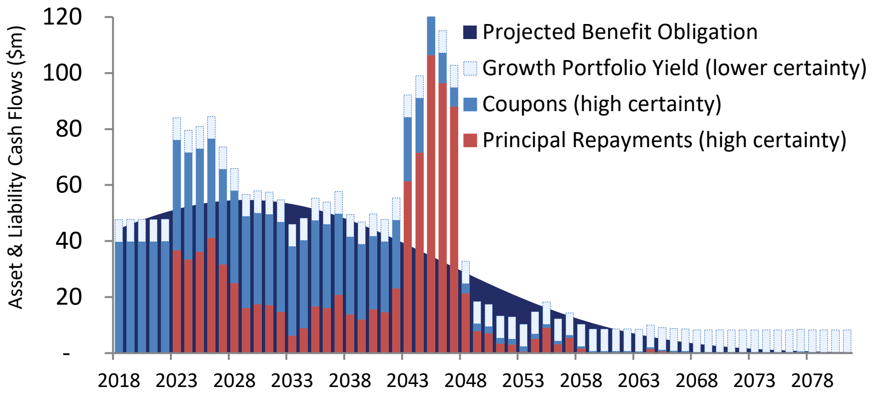
Change in Surplus ($m)

Cash Flow Comparison: Current vs Target Strategy

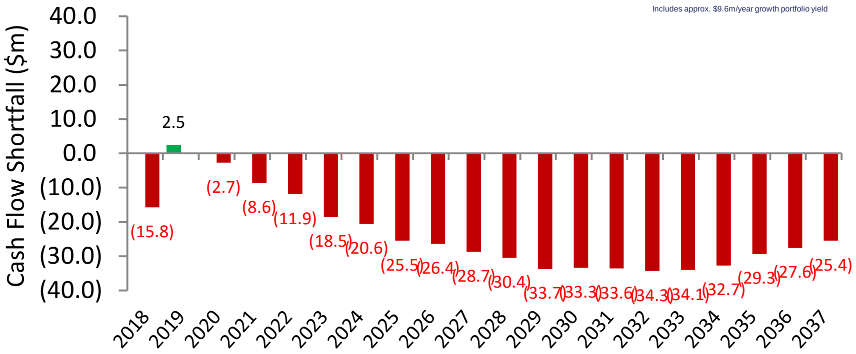
Current Strategy
Pension Plan Cash Flow Profile



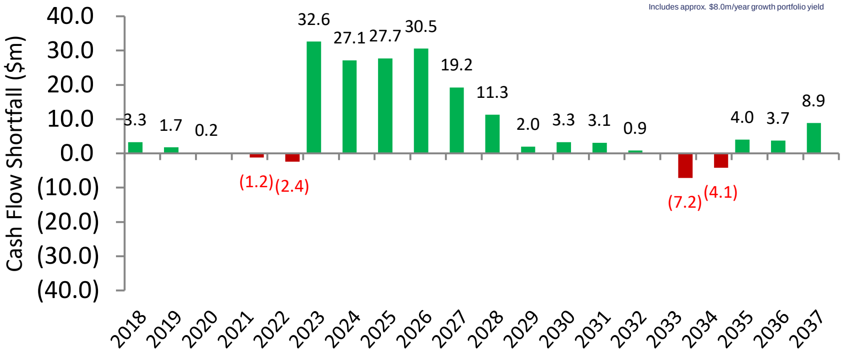
Target Strategy
Pension Plan Cash Flow Profile



Current Strategy
20-Year Cash Flow Projection (Asset/Liability)



Target Strategy
20-Year Cash Flow Projection (Asset/Liability)



- Questions

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