RISK-BASED STRATEGIES FOR PUBLIC PENSION PLANS

Public Pension Funding Forum

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Hypothetical Public Plan – Key Characteristics

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<th>Discounting Methodology</th>
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<tbody>
<tr>
<td></td>
<td>Assumed Rate of Return</td>
</tr>
<tr>
<td>Liability Value</td>
<td>$1,000,000,000</td>
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<tr>
<td>Single Rate Equivalent</td>
<td>7.65%</td>
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<tr>
<td>Funded Ratio</td>
<td>75.00%</td>
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Hypothetical Plan Payment Profile

Average liability maturity: 19 years
Cumulative payments total: $2.9 billion

Hypothetical Asset Allocation ($750 MM)

- Large Cap Equity: 29.0%
- Mid/ Small Cap Equity: 15.0%
- International Developed Equity: 12.5%
- Emerging Markets Equity: 12.5%
- Alternatives: 20.0%
- Core Fixed Income: 11.0%
The “Black Hole” Scenario

[Graph showing funded ratio and liability payments over time for different percentiles.]

- Liability Payments
- 10th Percentile Funded Ratio
- 20th Percentile Funded Ratio
- 30th Percentile Funded Ratio
- 40th Percentile Funded Ratio
- 50th Percentile Funded Ratio
- 60th Percentile Funded Ratio
- 70th Percentile Funded Ratio
- 80th Percentile Funded Ratio

Time (year): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Funded Ratio: 0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%, 110%
Liability Payments (millions): $0, $20, $40, $60, $80, $100, $120

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Simulating Hypothetical Plan Contributions

Simulation Assumptions

- Starting funded ratio is 75%, discounting the plan’s liability payments at 7.65%
- Starting size of investment portfolio is $750 million
- Starting liability present value is $1 billion
- The sum of all liability cash flows total $2.9 billion
- Assume contributions to increase the funded ratio from 75% to 100% over 10 years in 2.5% funded-ratio increments

<table>
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<tr>
<th>Expected PV of contributions:</th>
<th>$278 M</th>
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<tbody>
<tr>
<td>95th percentile PV:</td>
<td>$581 M</td>
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<tr>
<td>5th percentile PV:</td>
<td>$32 M</td>
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<tr>
<td>Range of contributions (95th – 5th percentile):</td>
<td>$548 M</td>
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<tr>
<td>Downside volatility (95th percentile - expected):</td>
<td>$303 M</td>
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</table>
Hypothetical 70% Equity / 30% Fixed Income Portfolio Volatility

Past performance is no guarantee of future results.

The equity portion of the portfolio is represented by the MSCI ACWI Index and the fixed income portion is represented by the Barclays Aggregate Bond Index. The data provided is not intended to represent any Nuveen portfolio or predict future results. Indices are unmanaged and are not available to direct investment. The information provided is for illustrative purposes only and has been obtained from sources believed to be reliable, but is not guaranteed for accuracy or completeness.

Sources: Bloomberg, Nuveen Asset Management.
Historical Portfolio Value – 70 / 30 Plan

Cumulative Value ($ MM)

Source: Nuveen Asset Management. Assumes monthly rebalancing to portfolio weights, and does not include contributions to or withdrawals from plan assets. The Hypothetical Public Plan portfolio is presented for illustrative purposes only and does not reflect a strategy or product currently or previously managed by Nuveen Asset Management, LLC (“NAM”). The hypothetical portfolio allocations, holdings and weights and other characteristics are subject to change without notice. There is no guarantee the hypothetical portfolio will meet its investment objectives. The reader should not assume that investment in the hypothetical portfolio will be profitable. This report contains no recommendation to buy or sell any specific securities and should not be considered investment advice of any kind. Please see Important Disclosures for further information regarding Hypothetical Public Plan assumptions.
Steps Toward Holistic Risk Solutions

**Advanced Step: Risk Overlay**

**Introductory Step: Individual Asset Classes**

- Volatility-Targeted U.S. Equities
- Volatility-Targeted International Developed Equities
- Volatility-Targeted Emerging Market Equities
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Sources: Bloomberg, Nuveen Asset Management.
Demographic-Based Asset Allocation

Benefit payments

- More predictable payments
- Easier to match with assets

- Less predictable payments
- Liability is equity diversifier

Asset allocation

- More predictable payments: More equity
- Less predictable payments: More fixed income

Benefit payments chart:
- Active
- Inactive

Asset allocation chart:
- Equity
- Fixed income

• More predictable payments
• Easier to match with assets

• Less predictable payments
• Liability is equity diversifier

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